GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

List of Programme Offered by Global PG College

Sr. No.	Name of The Programme	Type of Programme	Syllabus
1	Bachelor of Arts	Undergraduate	View Document
2	Bachelor of Commerce	Undergraduate	View Document
3	Bachelor of Science	Undergraduate	View Document
4	Master of Arts (Hindi)	Postgraduate	View Document
5	Master of Arts (Geography)	Postgraduate	View Document
6	Master of Science (Chemistry)	Postgraduate	View Document
7	Master of Science (Mathematics)	Postgraduate	View Document
8	Master of Science (Physics)	Postgraduate	View Document

GLOBAL P.G. COLLEGE

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Programme Syllabus of

Bachelor of Arts (B. A.)

Duration – 3 Years

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Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn how to explain their ideas and work in a clear way, by writing and speaking, so that teachers, classmates, and other people can understand.

PEO2: Students will learn how to do research and find out new things, so they can work on their own and add new knowledge in science.

PEO3: Students will join knowledge from different subjects together to solve big and difficult problems, and to find good and complete solutions.

PEO4: Students will clearly understand their chosen subjects, useful topics, which will help them in higher studies or getting jobs.

PEO5: Students will learn practical skills through activities, so that what they read in books can be used in real life and work.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will learn how to study and research social, cultural, and community issues by collecting information, understanding it, and finding useful conclusions.

PO2: Students will express their ideas in a clear, logical, and respectful manner in both oral and written forms.

PO3: Students will respect diversity, equality, and human values. They will develop a caring and inclusive attitude.

PO4: Students will learn to solve problems using logic and knowledge. They will apply solutions to real-life situations.

PO5: Students will use their knowledge for society and nation. They will contribute to social service and development.

PSO1: Students will understand subjects like history, politics, literature, and society. This will help them connect past knowledge with present.

PSO2: Students will collect information and analyze it carefully. They will make useful conclusions from their study.

PSO3: Students will develop awareness as responsible citizens. They will understand duties towards family, society, and nation.

PSO4: Students will connect classroom knowledge with real-world situations. They will apply learning in practical life

PSO5: Students will respect different cultures, languages, and traditions. They will promote peace and harmony in society.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

University of Rajasthan
Jaipur

SYLLABUS

B.A. Part-I

Examination – 2025

Dy. Registrar
(Academic)

CONTENTS

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Compulsory Subject (Four) :		Page No.
1.	सामान्य हिन्दी (General Hindi)	3-4
2.	General English (Essential Language Skills)	5-6
3.	Environmental Studies	7-10
4.	Elementary Computer Application	11-12
5.	प्रारम्भिक हिन्दी (Elementary Hindi) (In Lieu of Gen. Hindi)	13
	Optional Subjects (Any Three of the following subject to the restriction as mentioned in O. 203-I)	
1.	English Literature	14-17
2.	Hindi Sahitya	18-20
3.	Urdu	21-22
4.	Persian	23-24
5.	Sanskrit	25-30
6.	Philosophy	31-33
7.	History	34-39
8.	Political Science	40-42
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15.	Garment Production & Export Management	72-74
16.	Investigative Bio-Technology	75-77
17.	Mathematics	78-81
18.	Economics	82-83
19.	Geography	84-87
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21.	Applied Statistics	92-94
22.	Psychology	95-98
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26.	Anthropology	107-108
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28.	Physical Education	111-113
29.	Indian Heritage in Rural Handicrafts	114-115
30.	Computer Application	116-117

N.B. : 1. Candidates must Pass separately in each of the test/theory and Practical (wherever prescribed)

2. Common papers in the subjects of Statistics, Mathematics, Economics, Geography and Psychology will be set both in the Faculties of Social Science and Science. The allocation of marks will however be different as mentioned in the booklet of syllabus.

Raj (Toi)

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बी.ए./बी.एससी./बी.कॉम./~~ऑनर्स~~–प्रथम वर्ष
(कला, विज्ञान एवं वाणिज्य संकाय)
सामान्य हिन्दी

पूर्णांक 100 न्यूनतम उत्तीर्णांक 36

नोट : 36 से कम अंक लाने पर छात्रों को उत्तीर्ण नहीं किया जायेगा। इस प्रश्नपत्र में प्राप्त अंकों को श्रेणी निर्धारण हेतु नहीं जोड़ा जायेगा।

अंक विभाजन – प्रश्नपत्र में दो भाग होंगे – 1. साहित्य खण्ड एवं 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे – गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित है।

अंक विभाजन **50 अंक**

- दो व्याख्या पद्य से (प्रत्येक में विकल्प देना है) 5 x 2 = 10 अंक
- दो व्याख्या गद्य से (प्रत्येक में विकल्प देना है) 5 x 2 = 10 अंक
- आलोचनात्मक प्रश्न पद्य से (विकल्प देना है) $7\frac{1}{2}$ x 2 = 15 अंक
- आलोचनात्मक प्रश्न गद्य से (विकल्प देना है) $7\frac{1}{2}$ x 2 = 15 अंक

क. साहित्य खण्ड – गद्य–पद्य की निर्धारित रचनाएं

गद्य भाग –

1.	कहानी	–	हार की जीत – सुदर्शन
2.	निबंध	–	नाखून क्यों बढ़ते हैं – आ. हजारी प्रसाद द्विवेदी
3.	संस्मरण	–	असीम औ' ससीम के बीच – अज्ञेय
4.	रेखाचित्र	–	गौरा – महादेवी वर्मा
5.	व्यंग्य	–	प्रेमचंद के फटे जूते – हरिशंकर परसाई
6.	रिपोर्ताज	–	स्टिल लाइफ – फणीश्वरनाथ रेणु
7.	साध्य–साधन एकत्व	–	नन्दकिशोर आचार्य
8.	पर्यावरणीय निबंध	–	आज भी खरे हैं तालाब – अनुपम मिश्र

ख. पद्य भाग

1.	कबीर	–	कबीर ग्रंथावली, संपादक – श्यामसुंदर दास
			सुमिरन कौ अंग – साखी संख्या – 17, 21, 27, 29 = 4
			विरह कौ अंग – साखी संख्या – 3, 5, 20, 29 = 4
			चितावणी कौ अंग – साखी संख्या – 2, 8, 12, 18 4
2.	सूरदास	–	सूरसागर सार, संपादक – डॉ. धीरेन्द्र वर्मा
		–	विनय भक्ति पद – 21, 33
		–	यशोदा हरि पालने झुलावै, खेलत में को काको गुसैंया
			मैया मोहि दाऊ बहुत खिझायों
			आये योग सिखावन पाण्डे = 6 पद
3.	तुलसीदास	–	रामचरित मानस – लंका काण्ड – (रावनुरथी विरथ रघुवीरा.....
			..... निज–निज प्रभुआन।
4.	मीरां	–	मीरां पदावली – सं0 शंभुसिंह मनोहर
			मन थें परस हरि के चरण (01), थारो रूप देख्यां अटकी (09)
			मो हे रावरे के रंग की राँची (19) मैं तो गिरिधर के घर जाऊ(20)
			म्हाँ गिरिधर के रंग राती वहाँ (26)
5.	रहीम	–	रहीम ग्रंथावली, सं0 – विद्यानिवास मिश्र तथा डॉ. गोविन्द रजनीश
			दोहा संख्या – 186, 191, 211, 212, 214, 218, 219, 220, 223,
			224 = 10 दोहे
6.	मैथिलीशरण गुप्त	–	साकेत – कैकेयी अनुताप
			(तदनन्तर बैठी सभा उटज के आगे ..... विनय आज यह माता)
7.	निराला	–	वह तोड़ती पत्थर, भिक्षुक
8.	अज्ञेय	–	भीतर जागा दाता
9.	नागार्जुन	–	कालिदास के प्रति

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खण्ड 2. व्याकरण/व्यावहारिक हिन्दी – **50 अंक**

1. निबन्ध लेखन	–	शब्द सीमा – 300 शब्द	8 अंक
2. कार्यालयी पत्र	–	शासकीय, अर्द्धशासकीय, कार्यालय ज्ञापन, कार्यालय आदेश, अधिसूचना, पृष्ठांकन	$3\frac{1}{2}x2$ = 7 अंक
3. संक्षेपण	–		5 अंक
4. पल्लवन	–		5 अंक
5. शब्द निर्माण	–	उपसर्ग, प्रत्यय, संधि, समास	5 अंक
6. शब्द के प्रकार	–	संज्ञा, सर्वनाम, क्रिया एवं क्रिया विशेषण	5 अंक
7. शब्द शुद्धि एवं वाक्य शुद्धि			5 अंक
8. मुहावरे एवं लोकोक्ति			5 अंक
9. पारिभाषिक शब्दावली (अंग्रेजी के 5 पारिभाषिक शब्दों के हिन्दी रूप)			5 अंक

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2. GENERAL ENGLISH

Duration: 3 hrs. **Max. Marks: 100**

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives:

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation (sounds and word stress)
2. Reinforcing selected components of grammar and usage
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing. CVs and job applications.

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics and Translation **(20 marks)**
(10 periods)

I Phonetic Symbols and Transcription of Words	(05)
III Translation of 5 Simple sentences from Hindi to English	(05)
from English to Hindi	(05)
IV Translation of 05 Words from Hindi to English	($2^{1/2}$)
from English to Hindi	($2^{1/2}$)

Unit B: Grammar and Usage **(25 marks)**
(10 periods)

I Elements of a Sentence (05)

II Transformation of Sentences (05)

a. Direct and Indirect Narration
b. Active and Passive Voice

II Modals	(05)
III Tense	(05)
IV Punctuation of a Short Passage with 10 Punctuation Marks (As discussed in Quirk and Greenbaum)	(05)

Unit C: Comprehension **(25 marks)**

Following Essays and Stories in *Essential Language Skills* revised edition compiled by Macmillan for University of Rajasthan General English B. A. /B. Com./B. Sc.

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Candidates will be required to answer 5 questions out of ten questions from the prescribed texts. Each question will be of two (2) marks. (10)

Sujata Bhatt	Voice of the Unwanted Girl
Ruskin Bond	Night Train for Deoli
M.K. Gandhi	The Birth of Khadi
J.L. Nehru	A Tryst with Destiny
A.P.J. Abdul Kalam	Vision for 2020

The candidates will be required to answer 5 questions from an unseen passage.

(10)

One vocabulary question of 10 words from the given passage.

(5)

Unit D: Compositional Skills **(30 marks)**
(15 periods)

I Letters-Formal and Informal	(10)
II CV's Resume and Job Applications and Report	(10)
III Paragraph Writing	(10)

Recommended Reading:

Sasikumar, V., Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation Books. 2005.

Sawhney, Panja and Verma eds. English At the Workplace, Macmillan 2003.

Singh, R.P. Professional Communication. OUP. 2004

Judith Leigh. CVs and Job Applications. OUP. 2004

Arthur Waldhorn and Arthur Zeiger, English Made Simple. Upa and Co.

Gunashekar ed. A Foundation English Course for Undergraduates. Book I, CIEFL, Hyderabad.

Quirk and Greenbaum: A University Grammar of English Longman, 1973

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3. ENVIRONMENTAL STUDIES

B.A. Part-I

Scheme of examination

Time	Min Marks	Max.Marks
3 hrs	36	100

This paper will contain 100 multiple choice questions. Each question will carry 1 mark. Students should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

Unit.1: The Multidisciplinary nature of environmental studies

Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

a. Natural resources and associated problems, Classification of resources: renewable resources,non renewable resources, classes of earth resources, resources regions: Definition and criteria, resource conservation.
b. Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problems.
d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.
f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
g. Land resources: Land as a resource, Land degradation man induced Landslides, soil erosion and desertification.

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- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems, Concepts, Structure, Functions and Types

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types characteristics features, structure and function of the following ecosystem:

a. Forest ecosystem, Tropical Temperate and Alpine Ecosystem

b. Grassland ecosystem and Their Types

c. Desert ecosystem with emphasis on Thar Desert

d. Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries) and Wet Lands

Unit 4: Biodiversity and its conservation

- Introduction –Definition, genetic, species and ecosystem diversity
- Biogeographically classification of India
- Value of biodiversity :consumptive use, productive use, social ethical., aesthetic and option values
- Biodiversity at global, National and local level
- India as a mega-diversity nation
- Hot-sport of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered, Threatened and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
- Red Data Book

Unit 5 : Environmental Pollution and Control Measures

Definition

- Causes, effects and control measures of:

a) Air Pollution

b) Water Pollution

c) Soil Pollution

d) Marine Pollution

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e) Noise Pollution

f) Thermal Pollution

g) Nuclear Hazards

- Solid waste management" Causes, effects and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods earthquake, cyclone and landslides

Unit 6 : Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain ozone layer depletion, nuclear accidents and holocaust. Case studies
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act.
- Air (Prevention and Control of Pollution)Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations
- Population explosion-Family Welfare Programme
- Environment and Human health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case Studies

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Suggested Readings:-

1. Diwan A.P. and Arora D.K.1995. Human Ecology Anmol Publication Pvt.Ltd.,New Delhi.
2. Dubey, R.M.1992. Human Ecology and Environmental Education,Chaugh Publications,Allahabad.
3. Goudie,Andrew.The Human Impact.
4. Husain Maxia.1994 Human Geography,Rawat Publication,Jaipur.
5. Johnston, R.J.Ed.1986 Dictionary of Human geography,National Publication,New Delhi.
6. Malik,S.L.and Bhattacharya D.K.1986. Aspects of Human Ecology,Northern Book Center,New Delhi.
7. Mishra,R.P and Bhooshan,B.S.1979.Human Settlements in Asia.Public,Polices and programmes Haritage publisher,New Delhi.
8. Nathawat, G.S.1985. Human Ecology,An Indian perspective,Indian Human Ecology Council,Jaipur.
9. Russel, Bartrand, 1976.Impact of Science of society Unwin,Publisher,Indian. (paper back).
10. Sinha Rajiv, 1996.Gloobal Biodiversity Ina.,Shri publication,Jaipur.
11. Sinha Rajiv K., 1994. Development without Desertrction 14.Environmentalist,Jaipur. Sinha Rajiv K., 1996.Environmental Crises and Human at Risk,In A Shri Publication,Jaipur.
12. Smith, Dlanne, 1984.Urban Ecology,George Allen,London.
13. Swarnkar, R.C.1985.Indian Tribes.Printwell publisher,Jaipur.
14. Tivy,Joy and O'Hugegreg,1985.Human Impact on the Ecosystem Edinburgh George Allen Boyd.
16. United Nations Development Report, 1996.Human Development Report, 1996.Oxford University Press,Delhi.
17. Vannathony & Rogers Paul, 1974. Human Ecology and World Development,Flehum Press,New York.

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Elementary Computer Applications

Maximum Marks- 100 (Main University Examinations)
Theory : Max. Marks -60
Practical : Max. Marks- 40

Each Candidate has to pass in Theory and Practical Examinations separately.

Question paper for Elementary Computer Applications, (Compulsory paper-common for B.A. / B.Sc./ B.Com. Part-I) be so set that it has 120 multiple choice questions (Bilingual) of ½ marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit – I

Introduction to information technology : Evolution and generation of computers, type of computers, micro , mini , mainframe and super computer. Architecture of a computer system : CPU , ALU, Memory (Ram, Rom families)cache memory, input /output devices, pointing devices.

Concept of Operating system, need types of operating systems. batch. single user, multi – processing , distributed and timeshared operating systems, introduction of Unix. Linux. Windows, Window NT. Programming languages Low level and high level languages, generation of languages , 3 GL and 4 GL languages .Graphic User Interfaces.

Unit – II

Word Processing tool : Introduction , Creating, Saving, Copy, Move and Delete. Checking Spelling and Grammer. Page Layout. interface, toolbars, ruler, menus keyboard shortcut , editing. Text Formatting, insert headers and footers. Bullets and Numbering. Find and Replace etc. Insert Table and Picture , Macro, Mail Merge.

Power Point : Creating and viewing a presentation, managing slide shows navigating through a presentation using hyperlinks, advanced navigation with action setting and action buttons. Organizing formats with Master Slides applying and modifying designs adding graphics , multimedia and special effects.

Unit - III

Electronic Spreadsheet : Worksheet types of create and open a worksheet. Entering data text numbers and formula in a worksheet inserting and deleting cells, cell formatting, inserting rows and columns in a worksheet formatting worksheets. Using various formula and inbuilt function. Update worksheet using special tools like spell check and auto correct setup the page

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find margins of worksheets for printing, Format the data in the worksheet globally or selectively creating charts, Enhance worksheets using charts, multiple worksheets-concepts

Unit – IV

The Internet - History and Functions of the Internet, Working with Internet, Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names, Uses of Internet, Search for Information, Email, Chatting, Instant messenger services, News Group, Teleconferencing, Video Conferencing, E-Commerce and M-Commerce

Manage an E-mail Account, E-mail Address, configure E-mail Account, log to an E-mail, Receive E-mail, Sending mails, sending files an attachments and Address Book; Downloading Files, online form filling, E-Services - E-Banking and E-Learning.

Unit - V

Social, Ethical and Legal Matters - Effects on the way we: Work Socialise, Operate in other areas Cyber crime, Prevention of crime, Cyber law: Indian IT Act, Intellectual property, Software piracy, Copyright and Patent, Software licensing, Proprietary software, Free and Open source software.

Network Security - Risk assessment and security measures, Assets and types (data, applications, system and network), Security threats and attacks (passive, active): types and effects (e.g. Identity theft, denial of services, computer virus etc.), Security issues and security measures (Firewalls encryption/decryption), Prevention.

Question Paper pattern for Main University Practical Examination *Max Marks: 40*

Practical

The practical exercises will be designed to help in the understanding of concepts of computer and the utilization in the areas outlined in the theory syllabus. The emphasis should be on practical usage rather than on theoretical concepts only.

The practical examination scheme should be as follows

- Three Practical Exercise (including Attendance & Record performance) 30 marks
  - Operating system
  - MS Word
  - MS Excel
  - MS Power Point
  - Internet
- Viva voce 10 marks

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5 बी.ए. प्रथम वर्ष : प्रारम्भिक हिन्दी

पूर्णांक : 100 अवधि : 3 घण्टे

अंकों का विभाजन

1. पुस्तकों पर आधारित प्रश्न — 50 अंक
2. व्याकरण से संबंधित प्रश्न — 24 अंक
3. रचना से संबंधित प्रश्न — 26 अंक
   (क) लोकोक्तियाँ मुहावरे
   (ख) पत्र लेखन अथवा निबंध

पाठ्यक्रम

1. गद्य संग्रह
2. व्याकरण : शब्द विचार, वाक्य विन्यास, वाक्य खण्ड, पद क्रम का ज्ञान तथा इनमें होने वाली सामान्य त्रुटियों का ज्ञान।
3. (क) मुहावरों एवं लोकोक्तियों का प्रयोग, वाक्यों में रिक्त स्थानों की पूर्ति, समान दिखने वाले शब्दों का अर्थ भेद अथवा वाक्यों में प्रयोग
   (ख) पत्र लेखन अथवा निबंध

पाठ्य पुस्तकें

1. गद्य–संग्रह–राष्ट्रीय गौरव के चिन्ह– डॉ. हरिकृष्ण देवसरे
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली

व्याकरण एवं रचना

1. आधुनिक हिन्दी व्याकरण तथा रचना – लेखक कृष्ण विकल
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली
2. सुबोध व्याकरण एवं रचना–सम्पादक–व्यथित हृदय–संशोधनकर्ता–डॉ.अम्बा प्रसाद सुमन
   प्रकाशक – श्रीराम मेहरा एण्ड कम्पनी, आगरा

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OPTIONAL SUBJECTS

1. ENGLISH LITERATURE

The Syllabus aims at achieving the following objectives:

1. Interpretation and appreciation of selected texts from the genres of poetry, drama, prose and fiction.
2. Strengthening skills of note making, summarizing and dialogue writing.
3. Understanding texts with specific reference to genres, forms and literary terms.

Paper I: Poetry and Drama

Maximum Marks: 100

Duration: 3 hrs **Min. Pass Marks: 36**

Question No. 1: References to Context from unit A, B &C.

Candidate will be required to explain **four (4)** passages of Reference to Context out of **Eight (8)** of five marks each, with a total of **20 Marks.**

Knowledge of Literary Terms and Poetry Appreciation and usages of drama is required.

Question No. 2 will also be compulsory. The student will be required to attempt 5 questions out of 10, to be answered in about 5 lines each. Each question will carry 4 marks to a total of **20 marks.**

The other 3 questions will be Essay-type questions of **20 marks** each, one from each section with internal choice.

SECTION A

W. Shakespeare:
Shall I Compare Thee
Not Marble, nor the Gilded Monuments
Remembrance
J. Donne: Death be not Proud.
Herbert: Pulley
Andrew Marvell: To His Coy Mistress

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J. Milton:

On His Blindness

On His Twenty Third Birthday

J. Dryden: A Song for St. Cecilia's Day

Reference Books :

Strings of Gold Part I Ed. Jasbir Jain (Macmillan)

The Golden Treasury by Francis Turner Palgrave (OUP)

Poet's Pen: An Anthology of English Verse Paperback – by Dustoor P.E. (Author), Homai P.Dustoor (Author) (Oxford University Press)

The New Oxford Book of English Verse, 1250-1950 (Oxford Books of Verse) by Helen Gardner (Editor)

SECTION B

The following poems from *Strings of Gold* Part I Ed. Jasbir Jain (Macmillan)

Kabir

It is Needless to Ask a Saint the Caste to which he belongs.

Rabindra Nath Tagore

Where The Mind is Without Fear

Toru Dutt

The Lotus

Our Casuarina Tree

Sarojini Naidu

Indian Weavers

Song of Radha, The Milkmaid

Reference Books :-

Strings of Gold Part I Ed. Jasbir Jain (Macmillan)

Indian Writing in English by K.R.Srinivasa Iyengar .Sterling Publishers Pvt.Ltd

A History of Indian English Literature by M.K.Naik Sahitya Akademi

The Golden Treasury of Indo-Anglian Poetry, 1828-1965 by Vinayak Krishna Gokak (Editor) Sahitya Akademi

Kabir (Penguin Classics) by Vinay Dharwadker

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SECTION C

W. Shakespeare: *As You Like It*

Reference Books :-

As You Like It (The Pelican Shakespeare) by William Shakespeare (Author), Frances E. Dolan (Editor, Introduction), Stephen Orgel

History of English Literature by Hudson

Pelican Guide to English Literature by Boris Ford ed:

Paper II: Prose and Fiction

Maximum Marks: 100

Duration: 3 hrs **Min. Pass Marks: 36**

Question No. 1: References to Context from unit A & B only.

Candidate will be required to explain **four (4)** passages of Reference to Context out of **Eight (8)** of five marks each, with a total of **20 Marks.**

Question No. 2: will also be compulsory. The student will be required to attempt 5 questions out of 10, to be answered in about 5 lines each. Each question will carry 4 marks to a total of **20 marks.**

The other 3 questions will be Essay – type questions of **20 marks** each, one from each section with internal choice.

SECTION A

Bacon	:	Of Studies
B. Russell	:	Knowledge and Wisdom
Leigh Hunt	:	On Getting Up on Cold Mornings
M.K. Gandhi	:	Fearlessness
Lucas	:	Third Thought
S. Radhakrishnan	:	Democracy
H. Belloc	:	On Educational Reform

Reference Books :-

English Prose Selections (O.U.P.) ed. Dr. S.S. Deo et al.

The Art of the Essayist By Lockitt, C. H. (ed.)

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SECTION B

K. Mansfield	:	A Cup of Tea
R. Tagore	:	Living or Dead
H.H. Munro (Saki)	:	The Open Window
R.K. Narayan	:	An Astrologer's Day
E. Hemingway	:	Old Man at the Bridge
George Orwell	:	*Animal Farm*

Reference Books :

Popular Short Stories ed. By Board of Editors (O.U.P.)

Malgudi Days by R. K. Narayan Indian Thought Publications

SECTION C

1. Prose Appreciation
2. Formal Communication
3. Report Writing
4. Presentations Skills

Reference Books :-

Mohan, Krishna., Raman, Meenakshi. Effective English Communication. Tata McGraw Hill, New Delhi, 2009.

Vandana R. Singh: *The Written Word* (O.U.P.)

The Handbook of Creative Writing. Ed. Steven Earnshaw, Edinburgh University Press, London, 2007.

Pal, Rajendra & Korlahalli, J.S. Essentials of Business Communication. New Delhi: Sultan Chand & Sons: New Delhi, 2005.

English at the Workplace eds. Sawhney Panja and Varma (Macmillan)

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बी.ए. पास/~~ऑनर्स~~ प्रथम वर्ष – हिन्दी साहित्य
प्रथम प्रश्नपत्र – आदिकाव्य और भक्तिकाल

पूर्णांक 100 न्यूनतम उत्तीर्णांक 36

खण्ड–क

1. ढोला मारू रा दोहा – सं0 – नरोत्तम दास स्वामी, सूर्यकरण पारीक रामसिंह
दोहा संख्या– 8,9,10,19,20,21,37,38,40,49,52,61,69,112,116 = 15

2. विद्यापति – सं0 शिवप्रसाद सिंह – विद्यापति पदावली
   - नन्दक नन्दन कदम्बेरि तरुतरे
   - सुन जसिया ऊबन बजाऊ बिपिन बसिया
   - विरह व्याकुल मृदुल तरुवर
   - कुंज भवन से चल भेलि हे
   - सखि हे कतऊं न देख मधाई

3. नरपति नाल्ह – बीसलदेव रास – संपादक – माता प्रसाद गुप्त – 1,3,4,6,7,8,9,10

4. कबीरदास – कबीर ग्रंथावली, संपादक – श्यामसुंदर दास
   साखी – 1. गुरुदेव को अंग
   2. मन को अंग
   पद – 1. मन रे जागत रहियो माई 23
   2. पांडे कौन कुमति तोहि लागी 39
   3. पंडित वाद वदन्ते झूठा 30
   4. मन रे हरि भज हरि भज भाई 102
   5. पंडित होइ सुपरहि दिखाई 159

5. सूरदास – भ्रमरगीत सार, संपादक – रामचन्द्र शुक्ल
   - ऊधो अंखियां अति अनुरागी
   - आयो घोस बड़ो व्यापारी
   - ऊधो मन नाहीं दस–बीस
   - निर्गुण कौन देस को वासी
   - हमारे हरि हारिल की लकरी
   - उर में माखन चोर अड़े
   - मधुकर श्याम हमारे चोर
   - ऊधो भली करी ब्रज आए
   - बिन गोपाल बैरिन भई कुंजैं
   - लखियत कालिन्दी अति कारी

6. तुलसीदास – विनयपत्रिका
   1. केशव कहि न जाइ का कहिए
   2. मोहि मूढ़ मन बहुत बिगोयो
   3. मन पछितैयै अवसर बीते
   – रामचरितमानस (बालकाण्ड) (दोहा संख्या 229 से 234)
   कंकन किंकिनि नूपुर धुनि सुनि.....निरखि–निरखि रघुवीर छत्रि, बाढ़हि प्रीति.....।

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7. जायसी — जायसी ग्रंथावली, संपादक — रामचन्द्र शुक्ल
- सिंहलद्वीप वर्णन खण्ड, प्रथम 05 दोहे तक
- नागमति वियोग खण्ड, प्रथम 05 दोहे तक

8. मीरां — मीरां पदावली – शंभुसिंह मनोहर – निपट बंकट छब अटकू (10)
माई म्हाँ गोविन्द गुण गास्यां (31), राणाजी थे जहर दियां म्हे (38)
मीरां मगन भई हरि के गुण गाम (41), जोगिया जी निस दिन जोऊं बाट (44)
हरि बिन कूँण गती (52), सखी म्हारी नींद नसानी हो (87)

9. रसखान — रसखान रचनावली – संपादक – विद्यानिवास मिश्र
1,2,4,6,8,11,14,15

खण्ड–ख
आदिकाल और भक्तिकाल की सामान्य प्रवृत्तियाँ

अंक विभाजन —

कुल चार व्याख्याएं (विकल्प देय) 10 x 4 = 40
एक कवि से एक ही व्याख्या हो

तीन आलोचनात्मक प्रश्न–3 (विकल्प देय) 15 x 3 = 45
(निर्धारित कवियों पर)

एक प्रश्न टिप्पणीपरक – दो विषयों पर
संक्षिप्त टिप्पणियाँ (विकल्प देय)
आदिकाल और भक्तिकाल की प्रवृतियों से संबंधित $7\frac{1}{2} + 7\frac{1}{2} = 15$

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(20)

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द्वितीय प्रश्न पत्र – उपन्यास और कहानी

पूर्णांक 100 न्यूनतम उत्तीर्णांक 36

खण्ड – अ

उपन्यास – ग्लोबल गांव के देवता – रणेन्द्र

खण्ड – ब

कहानी

1. चन्द्रधर शर्मा गुलेरी	–	उसने कहा था
2. प्रेमचंद	–	पूस की रात
3. जय शंकर प्रसाद	–	पुरस्कार
4. जैनेन्द्र	–	पाजेब
5. यशपाल	–	परदा
6. मोहन राकेश	–	आर्द्रा
7. मन्नू भण्डारी	–	यही सच हैं
8. रांगेय राघव	–	गदल
9. निर्मल वर्मा	–	पिक्चर पोस्टकार्ड
10. कृष्णा सोबती	–	सिक्का बदल गया

खण्ड – स

हिन्दी उपन्यास व कहानी स्वरूप और परिभाषा
हिन्दी उपन्यास व हिन्दी कहानी का विकास

अंक विभाजन

कुल चार व्याख्याएं (दो उपन्यास तथा दो कहानियों से) एक कहानी से एक व्याख्या (विकल्प देय)	10 x 4 = 40 अंक
कुल चार निबन्धात्मक प्रश्न	15 x 4 = 60 अंक
एक प्रश्न उपन्यास से संबंधित (विकल्प देय)	15
एक प्रश्न कहानियों से संबंधित (विकल्प देय)	15
एक प्रश्न खण्ड 'स' में निर्धारित पाठ्यवस्तु से संबंधित (विकल्प देय)	15
एक प्रश्न टिप्पणी परक – 2 विषयों पर टिप्पणियाँ (विकल्प देय)	$7\frac{1}{2} + 7\frac{1}{2} = 15$

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3. URDU

B.A. Part-I

Paper I : Prose and Drama

Min. Pass Marks 72

Max.Marks 100 3 Hrs. Duration Min.Pass Marks 36

Books Prescribed:

1. Meyare Adab Hissaye Nasr-Published by Educational Book House, Aligarh (U.P)
2. Darwaza Khol Do-by Krishna Chandar

Division of Marks:

Unit I	Ten short answer type questions.	Marks 20
Unit II	Explanation of Two Out of Three Texts.	Marks 20
Unit III	Critical Appreciation of a Prose & Poetry writer with Internal Choice	Marks 20
Unit IV	Critical Appreciation of Prescribed Drama with Internal Choice	Marks 20
Unit V	Salient Features of Urdu Drama/Technique Or Summary of A Prose Lesson	Marks 20

Total : Marks 100

Note: Attempt at least one question from each unit. All the short answer type questions of unit I are compulsory.

Paper II : Poetry and Rhetorics

Max.Marks 100 3 Hrs. Duration Min.Pass Marks 36

Books prescribed:

1. Shehpare (Nazm) Published by Idare Nashr-O-Ishat,Allahabad University-Allahabad, (1991 edition)

   The following are prescribed from the book:

   (a) Ghazaliyat : Meer, Atish & Ghalib

   (b) Nazmen: Iqbal, Nazeer & Josh.

2. Jadeed Idemul Balaghat by Abdul Majeed Khan

   The following Rhetorics (Sanaya) Only:

   1. Tazad, 2. Laf o Nashr, 3. Talmeeh, 4. Husne Taleel, 5. Mubalgha, 6. Tashbeeh, 7. Istiyara, 8. Marratun Nazeer, 9. Siyaqatuladad, 10. Tahseequs Sifat, 11. Iham, 12. Majaz, 13. Tajahule Arifana, 14. Ishateqaq.

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Division of Marks:

Unit I	Ten short answer type question.	Marks 20
Unit II	Explanation of Two out of Three Passages of Ghazal & Nazm.	Marks 20
Unit III	Appreciation of Ghazal Writer with Internal Choice	Marks 20
Unit IV	Appreciation of Nazm Writer with Internal Choice	Marks 20
Unit V	Meaning and Definition of Four Rhetorics with Internal Choice	Marks 20

Total : Marks 100

Note: Attempt at least one question from each unit. All the short answer type questions of unit I are compulsory.

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4. PERSIAN

B.A. Part-I 2020

Paper I : PROSE

Scheme:

Max. Marks 100 | 3 Hrs. Duration | Min. Pass Marks 36

Books Prescribed:

1. Farsi Wa Dastoor (Pt-I) By Zahra Khan Leri Published by Idara-e-Adabiyat-e-Delhi Only the following lessons at page No. of the book are prescribed:
   3,9,12,13,19,24,28,60,65,85,93,96,113,126,147,150,156,165,188
2. Intekhab-e-Nazm-o-Nasar Farsi Published by Aligarh Muslim University only the following Lessons is Prescribed : Intekhab-e-Gulistan-e-sadi-Hikayat First five only.

Division of Marks:

Unit-1	(A)Ten short answer type questions based on full paper.	10
	(B) Explanation of 2 passages out of 3 from the prescribed Text	20
Unit-2	Translation of 2 passages out of from the prescribed Text	20
Unit-3	Biographical questions on prescribed writers	15
Unit-4	Critical questions on prescribed writers	15
Unit-5	Summary of a lesson	20
	Total	**100**

Note: Unit-I Both A and B questions are compulsory.

Books Recommended :

1. Tareekh-e-Adabiyate Iran By Raza Zada Shafaq
2. Sanadeed-e-Ajam By Mehdi Hasan Nasri
3. Tareekh-e-Adab-e-Farsi By Shareef Husain Qasami
4. Sherul Ajam By Shibli Noormani

Note : Choice is to be given in all questions. At least one question from each unit is compulsory.

Paper-II : POETRY

Books Prescribed :

1. Farsi Wa Dastoor (Pt-I) By Zahra Khanleri (Only the following lessons at page No: 1,34,77,118,132,162,193)
   Ghazaliyat Aur Manzoomat

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1. Ghazaliyat Hafiz First Five (Intekhab-e-Nazm-o-Nasar Farsi)
2. Sadi
   (a) Sarmast Agar Darai Ajam Baham Baraid
   (b) Man Chun Tu Badibari Na Deedam
   (c) Ba Khuda Agar Ba Meeram
3. Prescribed Book for the above three Ghazals of Sadi 'Shera' Pub. By Kitabistan, Allababad.
4. Intekhab-e-Nazm-o-Naser Published by Aligarh Muslim University
   Iqbal
   (i) Khuda
   (ii) Insan
   (iii) Hoor
   (iv) Shayar
   (v) Nawa-e-Mazddor.
5. Jadeed Ilmul balaghat By Abdul Majeed Khan (only the following sanaya):
   1. Tazad 2. Laffo-Nashr 3. Talmeeh 4. Husn-e-Talel 5. Istara 6. Tajahul-e- Arifana 6.Iham 8. Ishtaqaq 9. Mubalgha 10. Tashbeeh

Division of Marks:

Unit-1	(A) Ten short answer type questions based on full paper.	10
	(B) Translation two passage out of three in to Urdu from Manzoomat.	20
Unit-2	Translation of two passages out of three in to Urdu from Ghazliyat.	20
Unit-3	Biographical/Critical question on Ghazal writer.	15
Unit-4	Biographical/Critical question on Nazm writer.	15
Unit-5	Rhetoric's with definition & examples/Critical questions	20
	Total	100

Note: Unit-I Both A and B questions are compulsory.

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5 SANSKRIT

बी.ए. संस्कृत प्रथम वर्ष

सामान्य निर्देश –

1. प्रत्येक परीक्षा में दो–दो प्रश्नपत्र होंगे।
2. प्रत्येक प्रश्नपत्र में न्यूनतम उत्तीर्णांक 36 तथा पूर्णांक 100 होंगे और समय 3 घण्टे का होगा।
3. परीक्षा का माध्यम हिन्दी/अंग्रेजी होगा , परन्तु प्रश्नपत्र केवल हिन्दी में बनाया जायेगा। परीक्षार्थी को छूट होगी कि वह हिन्दी,संस्कृत अथवा अंग्रेजी में किसी एक भाषा में उत्तर दे सके । यदि परीक्षक ने किसी प्रश्न विशेष के लिए भाषा का निर्देश कर दिया है तो उस प्रश्न का उत्तर उसी भाषा में देना अनिवार्य होगा।
4. संस्कृत केवल देवनागरी लिपि में ही लिखा जाना अपेक्षित है।
5. निर्धारित ग्रन्थ में से अनुवाद, व्याख्या, सरलार्थ एवं समालोचनात्मक प्रश्न पूछे जावेंगे।
6. प्रत्येक प्रश्नपत्र में 10 प्रतिशत अंक संस्कृत भाषा में उत्तर के लिये निर्धारित हैं।
7. प्रत्येक प्रश्नपत्र में दो भाग होंगे, जिसमें प्रथम 'अ' भाग लघूत्तरात्मक प्रश्नों का होगा। 'ब' भाग में निबन्धात्मक प्रश्न होंगे। 'अ' भाग में कुल 15 प्रश्न होंगे, जिनका पूर्णांक 30 होगा।

परीक्षा योजना–	न्यूनतम उत्तीर्णांक–72	पूर्णांक–200
प्रथम प्रश्न–पत्र		अंक–100
द्वितीय प्रश्न–पत्र		अंक–100

प्रथम प्रश्न–पत्र

दृश्य एवं श्रव्य काव्य

समय : 3 घण्टे अंक 100

प्रथम प्रश्न में निर्धारित ग्रन्थ में से लघूत्तरात्मक निबन्धात्मक, अनुवाद, व्याख्या व समालोचनात्मक प्रश्न पूछे जायेंगे। 15 प्रश्न लघूत्तरात्मक होंगे जिनमें से प्रथम 5 प्रश्नों का उत्तर संस्कृत भाषा के माध्यम से देना होगा, प्रत्येक प्रश्न के लिए 2 अंक निर्धारित हैं। जिस प्रश्नपत्र में संस्कृत अनुवाद/निबन्ध पूछे गए हैं वहाँ संस्कृत में उत्तर अपेक्षित नहीं हैं।

पाठ्यक्रम

1.	स्वप्नवासवदत्तम् (भास)	25 अंक
2.	नीतिशतकम् (भर्तृहरि)	30 अंक
3.	रघुवंशम् प्रथम सर्ग	25 अंक
4.	अनुवाद– संस्कृत से हिन्दी–कारक संबंधी पांच वाक्य	10 अंक
5.	हिन्दी से संस्कृत दस में से पांच वाक्य	10 अंक

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अंक– विभाजन

क्र. सं.	पुस्तक का नाम	लघूत्तरात्मक प्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	अंको का योग
1.	स्वप्नवासवदत्तम्	लघूत्तरात्मक 5	10	02	15	10+15=25
2.	नीतिशतक	लघूत्तरात्मक 5	10	02	20	10+20=30
3.	रघुवंशम् (प्रथमसर्ग)	लघूत्तरात्मक 5	10	02	15	10+15=25
4.	अनुवाद–कारक संबंधी			01	10	10
5.	हिन्दी से संस्कृत दस में से पांच वाक्य			01	10	10
	कुल	5	30	08	70	100

प्रश्न–पत्र का निर्माण निम्नानुसार होगा –

1. सभी प्रश्न अनिवार्य हैं।

2. प्रत्येक पुस्तक से लघूत्तरात्मक व निबन्धात्मक, व्याख्यात्मक प्रश्न पूछे जायेंगे ।

लघूत्तरात्मक प्रश्न के 2 अंक निर्धारित हैं।

निबन्धात्मक / व्याख्यात्मक प्रश्न

स्वप्नवासवदत्तम्

भाग अ में 2–2 अंक के पाँच लघूत्तरात्मक प्रश्न पूछे जायेंगे । 10 अंक

भाग ब

1. 4 श्लोक पूछकर उनमें से किसी 2 की सप्रसंग व्याख्या पूछी जायेगी। 10 अंक
2. दो विवेचनात्मक प्रश्न पूछकर किसी एक का उत्तर देय है। 5 अंक

नीतिशतकम्

भाग अ में 2–2 अंक के पाँच लघूत्तरात्मक प्रश्न पूछे जायेंगे । 10 अंक

भाग ब

1. 4 श्लोक पूछकर उनमें से किन्हीं 2 की सप्रसंग व्याख्या पूछी जायेगी। 14 अंक
2. दो विवेचनात्मक प्रश्न पूछकर किसी एक प्रश्न का उत्तर देय होगा। 6 अंक

रघुवंशम् (प्रथम सर्ग)

भाग अ में 2–2 अंक के पाँच लघूत्तरात्मक प्रश्न पूछे जायेंगे । 10 अंक

भाग ब

1. 4 श्लोक पूछकर उनमें से किन्हीं 2 श्लोकों की सप्रसंग व्याख्या पूछी जायेगी 10 अंक
2. दो विवेचनात्मक प्रश्न पूछकर किसी एक प्रश्न का उत्तर देय होगा। 5 अंक

अनुवाद

1. संस्कृत से हिन्दी– कारक संबंधी पांच वाक्यों का अनुवाद अपेक्षित है। 10 अंक
2. हिन्दी से संस्कृत– दस वाक्य देकर पांच वाक्यों का अनुवाद अपेक्षित है। 10 अंक

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सहायक पुस्तकें–

1. स्वप्नवासवदत्तम्–डॉ. कृष्णदेव प्रसाद–जगदीश संस्कृत पुस्तकालय, झालानियों का रास्ता , जयपुर।
2. स्वप्नवासवदत्तम्–डॉ.रूपनारायण त्रिपाठी –रचना प्रकाशन, जयपुर। स्वप्नवासवदत्तम्–संस्कृत हिन्दी व्याख्या –डॉ.जगन्नाथ पाण्डेय, जगदीश संस्कृत पुस्तकालय, झालानियों का रास्ता , जयपुर।
3. स्वप्नवासवदत्तम्–डॉ.सुभाष वेदालंकार, –अलंकार प्रकाशन, जयपुर।
4. स्वप्नवासवदत्तम्–डॉ.श्रीकृष्ण ओझा, अभिषेक प्रकाशन, चौडा रास्ता जयपुर।
5. नीतिशतकम्–डॉ. गोपाल शर्मा, हंसा प्रकाशन, जयपुर।
6. नीतिशतकम्–डॉ. श्रीकृष्ण ओझा,, राज प्रकाशन मंदिर, जयपुर।
7. नीतिशतकम्– डॉ.सुभाष वेदालंकार, हंसा प्रकाशन, जयपुर।
8. रघुवंशम् (प्रथम सर्ग)
9. संस्कृत व्याकरण– श्री निवास शास्त्री।
10. वृहद् अनुवाद चन्द्रिका – चक्रधर हंस नौटियाल

द्वितीय प्रश्न–पत्र

समय : 3 घण्टे **अंक–100**

भारतीय संस्कृति के तत्व, पद्य साहित्य, व्याकरण

प्रश्नपत्र योजना– प्रथम प्रश्न में निर्धारित ग्रन्थ में से लघूत्तरात्मक निबन्धात्मक, अनुवाद, व्याख्या व समालोचनात्मक प्रश्न पूछे जायेंगे।

पाठ्यक्रम

1.भारतीय संस्कृति के तत्त्व – 20 अंक

क– भारतीय संस्कृति–विषय, पृष्ठभूमि, विशेषताएँ।
ख– भारतीय संस्कृति के विकास की रूपरेखा–पूर्ववैदिक काल, वैदिकोत्तरकाल, मध्यकाल एवं आधुनिक काल।
ग– प्राचीनकाल– राजनैतिक, सामाजिक एवं आर्थिक स्थिति।
घ– वर्ण, आश्रम, एवं संस्कार।
ड– शिक्षा (वैदिककाल से लेकर 7वीं शताब्दी तक)
च– लेखन–कला की उत्पत्ति।
छ– भारतीय दर्शन की प्रमुख विचारधाराएं।
ज– भारतीय संस्कृति का मानव–कल्याण में योगदान।

2. किरातार्जुनीयम्(प्रथम सर्ग)–भारविकृत 25 अंक

3. व्याकरण–लघुसिद्धान्तकौमुदी–संज्ञा, एवं संधि प्रकरण 35 अंक

क–संज्ञा प्रकरण– 10 अंक
ख–अच् संधि– 10 अंक
ग– हल् संधि– 10 अंक
घ– विसर्ग संधि– 05 अंक

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4. निम्नलिखित कृत् प्रत्ययों से वाक्य निर्माण सम्बन्धी प्रश्न – 20 अंक

तव्यत्, अनीयर् – तव्यत्तव्यानीयर :

यत् –	अचो यत्, ईद्यति, पोरदुपधात्
क्यप्–	एतिस्तुशास्वृदृजुषः क्यप्, ह्रस्वस्य पिति कृति तुक्, शास् इदङ्हलोः
ण्यत्–	ऋहलोर्ण्यत्
शतृ, शानच्–	लटः शतृशानचावप्रथमासमानाधिरणे, आने मुक्
क्त, क्तवतु–	क्तक्तवतूँ निष्ठा, रदाभ्यां निष्ठातो नः पूर्वस्य च दः
क्त्वा–	समानकर्तृकयोः पूर्वकाले
ल्यप्–	समासेऽनञ् पूर्वे क्त्वो ल्यप्
तुमुन्–	तुमुण्ण्वुलौ क्रियायाँ क्रियार्थायाम्

अंक– विभाजन

क्र. सं.	पुस्तक का नाम	लघूत्तरात्मकप्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	अंको का योग
1.	भारतीय संस्कृति के तत्त्व	लघूत्तरात्मक 3	06	02	14	06+14=20
2.	किरातार्जुनीयम् (प्रथम सर्ग)	लघूत्तरात्मक 4	08	02	17	08+17=25
3.	लघुसिद्धान्तकौमुदी–संज्ञा, एवं संधि प्रकरण	लघूत्तरात्मक 5	10	01	25	10+25=35
4.	कृत् प्रत्यय	लघूत्तरात्मक 3	06	07	14	06+14=20
	कुल	15	30	10	70	100

प्रश्न–पत्र का निर्माण निम्नानुसार होगा –

1. सभी प्रश्न अनिवार्य हैं।

2. प्रत्येक पुस्तक से लघूत्तरात्मक व निबन्धात्मक, व्याख्यात्मक प्रश्न पूछे जायेंगे । लघूत्तरात्मक प्रश्न के 2 अंक निर्धारित हैं।

निबन्धात्मक / व्याख्यात्मक प्रश्न

भारतीय संस्कृति के तत्व

भाग अ में 2–2 अंक के तीन लघूत्तरात्मक प्रश्न पूछे जायेंगे । 06 अंक

भाग ब

1. दो निबन्धात्मक प्रश्न पूछकर किसी एक का उत्तर अभीष्ट है। 10 अंक

2. दो विषयों पर टिप्पणी पूछ कर किसी एक का उत्तर अभीष्ट है। 04 अंक

किरातार्जुनीयम् (प्रथम सर्ग)

भाग अ में 2–2 अंक के चार लघूत्तरात्मक प्रश्न पूछे जायेंगे । 08 अंक

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भाग- ब

1. 4 श्लोक पूछकर उनमें से किन्हीं 2 श्लोकों की सप्रसंग व्याख्या पूछी जायेगी। 12 अंक
2. दो विवेचनात्मक प्रश्न पूछकर किसी एक प्रश्न का उत्तर देय होगा। 5 अंक

व्याकरण–लघुसिद्धान्त कौमुदी

भाग अ में 2–2 अंक के पाँच लघूत्तरात्मक प्रश्न पूछे जायेंगे । 10 अंक

भाग ब

क. संज्ञा प्रकरण

4 सूत्र पूछकर किन्हीं 2 सूत्रों की सोदाहरण व्याख्या अपेक्षित है।
प्रत्येक व्याख्या के लिये 2 अंक निश्चित हैं। 04 अंक

ख. अच् संधि–

4 सूत्र पूछकर किन्हीं 2 सूत्रों की सोदाहरण व्याख्या अपेक्षित है।
प्रत्येक व्याख्या के लिये 2 अंक निश्चित हैं। 04 अंक

4 शब्दसिद्धि पूछकर किन्हीं 2 शब्दों की सूत्रनिर्देश पूर्वक सिद्धि अपेक्षित है। प्रत्येक सिद्धि के लिये 2 अंक निश्चित हैं। 04 अंक

ग. हल् संधि–

4 सूत्र पूछकर किन्हीं 2 सूत्रों की सोदाहरण व्याख्या अपेक्षित है।
प्रत्येक व्याख्या के लिये 2 अंक निश्चित हैं। 04 अंक

4 शब्दसिद्धि पूछकर किन्हीं 2 शब्दों की सूत्रनिर्देश पूर्वक सिद्धि अपेक्षित है। प्रत्येक सिद्धि के लिये 2 अंक निश्चित हैं। 04 अंक

घ. विसर्ग संधि–

2 सूत्र पूछकर किसी 1 सूत्र की सोदाहरण व्याख्या अपेक्षित है। 02 अंक
2 शब्दसिद्धि पूछकर किसी 1 शब्द की सूत्रनिर्देश पूर्वक सिद्धि अपेक्षित है। 03 अंक

ङ कृत् प्रत्यय–

भाग अ में 2–2 अंक के तीन लघूत्तरात्मक प्रश्न पूछे जायेंगे । 06 अंक

भाग ब

(कृत्प्रत्यय के प्रयोग पूर्वक संस्कृत में चार वाक्यों का निर्माण अपेक्षित है। 14 अंक

कुल योग–100 अंक

सहायक पुस्तकें– भारतीय संस्कृति

1. भारतीय सांस्कृतिक निधि– डॉ. रामजी उपाध्याय, महामनापुरी , वाराणसी।
2. भारतीय संस्कृति–श्री रामदेव साहू, श्याम प्रकाशन चौडा रास्ता, जयपुर।
3. भारतीय संस्कृति– वाई.एस.रमेश–रचना प्रकाशन,जयपुर।
4. भारतीय संस्कृति– डॉ. रामजी उपाध्याय, महामनापुरी , वाराणसी।
5. भारतीय दर्शन– डॉ. बलदेव उपाध्याय, चौखम्बा प्रकाशन, वाराणसी।

Raj Vaid

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किरातार्जुनीयम्

1. किरातार्जुनीयम् (प्रथम सर्ग)–आचार्य नवल किशोर कांकर, विद्या वैभव भवन, जयपुर।
2. किरातार्जुनीयम् (प्रथम सर्ग)–डॉ. विश्वनाथ शर्मा, आदर्श प्रकाशन , जयपुर।
3. किरातार्जुनीयम् (प्रथम सर्ग)– डॉ.सुभाष वेदालंकार, –अलंकार प्रकाशन, जयपुर।

अनुवाद के लिए

1. संस्कृत रचनानुवाद मंजरी–पं. नंदकुमार शास्त्री, अजमेरा बुक कम्पनी,त्रिपोलिया बाजार, जयपुर ।
2. रचनानुवाद कौमुदी–डॉ. कपिलदेव द्विवेदी, वाराणसी।
3. रचनानुवादप्रभा–डॉ.श्रीनिवास शास्त्री, कुरुक्षेत्र।

व्याकरण के लिये

1. लघुसिद्धान्त कौमुदी– श्रीमहेश सिंह कुशवाहा, चौखम्भा संस्कृत प्रतिष्ठान ,दिल्ली।
2. लघुसिद्धान्त कौमुदी– श्री धरानन्द शास्त्री, मोतीलाल बनारसीदास,दिल्ली।
3. लघुसिद्धान्त कौमुदी– भीमसेन शास्त्री।
4. संस्कृत व्याकरण– श्री निवास शास्त्री।
5. वृहद् अनुवाद चन्द्रिका – चक्रधर हंस नौटियाल

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6 PHILOSOPHY

B.A. Part-I

Scheme :

Two Papers	Min. Pass Marks 72	Max. Marks 200
Paper I	3 hrs. duration	Max. Marks 100
Paper II	3 hrs. duration	Max. Marks 100

General Instructions:

(1) There shall be two question papers: Paper I and Paper II.

(2) Both the question papers will be in two parts: Part I & Part II

(3) Part I of the question paper will be of 40 marks in total. This part will consist of twenty compulsory short questions, with 2 marks each. The word limit for these questions shall be upto 50 words. These questions will cover the entire units and there will be no unit wise division of the questions asked in this part.

(4) Part II of the question paper will be of 60 marks and students will required to write detailed answer in the answer sheet only. If syllabus (course contents) of a paper is divided into two units i.e. Unit A and Unit B, then in this part of the question paper six questions will be asked in total: three questions from each unit. Student will be asked to attempt three questions in total and at least one question from each unit. Each question will be of 20 marks. If syllabus (course contents) of a paper is divided into three Units i.e. Unit A, B & C then in the Part II of the question paper, which consist of Essay type questions, six questions will be asked in total: two questions from each Unit. Students will be required to attempt three questions in total and one question from each Unit. The ideal word limit for these questions is 500-600 words.

Paper I: Indian Philosophy

Unit A:

1. Nature of Indian Philosophy: plurality as well as common concerns.
2. Basic concepts of the Vedic and the Upanisadic world-views, Rta (the cosmic order): the divine and the human realms, the centrality of the institution of Yajna (sacrifice), Rna (duty/obligation).
3. Carvaka school: its espistemology, metaphysics and ethics.
4. Jainism: concepts of sat, dravya, guna, paryaya, jiva, ajiva, anekantavada, syadvada and nayavada, pramanas, ahimsa, bondage and liberation.

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5. Buddhism: theory of pramanas, theory of dependent origination, the four noble truths, doctrine of momentariness, theory of no-soul. A brief introduction of the schools of buddhism: Vaibhasika, Sautrantika, Yogacara, Madhyamika.

Unit B :

1. Nyaya: theory of pramanas, the individual self and its liberation, the idea of God and proofs for his existence.
2. Vaisesika: Padarthas: dravya, guna, karma, samanya, samavaya, visesha, abhava, Causation: asatkaryavada, karana: samavayi, asamavayi & nimitta, paramanuvada, adrsta, nihsreyas.
3. Samkhya: causation, satkaryavada, prakrti, its constituents, evolutes and arguments for its existence, purusa, arguments for its existence and plurality of purusas, relationship between prakrti and purusa, kaivalya, atheism.
4. Yoga: citta and citta-vrtti, eightfold path, God.

Unit C:

1. Purva Mimamsa: Pramana-mimamsa, Self.
2. Advaita: nirguna brahman, adhyasa, rejection of difference, vivartavada, maya, three grades of satta, pramanas, jiva, jivanmukti.
3. Visistadvaita: saguna brahman, refutation of maya, parinamavada, aprthaksiddhi, jiva, bhakti and prapatti, rejection of jivanmukti.

Prescribed Reading:

1. Dutta & Chatterjee : *Introduction to Indian Philosophy* (Hindi translation available)

Suggested Readings :

M. Hiriyanna : *Outlines of Indian Philosophy* (Hindi translation available)

C.D. Sharma : *A Critical Survey of Indian Philosophy* (Hindi translation available)

S.N. Dasgupta :*A History of Indian Philosophy, Vols. I to V* (Hindi translation available, Hindi Granth Academy, Jaipur)

S. Radhakrishnan: *Indian Philosophy, Vols. I & II,* (Hindi translation available, Rajkamal, Delhi).

R.D. Ranade : *A Constructive Survey of Upanisadic Philosophy* (Hindi translation available, Hindi Granth Academy, Jaipur)

R. Puligandla : *Fundamentals of Indian Philosophy*

संगम लाल पाण्डे :*भारतीय दर्शन का सर्वेक्षण,* सेन्ट्रल पब्लिशिंग हाऊस, इलाहाबाद।

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Paper II: History of Western Philosophy

Unit A:

1. Introduction: Early Greek philosophy: Sophists & Socrates.
2. Plato: Theory of knowledge: knowledge (episteme) and opinion (doxa), theory of forms, soul, idea of the Good
3. Aristotle: Critique of Plato's theory of forms, theory of causation, form and matter, potentiality and actuality, soul, God

Unit B:

1. St. Thomas Aquinas: Faith and reason, essence and existence, proofs for the existence of God.
2. Descartes: Method and the need for method in philosophy, method of doubt, cogito ergo sum, types of ideas, mind and matter, mind-body interactionism, God: nature and proofs for his existence.
3. Spinoza: substance, attributes and modes, the concept of God or Nature, pantheism, mind-body problem.
4. Leibniz: Monadology, doctrine of pre-established harmony; truths of reason and truths of fact, innateness of all ideas, principles of non-contradiction, sufficient reason and identity of the indiscernible, God: nature and proofs for his existence

Unit C:

1. Locke: Theory of knowledge-ideas and their classification, refutation of innate ideas, knowledge and its grades, substance, qualities: primary and secondary
2. Berkeley: Rejection of abstract ideas, rejection of the distinction between primary and secondary qualities, immaterialism, esse est percipi: the problem of solipsism.
3. Hume: Theory of knowledge- impressions and ideas; judgments concerning relations of ideas and judgments concerning matters of fact; causality; external world, self and personal identity; rejection of metaphysics; skepticism.
4. Kant: conception of critical philosophy; classification of judgments: analytic, synthetic, a priori, a posterior, possibility of synthetic apriori judgments.

Suggested Readings :

W.T. Stace : *A Critical History of Greek Philosophy*

J.S. Srivastava : 1- *ग्रीक दर्शन का वैज्ञानिक इतिहास,* किताब महल, इलाहाबाद
2- *मध्ययुगीन दर्शन का वैज्ञानिक इतिहास,* किताब महल, इलाहाबाद
3- *आधुनिक दर्शन का वैज्ञानिक इतिहास,* किताब महल, इलाहाबाद

याकूब मसीह : *पाश्चात्य दर्शन का समीक्षात्मक अध्ययन,* मोतीलाल बनारसीदास, दिल्ली (English Translation Available)

F. Thilly : *History of Western Philosophy (Hindi Translation Available)*

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7. HISTORY

The scheme of examination will be as follows:

Scheme:

Maximum Marks 200		Minimum Pass Marks 72
Paper I	3 hrs. Duration	Marks 100
Paper II	3 hrs. Duration	Marks 100

Note: There shall be two papers in all in the subject of History, and each paper shall be of three hours duration and of 100 marks.

Each paper shall consist of two parts. Part I shall carry 40 marks and shall consist of two compulsory questions. The first compulsory question will be of 20 marks, comprising of 10 very short answer type questions of two marks each. The answer to each question should not exceed 20 words.

The second compulsory question will be of 20 marks. It will comprise of 10 short answer type questions of 04 marks each, the candidate will be required to answer any 05 questions. The answer to each question should not exceed 50 words.

The second part of the question paper shall be divided into three sections comprising of 06 essay type questions, containing 02 questions from each section, of 20 marks each. Candidate will be required to answer 03 questions, selecting one question from each section. This part of the question paper shall be of 60 marks.

परीक्षा योजना :

अधिकतम अंक 200		न्यूनतम उत्तीर्णांक 72
प्रथम प्रश्नपत्र	समय 3 घंटे	अंक 100
द्वितीय प्रश्नपत्र	समय 3 घंटे	अंक 100

नोट : इतिहास विषय के कुल दो प्रश्नपत्र होगे, प्रत्येक प्रश्नपत्र तीन घंटे की अवधि का एवं 100 अंकों का होगा।

प्रत्येक प्रश्नपत्र के दो भाग होंगे। प्रथम भाग 40 अंको का होगा एवं इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंकों के प्रथम अनिवार्य प्रश्न में, दो–दो अंक के 10 अनिवार्य अतिलघुउत्तरात्मक प्रश्न होंगे। प्रत्येक उत्तर की शब्द सीमा 20 शब्द।

20 अंकों के द्वितीय अनिवार्य प्रश्न में, चार–चार अंकों के 10 लघुउत्तरात्मक प्रश्न होंगे जिनमें से 05 प्रश्न करने होंगे। प्रत्येक उत्तर की शब्द सीमा 50 शब्द।

प्रश्नपत्र के द्वितीय भाग में, पाठ्यक्रम के तीन खण्डों में से, प्रत्येक खण्ड से दो–दो प्रश्नों का चयन करते हुए, कुल 06 निबन्धात्मक प्रश्न होंगे। प्रत्येक प्रश्न 20 अंको का होगा। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए कुल 03 प्रश्न हल करने होंगे। प्रश्नपत्र का यह भाग 60 अंको का होगा।

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PAPER I : HISTORY OF INDIA (FROM THE BEGINNING UPTO 1200 A. D.)

Section - A

Main sources of the history of India upto 1200 A.D. A brief survey of Prehistoric ultures in India. The Indus-Saraswati civilization – origin, extent, salient features, ecline and continuity. The Vedic age – Vedic literature, polity, society, economy and eligion. A brief survey of Iron age cultures in India. Rise of Janapadas and ahajanapadas – monarchies and republics. Rise of Magadhan imperialism upto the andas. Jainism and Buddhism – origins, teachings, contribution.

Section – B

The Mauryan empire – main sources. Chandragupta Maurya and Aśoka. śoka's Dhamma – its nature and propagation. Mauryan state and administration, ociety and economy, art and architecture. Decline of the Mauryas. The post-Mauryan eriod (c. 200 B.C. to 300 A.D.) – achievements of the Sungas, Satavahanas, Sakas and ushanas. Social, Religious and Economic life and development of literature and arts uring the post-Mauryan period. The Sangam age – literature, society, economy, and ilture.

Section - C

The Gupta empire – achievements of Samudragupta, Chandragupta II kramaditya, Skandagupta. State and administrative institutions. Social and onomic Life. Religious thought and institutions. Developments in literature, arts and ences. Post-Gupta period upto 750 A.D. – achievements of the Vardhanas, Chalukyas d Pallavas. Tripartite Struggle. The Imperial Cholas and their achievements. A dy of social and economic changes and a brief survey of cultural life during the iod c. 750 to 1200 A. D.

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तैथम प्रश्नपत्र : भारत का इतिहास (आरम्भ से 1200 ईस्वी तक)

खण्ड – क

1200 ईस्वी तक भारत के इतिहास के मुख्य स्रोत। भारत की प्रागैतिहासिक संस्कृतियों का संक्षिप्त सर्वेक्षण। सिन्धु–सरस्वती सभ्यता – उद्गम, विस्तार, प्रमुख विशेषताएँ, पतन एवं निरंतरता। वैदिक युग – वैदिक साहित्य, राजशासन, समाज, अर्थव्यवस्था एवं धर्म। भारत की लौहयुगीन संस्कृतियों का संक्षिप्त सर्वेक्षण। जनपदों एवं महाजनपदों का उदय – राजतंत्र एवं गणतंत्र। नंद वंश तक मागध साम्राज्यवाद का उत्कर्ष। जैन धर्म एवं बौद्ध धर्म – उद्गम, शिक्षाएं, योगदान।

खण्ड – ख

मौर्य साम्राज्य– मुख्य स्रोत। चन्द्रगुप्त मौर्य एवं अशोक। अशोक का धम्म – इसकी प्रकृति एवं प्रचार। मौर्यकालीन राज्य एवं प्रशासन, समाज एवं अर्थव्यवस्था, कला एवं स्थापत्य। मौर्यों का पतन। मौर्योत्तर काल (लगभग 200 ई. पू. से 300 ईस्वी) – शुंगों, सातवाहनों, शकों एवं कुषाणों की उपलब्धियाँ। मौर्योत्तर काल में सामाजिक, धार्मिक एवं आर्थिक जीवन, तथा साहित्य एवं कलाओं का विकास। संगम युग – साहित्य, समाज, अर्थव्यवस्था एवं संस्कृति।

खण्ड – ग

गुप्त साम्राज्य – समुद्रगुप्त, चन्द्रगुप्त द्वितीय विक्रमादित्य, स्कंदगुप्त की उपलब्धियाँ। राज्य एवं प्रशासनिक संस्थाएँ। सामाजिक एवं आर्थिक जीवन। धार्मिक विचार एवं संस्थाएँ। साहित्य, कला एवं विज्ञान का विकास। 750 ईस्वी तक गुप्तोत्तर काल – वर्धनों, चालुक्यों एवं पल्लवों की उपलब्धियाँ। त्रि–राज्यीय संघर्ष। साम्राज्यवादी चोल एवं उनकी उपलब्धियाँ। 750 से 1200 ईस्वी के काल में सामाजिक एवं आर्थिक परिवर्तनों का अध्ययन तथा सांस्कृतिक जीवन का संक्षिप्त सर्वेक्षण।

***Books Recommended** (अनुशंसित पुस्तकें) :*

H. D. Sankalia	:	*Prehistory of India*, Munshiram Manoharlal, New Delhi, 1977
Dilip K. Chakrabarti	:	*India : An Archaeological History (Palaeolithic Beginnings to Early Historic Foundations)*, Oxford University Press, New Delhi, 1999
B. B. Lal	:	*India 1947-1997 : New Light on the Indus Civilisation*, Delhi, 1998
R.K. Mookerji	:	*Chandragupta Maurya and His Times*, Delhi, 1952 (also in Hindi)
	:	*Aśoka*, Delhi, 1972 (also in Hindi)
B. N. Puri	:	*India under the Kushanas*, Bombay, 1965

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R.C. Majumdar & A.S. Altekar	:	*The Vakataka-Gupta Age* (also in Hindi)
Baij Nath Sharma	:	*Harsha & his times*, Varanasi, 1970
K.A.N. Sastri	:	(Ed.) *Age of the Nandas & Mauryas* (also in Hindi)
	:	*A History of South India* (also in Hindi)
	:	*The Cholas* (also in Hindi)
Romila Thapar	:	*A History of India*, Vol I, Penguin, 1966 (also in Hindi)
	:	*Aśoka & the Decline of the Mauryas*, 3rd impression, Delhi, 1999
Upinder Singh	:	*A History of Ancient and Early Medieval India* (From the Stone Age to the 12th Century), Pearson Longman, Delhi, 2009
वेदुला जायसवाल	:	*भारतीय इतिहास का नव-प्रस्तर युग*, दिल्ली, 1992
के. के. थपल्याल एवं एस.पी. शुक्ला	:	*सिन्धु सभ्यता*, लखनऊ, 1976
मदन मोहन सिंह	:	*बुद्धकालीन समाज और धर्म*, पटना, 1972
वी.एल. गुप्ता	:	*गुप्त साम्राज्य*
विशुद्धानन्द पाठक	:	*उत्तर भारत का राजनीतिक इतिहास*, लखनऊ, 1990
बलराम श्रीवास्तव	:	*दक्षिण भारत का इतिहास*, वाराणसी, 1968
के.सी. श्रीवास्तव	:	*प्राचीन भारत का इतिहास तथा संस्कृति*, इलाहाबाद

PAPER II : HISTORY OF RAJASTHAN (FROM EARLIEST TIMES TO 1956 A.D.)

Section - A

A survey of the sources of the history of Rajasthan. Palaeolithic and Mesolithic ltures in Rajasthan. Extent and characteristics of Chalcolithic and Copper age ltures (Ahar, Balathal, Ganeshwar). Characteristics of Kalibangan culture. Matsya apada and Republican Tribes in Rajasthan. Origin of Rajputs. Rise and expansion of hilas, Gurjara-Pratiharas and Chahamanas.

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Section – B

Rajput resistance to Muslim incursions in Rajasthan. Mewar under Maharana Kumbha and Sanga. Maharana Pratap's struggle for independence. Chandrasen's efforts for freedom. Contribution of Sawai Jai Singh. A brief survey of the main features of the society and culture in Rajasthan (1200-1750 A.D.), Meera and Dadu. Art and architecture – fort architecture, temples.

Section – C

Maratha incursions in Rajasthan and their impact. Acceptance of British suzerainty and its consequences. Administrative and Judicial changes after 1818 A. D. Social changes – Prohibition of Female Infanticide and Sati. Economic changes – Land Revenue Settlements. British monopoly of Salt and Opium Trade. Outbreak of 1857 in Rajasthan. Influence of Arya Samaj in Rajasthan. A brief survey of Peasant Movements and Tribal Movements. Formation of Praja Mandals and Freedom Struggle in Rajasthan. Integration of the States of Rajasthan.

द्वितीय प्रश्नपत्र : राजस्थान का इतिहास (आरंभिक काल से 1956 ईस्वी तक)

खण्ड – क

राजस्थान के इतिहास के स्रोतों का सर्वेक्षण। राजस्थान में पुरापाषाणकालीन एवं उत्तरपाषाणकालीन संस्कृतियाँ। ताम्रपाषाणिक एवं ताम्रयुगीन संस्कृतियों का विस्तार एवं विशेषताएँ (आहाड़, बालाथल, गणेश्वर)। कालीबंगा संस्कृति की विशेषताएं। राजस्थान में मत्स्य जनपद एवं गणतांत्रिक जातियाँ। राजपूतों का उदय। गुहिलों, गुर्जर–प्रतिहारों एवं चाहमानों का उत्कर्ष एवं विस्तार।

खण्ड – ख

राजस्थान में मुस्लिम आक्रमणों का राजपूत प्रतिरोध। महाराणा कुंभा एवं सांगा के अधीन मेवाड़। महाराणा प्रताप का स्वतंत्रता के लिए संघर्ष। स्वातंत्र्य के लिए चंदसेन के प्रयास। सवाई जयसिंह का योगदान। राजस्थान में समाज एवं संस्कृति की मुख्य विशेषताओं का संक्षिप्त सर्वेक्षण (1200–1750 ईस्वी)। मीरा एवं दादू। कला एवं स्थापत्य – दुर्ग स्थापत्य, मंदिर।

खण्ड – ग

राजस्थान में मराठा आक्रमण एवं उनका प्रभाव। ब्रिटिश प्रभुत्व का स्वीकार एवं इसके परिणाम। 8 ईस्वी के पश्चात् प्रशासनिक एवं न्यायिक परिवर्तन। सामाजिक परिवर्तन – कन्या–शिशु वध एवं सती प्रतिबन्ध। आर्थिक परिवर्तन – भू राजस्व बंदोबस्त। नमक एवं अफीम व्यापार पर ब्रिटिश एकाधिकार। स्थान में 1857 का विप्लव। राजस्थान में आर्य समाज का प्रभाव। कृषक आन्दोलनों एवं जनजातीय लनों का एक संक्षिप्त सर्वेक्षण। राजस्थान में प्रजामंडलों का गठन एवं स्वाधीनता संघर्ष। राजस्थान के ों का एकीकरण।

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commended (अनुशंसित पुस्तकें)

ashar.th Sharma	:	*Rajasthan through the Ages*, Vol. I, Bikaner, 1966
	:	*Early Chauhan Dynasties*, Delhi, 1975
N. Sharma	:	*Rajasthan through the Ages*, Vol. II
	:	*Mewar and the Mughal Emperors*
	:	*Social Life in Medieval Rajasthan*
. S. Jain	:	*Rajasthan through the Ages*, Vol. III
	:	*Surplus to Subsistence*, Delhi, 1994
	:	*Concise History of Modern Rajasthan*
C. Shukla	:	*Early History of Rajasthan*, Delhi, 1978
N. Puri	:	*The History of the Gurjara-Pratiharas*, Delhi, 1975
arita Rani Sharma:		*Society and Culture in Rajasthan c. A.D. 700-900*, Delhi, 1996
S. Bhatnagar	:	*Life & Times of Sawai Jai Singh* (also in Hindi)
N. Misra	:	*Rajasthan : Prehistoric and Early Historic Foundations*, Aryan Books International, New Delhi, 2007
D. Sankalia *et al*	:	*Excavations at Ahar* (Tambavati), 1961-62, Deccan College, Poona, 1969
ıa Hooja	:	*A History of Rajasthan*, Rupa & Co., New Delhi, 2006
	:	*The Ahar Culture and Beyond*, Oxford, 1988.
नाथ शर्मा	:	*राजस्थान का इतिहास*, आगरा
	:	*राजस्थान का सांस्कृतिक इतिहास*, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
	:	*राजस्थान के इतिहास के स्रोत*, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर
आनन्द पाठक	:	*उत्तर भारत का राजनीतिक इतिहास*, लखनऊ
स. जैन	:	*आधुनिक राजस्थान का इतिहास*, जयपुर
सोद व्यास	:	*आधुनिक राजस्थान का वृहत् इतिहास*, खण्ड I एवं खण्ड II, राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर

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8. POLITICAL SCIENCE

B.A. Part-I

प्रश्न–पत्रों की रूपरेखा

राजनीति विज्ञान के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टे की अवधि का होगा तथा प्रश्न–पत्र के अधिकतम 100 अंक होंगे।

प्रत्येक प्रश्न–पत्र के तीन खण्ड होंगे। प्रथम खण्ड 20 अंको का होगा। इस खण्ड में दो अंकों के 10 अनिवार्य प्रश्न होंगे। जिनमें से प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20–25 शब्दों में देना होगा।

द्वितीय खण्ड 20 अंकों का होगा। इस खण्ड में 05 अंकों के 04 अनिवार्य प्रश्न होंगे, जिनमें से प्रत्येक का उत्तर 150 शब्दों में अपेक्षित होगा।

तृतीय खण्ड 60 अंकों का होगा। इस खण्ड में तीन भाग होंगे। जिनमें प्रत्येक में 20 अंकों के दो निबंधात्मक प्रश्न होंगे। परीक्षार्थी से प्रत्येक खण्ड में से एक प्रश्न का उत्तर अपेक्षित होगा। प्रत्येक खण्ड से एक प्रश्न का चयन करते हुए कुल 03 प्रश्नों का उत्तर अपेक्षित होगा।

Scheme of Question Papers

There shall be two papers of political Science. Each question paper shall be of three hours duration and of 100 marks.

Each Question Paper shall consist of three Parts. Part I shall carry 20 marks and shall consist of 10 compulsory questions of 2 marks each to be answered in 20-25 words each.

Part II shall carry 20 marks and shall consist of 4 compulsory questions of 5 marks each to be answered in 150 words each.

Part III of the question paper shall carry 60 marks. This part shall be divided into 3 sections each comprising of 2 essay-type questions of 20 marks each. Candidates will be required to attempt one question from each section (3 questions in all, one from each section)

प्रथम प्रश्न– पत्र राजनीति विज्ञान के मूल आधार

खण्ड 'क'

राजनीति विज्ञानः परम्परागत और आधुनिक दृष्टिकोण, व्यवहारवाद व उत्तर व्यवहारवाद, अन्तः अनुशासनात्मक दृष्टिकोण, राजनीति विज्ञान का अन्य समाज विज्ञानों से संबंध, अवधारणाएँः शक्ति, सत्ता व वैधता।

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खण्ड 'ख'

राजनीतिक व्यवस्था, राजनीतिक आधुनिकीकरण, राजनीतिक विकास, लोकतंत्र, निरंकुशतंत्र, राजनैतिक दल व दबाव समूह, प्रतिनिधित्व के सिद्धांत, विधि का शासन व संविधानवाद, शासन के अंग व उसके कार्य (आधुनिक दृष्टिकोण के विशिष्ट संदर्भ में)।

खण्ड 'ग'

राजनीतिक विचारधाराएँ: उदारवाद, प्रत्ययवाद, मार्क्सवाद, लोकतांत्रिक समाजवाद, अराजकतावाद व नारीवाद।

Paper-I : Foundations of Political Science

Section-'A'

Traditional and Contemporary Perspective of Political Science, Behaviouralism and Post-Behaviouralism, Inter-disciplinary Approach, Relation of Political Science with other Social Science, Concept: Power, Authority, Legitimacy.

Section-'B'

Political System, Political Development, Political Modernization, Democracy and Dictatorships, Political Parties, Pressure Groups, Theories of Representations, Rule of Law and Constitutionalism, organs of Government and their Functions (with reference to recent trends.)

Section-'C'

Political Ideologies: Liberalism, Idealism, Marxism, Democratic Socialism, Anarchism and Feminism.

Books recommended:-

Asirvatham : Political theory (Hindi and English editions)
Mac Iver: The Modern State
Appadorai: Substance of Politics (Hindi and English editions)
S.B Dubey: Rajnitik Shastra Ke Sidhant
V.k. Arora: Rajniti Vigyan (Gadodia Pustak Bhandar, Bikaner)
J.C Johri: Principles of Political science
Chandradev Prasad: Political ideas
एस.एन. दुबे : डवलपमेंट एण्ड पॉलिटिकल थाट इन इण्डिया
इकबाल नारायण : राजनीति शास्त्र के सिद्धांत
पुखराज जैन : राजनीति शास्त्र के मूल आधार
पी.के.चड्ढा : राजनीति शास्त्र के मूल आधार
आर.सी.अग्रवाल : राजनीति शास्त्र के सिद्धांत
डॉ. बी.एम.जैन एवं चन्द्रा हीरावत : राजनीति शास्त्र के आधार
अरूण कुमार त्यागी : राजनीति विज्ञान के मूल आधार
ओ.पी.गाबा : राजनीति विज्ञान के मूल आधार तत्व
रूद्र जैन : राजनीति विज्ञान के सिद्धांत

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द्वितीय प्रश्न –पत्र: प्रतिनिधि भारतीय राजनीतिक विचारक

खण्ड 'क'

मनु, कौटिल्य व शुक्र।

खण्ड 'ख'

राजा राममोहन राय, स्वामी दयानन्द सरस्वती, गोपाल कृष्ण गोखले व बाल गंगाधर तिलक, स्वामी विवेकानन्द।

खण्ड 'ग'

मोहनदास करमचंद गांधी, जवाहर लाल नेहरू, बी.आर. अम्बेडकर, एम.एन. राय, जयप्रकाश नारायण व दीनदयाल उपाध्याय।

Paper- II : Representative Indian Political Thinkers

Section- A

Manu, Kautilya, Shukra.

Section- B

Raja Rammohan Roy, Swami Dayananda Saraswati, Gopal Krishan Gokhale, Bal Gangadhar Tilak, Swami Vivekanand.

Section- C

Mohandas Karamchand Gandhi, Jawahar Lal Nehru, Bhim Rao Ambedkar, M.N.Roy, Jai Prakash Narain and Deen Dayal Upadhyay.

Books recommended: -

Awasthi and Awasthi : Pratinidhi Bhartiya Rajnitik Chintan
V.P Verma : Aadhunik Bhartiya Rajnitik Avam Samajik Chintan
Purshotam Nagar : Aadhunik Bhartiya Chintan.
Vishnoo Bhagavan : Pramukh Bhartiya Rajnitik Vicharak (Adarch Prakashan, Chaura Rasata, Jaipur)
N.P. Verma : Indian Political Thought Vol. I&II
J.P. Sood : Main Currents of Indian Political Thought.
परमात्मा शरण : प्राचीन भारत में राजनीतिक चिन्तन व संस्थाएँ
जे.पी. सूदः मेन करन्टस ऑफ इण्डियन पॉलिटिकल थॉट (हिन्दी व अंग्रेजी)
एस.एल.वर्मा व बी.एम. शर्मा : प्रमुख भारतीय राजनीतिक विचारक
वी.पी वर्मा : भारतीय राजनीतिक व सामाजिक चिन्तन।
ओ.पी.गाबा : प्रमुख भारतीय राजनीतिक विचारक
अवस्थी एवं अवस्थी : भारतीय राजनीतिक चिन्तन
बी.एम.शर्मा : प्रमुख भारतीय राजनीतिक विचारक
मधुकर श्याम चतुर्वेदी : प्रमुख भारतीय राजनीतिक विचार

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B.A. PART I

INDIAN MUSIC (VOCAL)

Scheme :

Number of Student–

- **Max.- 15**
- **Min. – 04**

Paper I	**3 hrs. duration**	**Max.Marks 40**	**Min. Marks 15**
Paper II	**3 hrs. duration**	**Max.Marks 40**	**Min. Marks 15**
Practical	**1 hr. per candidate**	**Max. Marks120**	**Min. Marks 43**

Teaching Hours

Practical

6 Hours Per Week

Theory

Paper -I	2 Hours Per Week
Paper -II	2 Hours Per Week

Total Teaching Hours for practical - 06, Theory - 04 Hours Per Week

Note : Each theory paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

- Candidates must pass separately in each of the paper Theory and Practical wherever prescribed.

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NOTICE

1. The Ordinance governing the examinations in the Faculties of Arts, Fine Arts, Social Sciences, Science, Commerce and Law are contained in a separate booklet. The students are advised to refer to the same.
2. Changes in Statutes/ Ordinances / Rules/ Regulations/ Syllabi and Books may, from time to time, made by amendments or re-making and a candidate shall, except in so far as the University determines otherwise comply with any change that applies to previous years he / she has not completed at the time of change.
3. The paper will contain nine questions having three sections viz. Sec.-A, Sec. –B, Sec.-C Students are required to attempt five questions in all including atleast one question from each section.
4. All court cases shall be subject to the jurisdiction of the Rajasthan University headquarter at Jaipur only and not any other place.

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Important

B.A. Part -I Examination
(under 10+2+3 Pattern)

The number of papers and maximum marks for each paper altogether with the minimum marks required for passing are shown in the Scheme of Examination on against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of this subject/ paper, wherever prescribed, separately. Gradation of successful candidate shall be as follows:

First division	60%	of the aggregate marks obtained in Pt.I., Pt-II and Pt. III Examinations taken together.
Second division	48%	

Rest of the candidates will be declared as passed. Minimum pass percentage is 36% No division shall be awarded at the Pt. I and Pt. II Examination.

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Theory:-

Paper-I

Principles of Indian Music (Vocal)
Common with Instrumental
Section –A

Paper : I **3 hrs. duration.**

Max. Marks-40 Min. Marks-15

1. Definition and explanations of the Following: Naad, Shruti, Swar Saptak, That, Raga, Mukhra, Sthai, Antara, Vadi, Samvadi, Anuvadi, Vivadi, Taal, Laya, Matra, Sam, Khali, Avartan, Theka, Alap, Taan, Bol-alap, Bol-taan, Sargam. Tihai, Maseetkhani Gat and Rajakhani Gat.

2. Critical study of all the Ragas, Identification and development of Raga through Alaps : Yaman, Bageshwari, Alhaiya Bilawal, Bhoopali, Hindol, Hameer, Des and Bhimpalasi.

Section –B

3. Important and Basic rules regarding Hindustani Music.

4. Writing of the prescribed Talas, with Dugun, Dhamar, Keharva, Trital, Jhaptal, Ektal, Chautal, Dadra.

Section –C

5. Classification of Indian instruments.

6. Notation writing of Composition in the prescribed Ragas.

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Paper-II

History of Indian Music(Vocal)
Common with Instrumental

Paper: II **3 hrs. duration**

Max.Marks-40 Min. Marks-15

Note : The paper will contain five questions, having three questions in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

Section – A

1. Definition of RaagLakshan, Nayak, GayakKalawant and Gandharava, Adat, Jigar,Hisab, Varieties of Gamakand Taan.

2. Detailed study of the Notation system of Pt. Vishnu Digamber Paluskar and Pt. V.N. Bhatkhande.

Section – B

3. Contribution of the following:
   Jaideo, Swami Haridas, Amir Khusro, Tansen.

4. General study : Development of Music from 13th to 18th century with special reference to : (a) Religion and Music, (b) Musical Compositions, (c) Musical Instruments.

Section – C

5. Use and description of the following instruments: Tabla, Tanpura, Sitar and Harmonium.

6. Elementary knowledge of the following dances :Katthak, Bharat Natyam, Kathakali and Manipuri.

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Practical Vocal

There shall be one practical paper. (conducted by two different Examiners : External and Internal)
(Non-collegiate candidates will have to attend a practical course of forty eight hours at university allotted centres)

Presentation of Ragas & Viva-voce

Duration of Exam. : 1 hour per candidate.

Max. Marks 120, Min. Marks. 43
(Pertaining to general questions on Raga, Laya and Taal and to sing and play all the Ragas prescribed in the syllabus).

Detailed Course:

1. To sing a given musical piece and to recognize the raga.
2. To show the difference of ragas by means of characteristics swarvistaras and to play swar-vistar in all the ragas.
3. Knowledge of bolas and Thekas on Hand Palm and Tabla to recognize prescribe Talas in syllabus as -Dhamar, Tilwara, Trital, Ektal, Chautal, Kaharva and Dadra.
4. To sing Aroh, Avroh, Pakad and Swar Vistar of the following ragas- Yaman, Bageshree, Bhoopali, Bheempalasi, AlhaiyaBilawal, Hindol,and Desh.
5. To sing and play aBadaKhyal andChhotaKhyal with sufficient varieties of Aalap-Tanas in the following Three ragas.
   (i) Yaman (ii) Bageshree (iii) Bheempalasi.
6. With the accompaniment of tabla to singChhotaKhyal withAalap-Tanas in any Three ragas of the following
   (i) Alhaiya-bilawal (ii) Hindol (iii) Bhoopali
   (iv) Des.
7. With to play a composition composed in other than trital in any of the ragas / One Dhruvpad and Dhamaar with Dugun in any Ragas mentioned in clause 4 but not selected under

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clause 5 & 6

8. To sing Light-classical / Bhajan composition in the prescribe Ragas.
9. One Sargam.

Books Recommended :

1. A Short Historical Survey of the Music of Northern India by Pt. V.N. Bhatkhande.
2. संगीत के जीवन पृष्ठ – एस.एन.राय।
3. Vadya shastra - Shri Harish Chandra Srivastava,
4. Hamare Sangeet Ratna Sangeet Karyalaya, Hathras.
5. Sangeet Visharad by Basant.
6. Comparative Study of the Music of the 15th 16th and 17th Centuries, By Pt. V.N. Bhatkhande (Sangeet Karyalaya, Hathras.)
7. Sangeet Kaumudi-Vikramaditya Singh, V. Nigam.
8. Tan Malika, Pt. III (Uttararadha) by Raja Bhaiya Poonchwale.
9. Hindustani Music : Its Physics and Aesthetics by G.S. Ranade, Sangeet Karyalaya, Hathras.
10. Music of Hindustan – Fox Staug Ways.
11. Origin of Ragas- Bandopadhayaya.
12. The Music of India by H.A. Popley.
13. Hindustani Sangeet Paddyati (Shastra) by Pt. Bhatkhande
14. Sangeet Mani Part-I,II- Maharani Sharma
15. SangeetSwarit- Ramakantdivedi
16. Swaranjali- Dr. Sharda Mishra
17. RaagRoopanjali- Prof. Pushpa Vasu

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10. Public Administration

Scheme :	Max. Marks	Pass Mini. Marks	Time
Two Papers	200	72	
Paper-I	100	36	3 Hours
Paper-II	100	36	3 Hours

Note : Each paper shall consist of two parts.

Part-I would contain 10 compulsory short answer questions of 4 marks each to be answered in 50 words.

Total Marks : 40

Part-II divided into three sections - each section contains 2 descriptive type question of 20 marks each. The candidates are required to attempt three questions selecting one question from each section.

Total Marks : 60

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Paper - I : Elements of Public Administration

Section A

Meaning, Nature of Scope of Public Administration, Importance of Public Administration in Modern Society, Public and Private Administration. Evolution of the study of public Administration. Public Administration as a Social Science, Relationship with other Social Sciences - Political Science, Economics, Sociology, Law and Psychology; Approaches to the Study of Public Administration - Classical and Humanistic.

Section B

Organization - Meaning, Formal and Informal Organization, Principles of Organization Hierarchy, Unity of Command, Span of Control, Coordination, Centralization, Decentralization, Authority and Responsibility.

Chief Executive, Line and Staff Agencies, Supervision, Delegation, Leadership, Communication, Decision-making, Public Relations.

Section C

Budget, Meaning and forms, Principles of Budgeting, Budget as a tool of socio-eco Policy, Personnel Administration : Meaning, Nature and Importance, Nature of Bureaucracy, Civil Service and its Role in a developing Society, Classification, Recruitment, Training, Promotion of Civil Servants, Morale and Motivation in Public Administration.

Books Recommended :

1. A. Awasthi, S.R. Maheshwari, Public Administration.
2. C.P. Bhambhari : Public Administration
3. D.R. Sachdeva and Meena Sogani : Public Administration Concepts and Application.
4. Mohit Bhattacharya : Public Administration.
5. Rumki Basu : Public Administration.
6. M.P. Sharma and B.L. Sadna, Public Administration in Theory and Practice,
7. S.L. Goel; Public Administration - Theory & Practice.
8. Hoshiar Singh and Pradeep Sachdeva, Administrative Theory.
9. Ravindra Sharma, Lok Prashashan Ke Tatav.
10. Surendra Katariya, Lok Prashashan Ke Tatav.

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Paper - II : Public Administration in India

Section - A

Historical Background of Indian Administration with special reference in influence of British period, salient features of Indian Administration. The Union Executive : President, Prime Minister and council of Ministers. The organization and working of the Central Secretariat and Cabinet Secretariat

Section - B

Organisation of Working of Ministry of Home and Ministry of Personnel, Pensions & Public Grievances, Major Forms of Public Enterprises - Departments, Corporations and Companies, Committee on Public Undertakings, Financial Administration : Budget Formulation, Budget Enactment and Budget Execution, Comptroller and Auditor General of India, Public Accounts Committee, Estimates Committee.

Section - C

Personnel Administration : Classification of Indian Civil Services, Recruitment and Training of All India Services. Control over Administration : Legislative, Executive and Judicial; Administrative corruption, Redressal of Public Grievances, Administrative Reforms, Comparative study of Administrative Reforms, Commission I and Administrative Reforms, Commission II with reference of Personnel Administration and Corruption.

Books Recommended :

1. S.R. Maheshwari : Indian Administration.
2. P. Sharan; Public Administration in India.
3. Ramesh Arora & Rajni Goyal : Indian Public Administration.
4. Avasthi & Avasthi : Indian Administration.
5. Hoshiar Singh & Mohinder Singh : Public Administration in India : Theory and Practice.
6. बी.एल. फडिया : भारत में लोक प्रशासन
7. पी.डी. शर्मा एवं बी.एम. शर्मा : भारतीय प्रशासन
8. रविन्द्र शर्मा : भारत में लोक प्रशासन
9. सुरेन्द्र कटारिया : भारत में लोक प्रशासन
10. एस.आर. माहेश्वरी : भारतीय प्रशासन

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प्रश्न पत्र – I : लोक प्रशासन के तत्व

प्रथम खण्ड

लोक प्रशासन का अर्थ, प्रकृति व क्षेत्र, आधुनिक समाज में लोक प्रशासन का महत्व, लोक व निजी प्रशासन, लोक प्रशासन के अध्ययन का विकास, लोक प्रशासन एक सामाजिक विज्ञान के रूप में तथा लोक प्रशासन का अन्य सामाजिक विज्ञानों – राजनीति विज्ञान, अर्थशास्त्र, समाजशास्त्र, कानून व मनोविज्ञान से सम्बन्ध, लोक प्रशासन के अध्ययन के उपागम–शास्त्रीय एवं मानवीय।

द्वितीय खण्ड

संगठन – अर्थ, औपचारिक एवं अनौपचारिक संगठन, संगठन के सिद्धान्त – पदसोपान, आदेश की एकता, नियंत्रण का क्षेत्र, समन्वय, केन्द्रीयकरण, विकेन्द्रीकरण, सत्ता एवं उत्तरदायित्व।

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मुख्य कार्यपालिका, सूत्र एवं स्टॉफ अभिकरण, पर्यवेक्षण, प्रत्यायोजन, नेतृत्व, संचार, निर्णय–निर्माण, लोक सम्पर्क।

तृतीय खण्ड

बजट : अर्थ एवं प्रकार, बजट के सिद्धान्त, सामाजिक–आर्थिक नीति के साधन के रूप में बजट, कार्मिक प्रशासन : अर्थ, प्रकृति एवं महत्व, नौकरशाही की प्रकृति, लोक सेवा और विकासशील समाज में इसकी भूमिका, वर्गीकरण : लोक सेवकों की भर्ती, प्रशिक्षण, पदोन्नति, लोक प्रशासन में मनोबल एवं अभिप्रेरणा।

अनुशंसित पुस्तकें –

1. ए. अवस्थी, एस.आर. माहेश्वरी : पब्लिक एडमिनिस्ट्रेशन
2. सी.पी. भाम्भरी : पब्लिक एडमिनिस्ट्रेशन
3. डी.आर. सचदेवा एण्ड मीना सोगानी : पब्लिक एडमिनिस्ट्रेशन : कन्सेप्टस एण्ड एप्लीकेशन्स
4. मोहित भट्टाचार्य : पब्लिक एडमिनिस्ट्रेशन
5. रूमकी बसु : पब्लिक एडमिनिस्ट्रेशन
6. एम.पी. शर्मा एण्ड बी.एल. सडाना : पब्लिक एडमिनिस्ट्रेशन इन थ्योरी एण्ड प्रेक्टिस
7. एस.एल. गोयल : पब्लिक एडमिनिस्ट्रेशन – थ्योरी एण्ड प्रेक्टिस
8. हेशियार सिंह एण्ड प्रदीप सचदेव : एडमिनिस्ट्रेटिव थ्योरी
9. रविन्द्र शर्मा : लोक प्रशासन के तत्व
10. सुरेन्द्र कटारिया : लोक प्रशासन के तत्व

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द्वितीय पत्र – भारत में लोक प्रशासन

प्रथम खण्ड

भारतीय प्रशासन की ऐतिहासिक पृष्ठभूमि – ब्रिटिश काल के प्रभावों के विशेष सन्दर्भ में, भारतीय प्रशासन की मुख्य विशेषताएँ, संघीय कार्यपालिका : राष्ट्रपति, प्रधानमंत्री एवं मंत्रिपरिषद, केन्द्रीय सचिवालय, मंत्रिमण्डल सचिवालय।

द्वितीय खण्ड

गृह मंत्रालय, कार्मिक पेंशन एवं लोक शिकायत मंत्रालय का संगठन व कार्यकरण, लोक उद्यमों के प्रमुख प्रकार : विभाग, निगम एवं कम्पनी प्रणाली, लोक उपक्रमों की संसदीय समिति, वित्तीय प्रशासन : बजट का निर्माण, बजट का संसद में अनुमोदन एवं बजट का क्रियान्वयन, नियंत्रक एवं महालेखा परीक्षक, लोक लेखा समिति, अनुमान समिति।

तृतीय खण्ड

कार्मिक प्रशासन : भारतीय लोक सेवकों का वर्गीकरण, अखिल भारतीय सेवाओं में भर्ती एवं प्रशिक्षण, प्रशासन पर नियंत्रण : विधायी, कार्यपालिका व न्यायिक नियंत्रण, प्रशासनिक भ्रष्टाचार, लोक परिवेदनाओं का निवारण, प्रशासनिक सुधार, कार्मिक प्रशासन एवं भ्रष्टाचार के विशेष संदर्भ में प्रथम प्रशासनिक सुधार आयोग एवं द्वितीय प्रशासनिक सुधार आयोग का तुलनात्मक अध्ययन।

अनुशंसित पुस्तकें :

1. एस.आर. माहेश्वरी : भारतीय प्रशासन
2. पी. शरण : पब्लिक एडमिनिस्ट्रेशन इन इण्डिया
3. रमेश अरोड़ा एण्ड रजनी गोयल : इण्डियन पब्लिक एडमिनिस्ट्रेशन
4. अवस्थी एण्ड अवस्थी : भारतीय प्रशासन
5. होशियार सिंह एवं प्रदीप सचदेवा : भारतीय प्रशासन
6. बी.एल. फडिया : भारत में लोक प्रशासन
7. पी.डी. शर्मा एण्ड बी.एम. शर्मा : भारतीय प्रशासन
8. रविन्द्र शर्मा : भारत में लोक प्रशासन
9. सुरेन्द्र कटारिया : भारत में लोक प्रशासन
10. एस.आर. माहेश्वरी : भारतीय प्रशासन

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B.A. Part – I

DRAWING & PAINTING

EXAMINATION SCHEME :

Theory Paper I	Duration	M.M.	Min. Pass Marks
Fundamentals of Arts	3 hrs.	90	$32^{1/2}$
Practical Paper II			
Part A- Study from object	3 hrs.	45	$32^{1/2}$
Part B-Creative Design	3hrs.	45	
Submission of Works (A & B)		20	07
	Total	**200**	**72**

Paper I : Fundamental of Art

Note : The paper consist of two parts :-
Part –I: Carries 30 marks and consist of 15 short type questions of 2 marks each.
Part –II: Carries 60 marks divided into three sections 4 questions of 15 marks each with internal choice. Candidates are required to attempt four questions selecting one question from each section. Each answer should be limited in 700-800 words.

Section – A

Meaning and Definition of Art, Importance of Art, Visual and Performing Arts (Painting, Sculpture, Music, Dance and Drama), Various Art Styles – Tribal and Folk Art, Child Art, Classical and Modern Art.
Creative Process – Observation, Perception, Imagination and Creative Expression.

Section – B

Elements of Painting – Line, Form, Colour, Tone, Texture, Space.
Principles of Composition – Unity, Harmony, Balance, Rhythm, Dominance, Proportion.
Perspective, Drawing and Rendering.

Section – C

Art Techniques and Materials – Fresco–Buno and Secco, Wash and Wash, Graphic Art – Lino, Wood Cut, Etching, Colograph, Lithograph etc., Colour Media and Technique - Oil, Water, Acrylic, Tempera, Pastel.

Books Recommended :

1. Survey of Indian Sculpture - S.K. Saraswati.
2. Bhartiya Murtikala - Rai Krishna Das. Nagri Pracharini Sabha, Varanasi (Kashi) AD 2030
3. Bhartiya Murtikala - Rama Nath Mishra.
4. Kala Ke Pran Buddha - Jagdeesh Gupta.
5. Studies in Indian Art - V.S. Agarwal.
6. Saga of Indian Sculpture - K.M. Munshi
7. Roop Prad Kala Ke Mooladhar - Shri Kumar Sharma, R.A. Agrawal. International publishing house, Meerut, 2004.
8. Fundamentals of Design - Donald M. Enderson.
9. Visual Dialogue - Nathan Knobler, New York, 1971
10. कला के नवीन स्वरूप – नरेन्द्र सिंह यादव, अजय यादव, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर, 2015।

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Paper – II Practical
Part-A

Study from Objects

Medium water colour size ½Imp. 3 hrs. duration

A group of objects (not more than four) should be arranged against drapery background with a flat foreground. The objects should include common articles of daily use with fruits and vegetable etc.

Part-B
Creative design

Medium any medium size ½ Imp. 3 hrs. duration

Two dimensional design should be made giving stress on stylisation, colour-scheme and texture etc.

Practical paper shall have two sessions of three hours each excluding break of one hour.
Submission of practical work Max. Marks 20 Min. Pass Marks 7

(a) 3 plates of pencil shading and 5 plates of study from objects with water colour.
(b) 8 plates of creative design.
(c) A sketch book of not less than 50 sketches.

Note : Submission of work will be submitted to the Head of the Department of Drawing and Painting of the College fifteen days before the commencement of examination. The marks in the submission will be awarded by the subject teacher (internal). However, the external examiner shall be empowered to review the work of the submission in case there is a drastic difference between the marks of the examination and submission.

Submission work will be retained till the declaration of the result and returned to the Candidate by the Department thereafter. If no claim is made within two months of the declaration of the result, the submission will be destroyed.

Note:

(a) Candidate should pass in theory as well as in practical paper separately.
(b) There should be minimum 09 hours (12 Period) for the regular study including two hours for sketching.
(c) Minimum three demonstrations should be arranged by the subject expert during the session for each practical paper.
(d) The Department should also arrange for an Educational tour to Ancient Art centres like Ajanta, Ellora, Elephanta, Khujraho, Mahabalipuram etc. once a year.
(e) Practical examination will be conducted at the centres and the practical work will be examined external examiner. The examiner will examine the answer books in consultation with and internal examiner who is the subject teacher of the Department of Drawing and Painting. University may centralize the practical examinations at few well equipped Departments to hold examination economically.

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12. SOCIOLOGY

B.A. Part-I Examination-2020

Scheme:

Max. Marks	200	Min. Pass Marks	72
Paper-I	100	3 hrs. duration	
Paper-II	100	3 hrs. duration	

नोट : समाजशास्त्र के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टों में विभाजित होगा। प्रत्येक प्रश्न–पत्र के दो भाग होंगे। प्रथम भाग 40 अंको का होगा। इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंको के एक प्रश्न में, एक–एक अंक के 20 लघु प्रश्न होंगे तथा प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20 शब्दों में देना होगा। दूसरे अनिवार्य प्रश्न के अंतर्गत दो–दो अंको के 10 प्रश्न होंगे। प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 40 शब्दों में देना होगा। निर्धारित शब्द सीमा से अधिक शब्दों में उत्तर देने पर अंक काटे जा सकेंगे। प्रश्न–पत्र के लिए निर्धारित कुल 3 घण्टों की अवधि में से अधिकतम 1 घंटे की अवधि प्रश्न–पत्र के इस भाग के लिए निर्धारित होगी।

प्रश्न–पत्र के इस प्रथम भाग के दोनों प्रश्न, 3 घण्टों में विभाजित पाठ्यक्रम के तीनों खण्डों से संबंधित होंगे। अर्थात् प्रश्न–पत्र के इस भाग में पूरे पाठ्यक्रम से संबंधित प्रश्न होंगे।

प्रश्न–पत्र के द्वितीय भाग में, पाठ्यक्रम के तीनों खण्डों में से प्रत्येक में से दो–दो निबन्धात्मक प्रकृति के प्रश्न होंगे। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए, कुल 3 प्रश्न हल करने होंगे। प्रत्येक प्रश्न 20 अंकों का होगा। प्रश्न–पत्र का यह भाग 60 अंको का होगा।

Note: There shall be two papers in all, and each paper shall be of three hours duration and of 100 marks. Each paper shall consist of two parts. Part I shall carry 40 marks. There shall be 2 questions in Part-I, first question will consist of 20 short questions of 1 mark each, carrying a word limit of 20 works. The second question will consist of 10 questions of 2 marks each, carrying a word limit of 40 words. Marks may be deducted if the word limit is exceeded. This part of the question paper will be given maximum one hour duration and shall relate to all the three sections covering thereby the entire course.

Part-II of the question paper shall be divided into three sections comprising 6 essay type questions of 20 marks each. Candidates will be required to attempt 3 questions selecting one question from each section. This part of the question paper shall be of 60 marks.

Paper I: Introduction to Sociology

Max Marks: 100

Unit 1: Understanding Sociology

- Origin of Sociology, Meaning, Nature, Subject Matter and Scope of Sociology.
- Sociology and other Social Sciences.
- Scientific and Humanistic Perspectives.

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Unit 2: Basic Concepts in Sociology

- Society, Community, Social Group.
- Institution, Social Structure, Social System, Status and Role, Social Action, Culture, Norms and Values.
- Associative and Dissociative Social Processes.

Unit 3: Dynamics in Sociology

- Social Stratification: Concept, Forms and Theories (Functional and Marxist).
- Social Change and Mobility: Concept and Forms, Theories of Social Change (Linear, Cyclical).
- Socialization: Concept, Stages and Theories (Sigmund Freud, G.H. Mead and C.H. Cooley).

Essential Readings: (in English):

1. Beteille Andre, 2002: Sociology: Essay on Approach and Method, New Delhi: OUP
2. Bottomore, T.B. 1972: Sociology: A Guide to Problems and Literature,
3. Bombay: George Allen and Unwin (India). (Hindi Edition also)
4. Davis, Kingsley, 1981: Human Society, Delhi: Surjeet Publications.
5. Giddens Anthony, 2005: Sociology, London, Polity Press
6. Harlambos, M: 1998: Sociology: Themes and Perspectives. New Delhi: Oxford
7. Inkeles, Alex. 1987: What is Sociology? New Delhi: Prentice-Hall of India Pvt Ltd.
8. Jayaram, N. 1988: Introductory Sociology, Madras: Macmillan India.
9. Johnson, Harry M. 1995: Sociology: A Systematic Introduction. New Deihi: Allied Publishers.
10. Rawat, H.K. 2007: Sociology: Basic Concepts, Rawat Publications, Jaipur.
11. Rawat, H.K. 2013: Contemporary Sociology, Rawat Publications, Jaipur
12. Schaefer, Richard T. and Robe i P. Lamun. 1999: Sociology, NewDelhi, Tata McGraw Hill.
13. Singh J.P. 2008: Sociology: Concepts and Theories, Prentice-Hall of India Pvt. Ltd.

Essential Readings: (in Hindi):

1. सिंधी, नरेन्द्र कुमार एवं गोस्वामी, वसुधाकर, 2007, समाजशास्त्र विवेचन, जयपुर : राजस्थान हिन्दी ग्रन्थ अकादमी
2. आहूजा, राम एवं आहूजा, मुकेश, 2008, समाजशास्त्र विवेचना एवं परिपेक्ष्य, जयपुर : रावत पब्लिकेशन्स
3. दोषी, एस. एल. एवं जैन पी. सी., 2006, समाजशास्त्र नई दिशाएँ, जयपुर : रावत पब्लिकेशन्स
4. सिंह, जे. पी., 2008, समाजशास्त्र : अवधारणाएँ एवं सिद्धान्त, नई दिल्ली : प्रेंटिस हाल ऑफ इण्डिया प्राइवेट लिमिटेड
5. सिंह, जे. पी., 2008, आधुनिक भारत में सामाजिक परिवर्तन, नई दिल्ली : प्रेंटिस हाल ऑफ इण्डिया प्राइवेट लिमिटेड
6. मैकाइवर, आर. एम. एवं पेज चार्ल्स एच. 1992 : समाज (एक परिचयात्मक विश्लेषण), आगरा : रतन प्रकाशन मन्दिर (अनुवादक जी. विश्वेश्वरया एवं रामपाल सिंह गौड़)

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Paper II: Society in India

Max Marks: 100

Unit 1: Sociological Understanding of Indian Society

- Textual and Field-View Traditions : G.S. Ghurye and M.N. Srinivas
- Civilization and the Marxian Tradition: N.K. Bose and D.P. Mukerji

Unit 2: Basic Institutions of Indian Society

- Family, Marriage and Kinship: Meaning, Forms and Challenge.
- Caste and Class: Meaning, Forms and Changing Patterns.

Unit 3: Challenges & Problems before Indian Society

- Casteism, Communalism, Regionalism.
- Corruption, Drug Abuse, Crime against Women and Children.
- Problems of Ageing.

Essential Readings: (in English):

1. Ahuja, Ram, 1993: Indian Social System, Jaipur: Rawat Publications.
2. Ahuja, Ram, 2002: Society in India: Concepts, Theories and Recent Trends, Jaipur: Rawat Publications.
3. Ahuja, Ram, 2014: Social Problems in India, Jaipur : Rawat Publications.
4. Atal, Yogesh, 2008: Changing Indian Society, Jaipur: Rawat Publications.
5. Bose, N.K. 1967: Culture and Society in India, Bombay: Asia Publishing House.
6. Bose, N.K. 1975: Structure of Hindu Society, New Delhi.
7. Dube, S.C. 1990: Society in India, New Delhi: National Book Trust.
8. Mandelbaum, D.G., 1970: Society in India, Bombay: Popular Prakashan
9. Nagla, B.K. 2013: Indian Sociological Thought, Jaipur: Rawat Publications
10. Sharma K.L., 2007, Indian Social Structure and Change, Jaipur: Rawat Publications
11. Singh, Yogendra, 1994: Modernization of Indian Tradition, Jaipur: Rawat Publications
12. Srinivas, M.N., 1963: Social Change in Modern India, California: University of California Press.
13. Srinivas, M.N., 1980: India: Social Structure, New Delhi: Hindustan Publish

Essential Readings: *(in Hindi):*

1. आहूजा, राम, 2009, भारतीय सामाजिक व्यवस्था, जयपुरः रावत पब्लिकेशन्स
2. दोषी, एस॰ एल॰ 2009, भारतीय सामाजिक विचारक, जयपुरः रावत पब्लिकेशन्स
3. शर्मा, के॰ एल॰, 2006, भारतीय सामाजिक संरचना एवं परिवर्तन, जयपुरः रावत पब्लिकेशन्स
4. दोषी, एस॰ एल॰ एवं जैन पी॰ सी॰, 2002, भारतीय समाज, जयपुरः नेशनल पब्लिशिंग हाऊस
5. पटेल, तुलसी, 2011, भारत में परिवारः संरचना एवं व्यवहार, जयपुरः रावत पब्लिकेशन्स
6. जैन, शोभिता, 2006, भारत में परिवार, विवाह और नातेदारी, जयपुरः रावत पब्लिकेशन्स

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13. HOME SCIENCE

B.A. Part-I Examination-2020

Examination Scheme in each Year

- Each Theory paper will contain nine questions having three questions from each unit. Candidates are required to attempt five questions in all selecting at least one question from each unit. Each question will be of 10 marks.

Eligibility

- Those students who have passed 12th class or intermediate under the scheme of 10+2 with minimum 48% marks in aggregate are eligible for admission in BA (Part I)

Learning Outcome of the Course

The following learning outcomes of this course are :-

- The course will enable the students to have an in depth understanding of the several concerns pertaining to family and community. After program of study they shall become more effective and better at handling the requirements of their family and community related to nutrition, human relationships, resource management and textiles and clothing.
- The student shall have knowledge about management of family resources and be able to do designing of interiors and plan their housing requirements.
- They shall have knowledge about the nutritional requirements through the various stages of life cycle and shall learn skills for cooking various food groups.They shall also have a basic knowledge about therapeutic nutrition and management of simple illnesses.
- The students shall have an understanding of family and lifespan development; and shall learn about the developmental milestones. It will enable them to achieve balance in their family relationships.
- This course will give them knowledge about textiles and clothing, and will help them in selection of appropriate textiles and apparel. It will provide them with basic stitching and finishing skills.
- They will also have an understanding of the reproductive issues of women through various stages, and shall enable them to care for new born, infants, pregnant and lactating mothers.
- The vocational training options shall enable the students to take up an area of their interest and convert it into a profitable enterprise. They can opt for event management, food preservation, nutrition education programs, early childhood education, dyeing and printing or extension activity management.

BA Home Science Part I

Paper	Subjects	Duration of exam	Maximum marks	Minimum marks	No. of hrs/wk

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Theory Paper I	Family Resource Management	3hrs	50	18	4
Practical I	Family Resource Management	3hrs	50	18	2
Theory Paper II	Foods& Nutrition	3hrs	50	18	4
Practical II	Foods & Nutrition	3hrs	50	18	2
		Total	200	72	12

B.A. PART I

FAMILY RESOURCE MANAGEMENT (THEORY PAPER I)

Maximum Marks: 50
Minimum Marks: 18
Teaching workload: 4 hrs /week
Total teaching workload: 96 hrs/ year

Learning Outcomes

1. Students will develop an insight in managing family resources i.e. time , money, and energy.
2. The procedure of handling money and savings and investment will be learnt.
3. There will be a general insight regarding consumer rights and responsibilities.
4. Students will develop an insight in house planning and interior decoration

Objectives :

1. To understand the meaning of resources management concepts related to management.
2. To apply managerial process to management of time, energy and money.
3. To understand saving, investment and credit pattern of family.
4. To increase awareness about consumer problems, rights, responsibilities & protection laws

Contents :

UNIT-I

Housing	**Hours**
1. Function & family need of housing	2
2. Principles of house planning: aspect, prospect, grouping of room, roominess, privacy, orientation, circulation, flexibility, spaciousness, aesthetics economy, ventilation services	7
3. Site selection: • Vegetation: i. size ii. soil types drainage iii. contour (shape) iv. orientation	3
4. Elements and principles of arts and design as related to interior decoration with specific reference to color and light	8
5. Floor decoration with use of elementary art	

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6. Table setting & etiquettes	2 1
UNIT II **Interior designing**	
7. Room arrangement and decoration - arrangement of furniture, furnishings and accessories in various rooms.	8
8. Kitchen planning, importance of counters, storage, principles, working heights.	8
9. Selection and care of household equipment (without reference to any specific equipment)	2
10. Household waste & its management by 3R	4
11. Flower decoration • Basic equipments • Vases and containers • Preparing plant material • Shaping an arrangement	5
12. Furniture • Types of furniture • Selection use & care • Arrangement of furniture in various rooms	4
13. Consumer problems, rights & responsibilities	3
14. Seeking redressal to consumer problems with special reference to consumer courts	5
UNIT-III **Resource Management**	
15. Meaning, definition and importance of home management	4
16. Process of management: • planning, • Organization, • Implementation, • controlling and evaluation	5
17. Introduction to motivational factor (meaning and types) • Values • Goals • Standards • Decision Making • Resources	5
18. Time management: • Tools in time management i. Time cost ii. Time norms iii. Peak loads iv. Work curve and rest periods • Process of managing time	5
19. Energy Management: • Process of energy management	

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• Fatigue • Body mechanics • Works simplification -Mundel's Classes of changes • Ergonomics: Meaning, importance & its components	7
20. Money Management • Family Income: sources & type • Budget: Definition & Process of budget making • Saving, investment and raising housing loan: i. Definition & Objectives ii. Channels: bank, insurance, post office	8
NOTE: Seminar presentations on selected topics from unit I and unit II	

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New Delhi.
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24. Varghese MA, Ogle M, Srinivasan K (1985). Home Management. Wiley Eastern Publishers, New Delhi.

FAMILY RESOURCE MANAGEMENT (PRACTICAL I)

Maximum marks: 50
Minimum marks: 18
Teaching workload: 1 practical/ week (2 hours/ practical)
Total teaching workload: 24 practical/ batch

Objectives:

1. To help students understand various banking procedures.
2. To help students understand house planning and interior decoration.

Contents:	**Hours**
1. Project work on money management:	4
• How to open various accounts in the bank.	
• Filling up of slips/forms of bank and post office.	
i. Application for draft	
ii. Cheques	
iii. Withdrawal slip	
iv. Money order form	
v. Application for housing loan	
2. Floor decoration: Alpana ,Rangoli & Mandana	2
3. Flower arrangement: fresh and dry arrangements.	2
4. Table setting	1
5. Best out of waste (one article)	1
6. Cleaning of wood, stone, tiles, metal & glass.	1
7. House plans :	6
• For various income groups (LIG,MIG,HIG)	
i. Drawing of architectural symbols of house plan	
ii. Architectural symbols of electricity plan	
iii. Furniture symbols	
• Rooms (making any one paper model)	
i. Drawing Room	3
ii. Dining cum leaving room	
iii. Children study room	
iv. Bed room	

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v. Pooja Room • Kitchen planning (making any one paper model) i. One wall ii. Two wall iii. L shape iv. U shape	4

Examination scheme:

Total Marks: 50 marks
Major: house plan/paper plan of rooms/paper plan of kitchen : 15 marks
Minor - I: Table setting/flower arrangement: 8 marks
Minor - II: Floor decoration/cleaning/filling of forms: 7 marks
Internal - 20 marks

FOODS & NUTRITION(THEORY PAPER II)

Maximum Marks: 50
Minimum marks: 18
Teaching workload: 4 hrs /week
Total teaching workload: 96 hours/week

Learning outcome:

After studying the subject, the student will possess the basic knowledge of food groups, nutrients and basic metabolism related to nutrition in humans. This will further help them in the selection of healthy diet. Knowledge of various cooking methods and meal panning will enable them to cook and select healthy foods for themselves and their families. This subject will also give them basic understanding about nutritional needs in the various stages of life cycle and during disease.

Objectives:-

1. To give knowledge about basics of nutrition, nutrients and metabolism.
2. To give knowledge about meal planning for families and individuals.
3. To give knowledge about Normal & Therapeutic nutrition.
4. To give knowledge about Nutritional problems of public importance.

Contents	**Hours**
Unit I	
1. Definition of foods and nutrition, 5 basic food groups, balanced diet 2. Function of food: • Physiological – hunger, appetite, satiety • Psychological • Social, economic, cultural	4
3. Functions, sources, daily allowances of: • Macro nutrients i. Carbohydrates ii. Proteins iii. Fats	6

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• Micro nutrients i. Minerals – calcium, iron, iodine, fluorine ii. Vitamins Water soluble – B complex vitamins, vitamin C Fat Soluble – A, D, E & K	15
• Water	2
• Energy metabolism i. Contributors of energy ii. BMR and factors affecting BMR	5
Unit II	
4. Meal Planning • Importance and factors affecting meal planning • Factors affecting food intake • Sample menu for adult male and female	4
5. Normal nutrition – nutritional requirements, physiological demands, problems, dietary guidelines for: • Pregnancy • Lactation • Infancy (with special emphasis on breastfeeding and complementary feeding) • Preschool child • School going children • Adolescent • Adult • Elderly person	26
Unit III	
6. Therapeutic nutrition • Modification of normal diet to therapeutic diet • Dietary management of the following: i. Weight management – obesity, underweight ii. Diseases of gastrointestinal tract – indigestion, diarrhea and constipation iii. Fever	22
7. Nutritional importance of public health importance and their management: • Protein Energy Malnutrition • Anemia • Vitamin A deficiency	10

References:

1. Srilakshmi B (2011). Dietetics. New Age International Publishers
2. Srilakshmi, B. Food Science , new Age International (P) Ltd. Publishers, New Delhi,
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FOODS AND NUTRITION (PRACTICAL II)

Maximum marks: 50
Minimum marks: 18
Teaching workload: 1 practicals/ week (2 hours/ practical)
Total teaching workload: 24 practicals/ batch

Learning outcome:-

This practical will enable the students to learn basic cooking skills and various methods of cooking used. It will help them to plan and prepare appropriate dishes for people of various age groups. They will learn about dietary management of various diseases.

Objectives:-

1. **To give knowledge about basics of methods of cooking.**
2. **To learn cooking of various food groups.**
3. **To understand about planning for Normal & Therapeutic nutrition.**
4. **To learn to plan and prepare foods for various nutritional problems of public importance**

Contents:	Hours
Methods of cooking: - Preparation of any four dishes by using the different methods of cooking (Steaming/Simmering/Frying/Baking/Roasting):	
• Preparation of Beverages – Tea (hot & iced), Coffee (Hot & Cold), Chaach, lassi, milk shakes, fruit punch (using squashes & fresh fruits), lemonade, jaljeera, aamla shake, aam panna, mocktails (any 2) mirinda shake.	2
• Cereal cookery – Chapaati, puri (Plain, missi), Parantha (Stuffed, plain), rice, Cheela, bhatura, Idli, Muthia mathri (namak para, shakkar para), chowmein , pizza, sandwiches (open toasted & vegetable), Cake, Biscuit, Nan khatai	2
• Legumes & pulses - daal (plain & daal fry), rajma, chhole, dal makhani, kadhi mangodi, dahivada, dal pakodi, besan pakodi, sprout chaat, dal halwa. Dhokla, muthia, Kadhi	2
• Vegetables –Dry Vegetables (for e.g. aalu gobi, methi aalu, arbi, bhindi), stuffed vegetables (bhindi, capsicum), vegetables with gravy (dahi aalu, malai kofta, gatta, dum aalu, kadhai panner, shahi paneer), baked vegetables, soups (clear & cream), salads & salad dressings (mayonnaise, lemon, vinegar).	4
• Milk & Milk products – Paneer, khoa, curd, shrikhand, kheer, rabri, fruit custard, raita, fruit cream, Kheer, Custard, Stews- apple & pear	2
• Savory food preparation- dosa, uttapam, mixed veg cutlets, hara bhara kabab, burger, samosa, kofta, kachori, vada, pav bhaji, sago khichri, bhelpuri.	2

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• Sweets- jalebi, sandesh, laddu, coconut barfi, gujiya	2
Meal planning for	
• Exchange Lists	
• Adult man/woman	1
• Pregnant Woman	
• Lactating Woman	
• Packed lunch for school going child	15
• Elderly	

Examination scheme:

Total Marks: 50 marks

1. **Major problem -** 20 marks
   Meal Planning and preparation of one dish for any one of the following
   - Pregnant woman
   - Lactating woman
   - Packed lunch for school going child adult man / woman
   - Elderly
2. **Minor Problem –** 10 marks
   Preparation of one dish from
   1. Any one method of cooking
   2. Any one food group (cereals, vegetable, milk etc.)
3. **Internal –** 20 marks

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14. TEXTILE CRAFT

B.Sc / B.Com / B.A. Part-I

Scheme: B.Sc. B.A/B.COM PART-I

			DURATION	MAX.MARK	MIN.MARK
(i)	**Theory:**	One paper	3Hrs	60	22
(ii)	**Practical:**	One	3Hrs	80	28
(iii)	**Submission:**	Two		60	22

(Theory): Introduction to Textile Craft

UNIT-I

1. Introduction to Textiles
2. Definition of fibre, Properties of textile fibres, Primary & Secondary properties.
3. Classification of fibres
4. Production, manufacturing, properties and uses of Natural vegetable fibres- cotton, linen and jute
5. Yarn manufacture by Takli and Charkha

UNIT-II

1. Warp and Weft, Difference between warp and weft
2. Handloom, Parts of Handloom
3. Warp path on Handloom
4. Motion of Handloom(primary & secondary)
5. Elementary Weaves(Basic weaves): Plain, Twill, Satin & Sateen

UNIT-III

1. Concept of colours, Colour Wheel, Colour schemes, Achromatic & Monochromatic colours
2. Dyes and Pigments (colourless dyes)
3. Classification of Dyes
4. Dyeing of cotton fabric by Tie and Dye process
5. Fabric finishes- Introduction and Importance, basic finishes- bleaching, scouring, singeing, mercerising

(Practical):

Samples preparation

(i) Tie and Dye (Marbling, pleating & folding, laheria and bandhej)

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(ii) Elementary weaves (plain, twill, satin and sateen) on graph paper
(iii) Primary colour, secondary colour, colour scheme, achromatic & monochromatic colour
(iv) Hand painting
(v) Stencil Preparation and Painting

Submission:

Develop any two products

(i) Dupatta / scarf/table cover using tie and dye
(ii) Cushion cover or table mats using hand painting or stencil painting

Examination Scheme:

Major Problem: 50 Marks

Tie and dye/ stencil printing / hand painting on a product

Minor Problem: 30 Marks

Preparation of any weave or colour scheme

Reference books :

Dantyagi, S. (2012) Fundamental of Textiles, Orient Blackswan private limited.

Gohl, E. P. G. & Vilensky, L.D. (2005) Textile Science, CBS publishers & distributors PVT.Ltd. New Delhi

Taggart, W. (1920) Cotton Spinning, London; New York: Macmillen. London

Bannergee, N.N. (1986) Weaving Technology, 9th edition, Textile book house

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15. Garment Production & Export Management

B.Sc. /B.Com/ B.A. Part-I Examination-2020

PAPER- I: UNDERSTANDING TEXTLES

B.A/B.Com. -M.M. 60 **Hrs.3**

B.Sc. M.M. 50

OBJECTIVES: -

1. To know different textile fibers & their performances.
2. To gain knowledge on different textiles fiber processes and finishes.
3. To become familiar with traditional textiles & embroideries of India.
4. To understand the selection criteria's of clothes

SECTION A: Textile Technology

1. Textile fibers: : General properties of Natural Fibers – Cotton, Wool. Silk, Regenerated – Rayon, Acetate Synthetic Fibers – Nylon, Acrylic
2. Fibers to yarn : The basic process involved in making yarns including blending, carding, combing, mechanical and chemical spinning
3. Fabric construction : Weaving: plain, twill, & satin weave
4. Fabric Finishes : Calendering, mercerization and tentering

SECTION B : Traditional Textile

5. Woven fabrics : Dacca muslin jamdani, chanderi, brocade baluchari, kashmiri shawls, doria, kanjivaram
6. Dyed Fabrics : Bandhej, ikat, patola.
7. Printed Fabrics : kalamkari, madhubani
8. Traditional embroideries of India :
   a) Kashida of Kashmir
   b) Kasuti of Karnataka
   c) Manipuri
   d) Chamba rumal of Himachal Pradesh
   e) Kantha of Bengal
   f) Phulkari of Punjab
   g) Chikankari of Uttar Pradesh

SECTION – C SELECTION CRITERIA

9. Selection of suitable fabrics for infants, toddlers, pre- school children, school going children, adolescents, adults and special needs
10. Buying criteria for readymade garments, definition, origin & evolution of ready to wear garments

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1. Corbman, B. P. (1983). Textiles fibre to fabric. Mc Graw Hill education.
2. Phyllis, G. T., & Billie J. C. (2009). Understanding textile. Pearson publication.
3. Naik, S.D. (1996). Traditional Embroideries of India. APH publishing.
4. Bhatnagar, P. (2009). Traditional Indian costumes and textiles. Abhishek publication.
5. Dhantyagi, S. (2012). Fundamentals of textile and their care. Orient Black swan.
6. Singh, B. Vastra vigyan avam paridhan.
7. Marjory, J. L. (1966). Introductory textile science. Holt McDougal.
8. Marjory, J. L. (1976). Essentials of textiles. Holt McDougal.
9. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER – II

BUSINESS AND GARMENTS INDUSTRIES

B.A/B.Com.-M.M.60 **Hrs.- 3**

B.Sc.- M.M.50

OBJECTIVES: - To enable students to:-

1. Acquaint with different types of Business ownership.
2. Understand merchandising in Apparel Industries.
3. Understand the garment industry and project planning.

SECTION-A BASICS OF BUSINESS

1. Meaning and scope of business with special reference to garment export trade in India
2. The important factors to be considered at the same time of commencement of business - legal, economical, and social
3. Different types of business-
   a) individual organization
   b) partnership
   c) co-operative
   d) public sector
   e) company
4. Objectives, importance and utility of book keeping.

SECTION – B MERCHANDISING THEORY

5. Introduction to fashion merchandising. merchandising planning, scheduling, buying and evaluation
6. Visual merchandising.
7. Careers in Apparel industries.

SECTION –C GARMENT INDUSTRY

8. Project planning for garment production unit.

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9. Production and storage space, laundry area of garment industry.
10. Site selection for unit
11. Budgeting for garment production unit.

Referances :

1. Kaplan, S. R. & Anthen A. A. (2014). Management. Darling kindesley Pearson education.
2. Frings, G.S. (2007). Fashion from concept to consumer. Pearson G edition.
3. Jindal, R. (1998). Handbook of fashion; best drafting techniques. Mittal publications.
4. A.K. Sharma , S. Sharma, R. Nagar, A. Jain, S. A. Bakshi, 2016, Entrepreneurship and small business management (Hindi) 1st ed. Ajmera Book Company, Jaipur

PRACTICAL – 1
BASICS OF GARMENT CONSTRUCTION

B.A./B.Com.- M.M. 80 **B.Sc. - M.M. 50** **Hrs. 4**

OBJECTIVES: - To enable students to:-

Develop skill in understanding all stitching technique.

Develop expertise in basic and traditional embroidery which gives creative, decorative and ornamental effect on dress.

Contents

1. **Sample making :**
   Basic seams - Basting (even, uneven) back stitch, blanket)
   Hems – visible, invisible
   Lace edging – (machine)
   Gathers - (machine), darts
   Pleats – knife, box, inverted box
   Frills one side, two sided
   Tucks – pin, cross, shell
   Fasteners – hook , press button, shirt button, button hole, loop with button, zip
   Plackets – continuous, two piece
   Pockets – patch, bound, inseam, kurta
   Edge finishing - piping and facings
2. **Basic Embroidery stitches :**
   Chain, stem, running, lazy-dazy, satin, herring- bone, buttonhole, bullion, feather patch and appliqué work.
3. **Make samples of following traditional embroideries :**
   kashida, kantha, kasuti, phulkari, chamba
   Taking body measurements and knowledge of standard measurements from child to adults

Examination Scheme: B.A.\B.COM:-Max Marks:-80 B.Sc:-Max Marks:-50

1. Major Problems:-40	2. Minor Problems:-25	Internal:-15
1. Major Problems:-20	2. Minor Problems:-20	Internal:-10

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16. INVESTIGATIVE BIO-TECHNOLOGY

Paper I : Bio-Chemistry and General Bacteriology

Max. Marks 60 3 hrs. duration Min. Pass Marks 22

Teaching Periods 60

Section - A : Bio-Chemistry (Teaching Period 30)

1. Introduction and Scope of Bio-Chemistry.

2. Simple Analytical techniques : Weighing of solids and liquids; Preparation of solutions : Simple acid-base titration.

3. pH, Buffers types and their uses.

4. Mole, Molar and normal solutions, concentration units.

5. Classification and metabolism of Carbohydrates, Lipids, Proteins, Nucleic acids and Nucleo proteins.

6. Introduction of Vitamins and Enzymes; Clinically important enzymes and their estimation.

7. Metabolism of inorganic substances like Iodine, Phosphorous, Copper, Iron and Calcium.

8. Electrolytes in various tissue fluids in health and disease.

9. Gastric Analysis- Functional test of Lever, Kidney Pancreas and alkalosis, acidosis.

Section-B General Bacteriology (Teaching Period 30)

1. Microbial World.

2. Structure of bacterial cell; functions of cell organelles.

3. Sterilization and disinfection.

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4. Culture media.
5. Cultivation of Bacteria.
6. Identification methods in bacteriology.

Paper II - Elementary Anatomy, Physiology and Halmatology
Max. Marks 60 3 hrs. duration Min. Pass Marks 22
Teaching Periods 60

Section-A : Elementary Anatomy and Physiology
(Teaching Period 30)

1. Introduction to human body.
2. Important land marks in surface anatomy for L.M. and I.V. injection in adults, children and infants
3. Muscculo- Skeleton and Respiratory system.
4. C.V.S. (Cardio Vascular System) circulation.
5. G.I.T. (Gestro Intestine Tract), Lever, Gallblader & Pancreas.
6. Urinary System.
7. C.N.S. (Central Nervous System) and A.N.S. (Autonomic Nervous System)
8. Endrocrines and Reproductive system.
9. Skin and temperature regulation.

Section - B : Hematology (Teaching Period 30)

1. Structure of cell and cell division.
2. Blood forming tissues and Bone-marrow.
3. Formation of RBCs. granulocytes, Mononuclear cells, Platelets and their normal counts.
4. Blood coagulation.
5. Anaemias-classification, diagnosis.

Practicals.
Max. Marks 80 (52x3 periods) Min. Pass Marks 28

Unit-I : Bio-Chemistry

1. Glassware use in Bio-chemistry.
2. Cleaning of Glassware, weighing and measuring volumes.
3. Making and testing of distilled water.
4. Importance of calibration of glass apparatus used in estimation.

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5. Collection, coding, preservation and disposal of biological specimen material for biochemical analysis.

6. Principles of Colorimetry and verification of Lumber-Bear's Law.

7. Bio-chemical estimation of-

(a) Sugar (b) Urine

(c) Stool (d) Protein

(e) A.G. ratio.

8. Detection of Organic poisons like opium, oliander and vomice.

9. Detection of Inorganic poisons like cooper, arsenic, antimony, tin, murcery, lead, barium and zinc phosphate, cyanides & insecticides.

Unit-II General Bacteriology and Hematology

General Bacteriology :

1. Introduction to microscopy, various types of microscopes and their uses.

2. Wet bacterias mount and hanging drop preparation and dark field examination.

3. Preparation of smears for bacterial examination and Gram's Stain.

4. Preparation of various stains.

5. Staining of Smears-Sputum C.S.F. Body fluids, pus, asyirations.

Hematology :

1. Collection of blood from various sites in adult and children.

2. Cleaning of slides and cover slips and identification of various pipettes and their cleaning.

3. Making of statins used in Hematology.

4. Staining and examination of blood films.

5. Differential RBC and WBC counts.

6. Estimation of Hemoglobin by comparator and calorimeter.

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17 MATHEMATICS

B.A. Part-I

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 candidates in each batch)

Examination Scheme :		**Min.Pass Marks**	**Max. Marks**
Science –		**54**	**150**
Arts –		**72**	**200**
		Duration	**Max.Marks**
Paper – I	**Discrete Mathematics**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – II	**Calculus**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – III	**Analytic Geometry and Optimization Theory**	**3 hrs.**	**40 (Science)** **54 (Arts)**
Practical	**Optimization Techniques**	**2 hrs.**	**30 (Science)** **40 (Arts)**

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.
4. Each candidate has to pass in Theory and Practical examinations separately.

Paper – I: Discrete Mathematics

Teaching : 3 Hours per Week **Max. Marks: 40 (Science)**

Duration of Examination : 3 Hours **53 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

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Unit 1 : Sets, Cardinality, Principal of inclusion and exclusion, Mathematical induction, Relations and Functions, Binary relations, Equivalence relations and partitions, Partial order relations and Lattices, Chains and Anti-chains. Pigeon hole principle.

Unit 2: Boolean Algebra- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices, Boolean Lattices, Boolean functions and Boolean expression.

Fundamental theorem of arithmetic, Divisibility in Z, Congruence's, Chinese reminder theorem, Euler's functions, Primitive roots.

Unit 3: Logic and propositional calculus, Simple and compound propositions, Basic logical operations, Truth tables, Tautologies and contradictions, Propositional functions, Quantifiers. Discrete numeric functions, Generating functions, Recurrence relations and Recurrence algorithms, Linear recurrence relation with constant coefficients and their solutions, Total solutions, Solution by the method of generating functions.

Unit 4: Basic concepts of graph theory, Types of graph (Connected Graphs, Regular graphs, Planar graphs), walk, Paths & Circuits, Shortest path problem. Operations on graphs (union, join, products)

Unit 5: Matrix representation of graphs, Adjacency matrices, Incidences matrices,

Tree, Spanning tree, Minimumm spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree. Hamiltonian and Eulerian graphs

Reference Books:

1. K.H. Rosen, Discrete Mathematics and it's Applications, McGraw Hill, 1999.
2. N.L. Biggs, Discrete Mathematics, Oxford Science Publication, 1985.
3. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Tata McGraw Hill, 2008.
4. T. Koshy, Discrete Mathematics with Applications, Academic Press, 2005.
5. N. Deo, Graph Theory, Prentice Hall of India, New Delhi, 2004.

Paper- II: Calculus

Teaching : 3 Hours per Week **Max. Marks: 40 (Science)**

Duration of Examination : 3 Hours **53 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Series – Infinite series and Convergent series. Tests for convergence of a series – Comparison test, D'Alembert's ratio test, Cauchy's n-th root test, Raabe's test, De-Morgan-Bertrand's test, Cauchy's condensation test, Gauss's test, (Derivation of tests is not required). Alternating series. Absolute convergence. Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of sinx, cosx, e^x, $\log_e(1+x)$, $(1+x)^n$.

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Unit 2: Derivative of the length of an arc. Pedal equations. Curvature – Various formulae, Centre of curvature and Chord of curvature. Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions.

Unit 3: Envelopes and evolutes, Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curves (Cartesian and Polar curves).

Unit 4: Beta and Gamma functions, Reduction formulae (simple standard formulae), Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral.

Unit 5: Areas, Rectification, Volumes and Surfaces of solids of revolution.

Reference Books :

1. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
3. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

Paper-III: Analytic Geometry and Optimization Theory

Teaching: 3 Hours per Week **Max. Marks: 40 (Science)**
Duration of Examination: 3 Hours **54 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics

Unit 2: Sphere, Cone.

Unit 3: Cylinder, Central Conicoids – Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes, Direct sphere, Normals.

Unit 4: Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equation of second degree in three-dimensions to standard forms.

Unit 5: The linear programming problem. Basic solution. Some basic properties and theorems on convex sets.. Fundamental theorem of L.P.P. Theory of simplex method only Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

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Reference Books :

1. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
2. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
3. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.

Practical

Teaching: 2 hours per week per batch not more than 20 students

Examination: **Duration: 2 Hours**

Scheme	**Science**	**Arts**
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks	(13 Marks each)	26
Practical Record	=	05 Marks		07
Viva-voce	=	05 Marks		07
Total Marks	=	30 Marks		40

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Group A : Modelling of industrial and engineering problems into Assignment Problems and Transportation Problems and their solutions.

Group B : List of problems (with free and open source software tool Scilab)

(i) Plotting the graphs of the following functions : ax, $\sqrt{ax+b}$,$|ax+b|$, $c\pm|ax+b|$, $x^{\pm n}, x^{1/n}$ $(n \in z)$, e^{ax+b}, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $|\sin(ax+b)|$, $|\cos(ax+b)|$. Observe and discuss the effects of change in the real constant a, b and c on the graphs.

(ii) Graphs of hyperbolic functions and inverse trigonometric functions.

(iii) Plotting and analyzing the graphs of polynomials and their derivatives.

(iv) Complex numbers: Operations like addition, subtraction, multiplication, division, Modulus and inbuilt functions conj, imag, imult, isreal, real.

(v) Matrix operations: Addition, Multiplication, Inverse, Transpose, Determinant, Rank and inbuilt functions eye, ones, zeros. Solving the system of linear equations.

(vi) Solution of linear programming problems by using inbuilt functions of Scilab.

Note:

1. For Group A : Problems will be solved by using Scientific Calculators (non-Programmable)
2. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
3. Each Candidate has to pass in Practical and Theory examination separately.

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18. ECONOMICS

B.A. Part-I

Scheme:		Min. Pass Marks	Max. Marks
Arts		72	200
Science		54	150
Paper- I	3 hours duration	Micro Economic Theory	Arts 100 Science 75
Paper-II	3 hours duration	Indian Economy	Arts 100 Science 75

Note: There will be two papers of Economics. Each paper shall consist of three parts.

Part A shall contain question No 1 consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Parts C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Parts A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

PAPER 1- MICRO ECONOMIC THEORY

Section – A

Nature and scope of Economics, Methodology: Micro and Macro Economics, Static and Dynamic analysis, Positive and Normative Economics.

Theory of Consumer Behavior: Utility Analysis, Indifference Curve Analysis: Consumer's Equilibrium, Price, Substitution and Income Effects, Normal, Inferior and Giffen Goods. Law of Demand and the Demand Curve. Elasticity of Demand: Price, Income and Cross Elasticity, Arc and Point Elasticity, Relationship between Elasticity, AR, MR and TR. Factors affecting Price Elasticity of Demand. Substitute and Complementary Goods, Consumer's Surplus.

Section- B

Production Function: Law of Variable Proportions, Three Stages of Production Function, Law of Returns to Scale. Iso-quant and Iso –Cost, Optimum Factor Combination. Theory of Cost: Short-run and Long- Run Cost Curves. Market Structures: Determination of Price and Output in the Short and Long Run under Perfect Competition, Monopoly, Discriminating Monopoly, Monopolistic Competition, Excess Capacity.

Section – C

Theory of Distribution, Marginal Productivity Theory, Factor Pricing Under Perfect and Imperfect Competition in Labor Market, Ricardian Theory of Rent, Modern Theory of Rent and Quasi-rent. Theory of Interest: Classical and Liquidity Preference, Theory of Profit, Risk and Uncertainty.

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Books Recommended:

1. Lipsey and Crystal : Economics 13ed, Oxford University Press.
2. Karl E. Case, Ray C. Fair and Sharon Oster, Principles of Economics 9th Edition, Pearson Education Inc.
3. Hal R. Varian : Intermediate Microeconomics WW Norton and Co. Fifth Edition.
4. D. Salvatore: Micro Economics, Harper Collins, 1991.
5. H.L. Ahuja: Advanced Economic Theory, S. Chand and Company, New Delhi. (English & Hindi).
6. लक्ष्मीनारायण नाथूरामकाव्यष्टि अर्थशास्त्र,रमेशबुकड़िपो, जयपुर।

Reference Books :

1. R.H. Leftwitch : Price System and Resource Allocation, Holt, Reinhart and Winston; 3rd Edition.
2. Samuelson and Nordhaus: Economics, McGraw Hill/Irwin; Latest Edition.
3. J.P. Gould and C.E Ferguson: Micro Economic Theory revised By , J.P Gould and E.P. Lazer, All India Traveller Book Seller, Delhi.

Paper – II Indian Economy

Section-A

Basic Features and Present Position of Indian Economy, Natural Resources, Population: Demographic Features and Major trends, Concept of Population Dividend, Population Policy, Human Resource Development. National Income in india: trends and composition. Agriculture: Role and Importance of Agriculture in the Indian Economy, Land Reforms, Growth of Modern Inputs :

Irrigation, HYV, Fertilizers. Institutional Credit, Microfinance, Marketing of Agricultural Goods Support Price, Concept of Crop Insurance, Food Security.

Section- B

Industry: Role. Strategy and Challenges, Growth of MSMEs, Public and Private Sector Industries. Industrial Finance, Industrial Policy of 1991, New Policy Initiatives for Industrial Development. New Economic Policy and Disinvestment, Foreign direct investment, Services Sector in India: IT, Education and Health.

Foreign Trade: Size, Composition and Direction; Recent trends, Foreign Trade Policy.

Section-C

Planning in India: Objectives and Achievements, NITI Aayog, National Development Agenda, Problems Of Poverty; Unemployment, Inflation And Regional Inequalities; Rural Development programmesand Policy; Sectoral Reforms in Infrastructure after 1991.

Books Recommended :

1. Rudra Datt and K.P.MSundaram: Indian Ecomony (Hindi & English), S. Chand, New Delhi.
2. S.K. Mishra and V.K. Pure: Indian Economy, Himalaya Publishing House, New Delhi.
3. A.N. Agarwal: Indian Economy, Vikas Publishing Co., New Delhi.
4. LaxminarayanNathuramka: BhartiyaArthvvyavastha, Ramesh Book Depot, Jaipur.
5. Uma Kapila, Indian Economy since Independence, Academic Foundations.
6. Government of Indian; Economic Survey (Hindi& English.)

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19. Geography

BA/BSc Pt. I [ ]

Scheme of Examination

Faculty	Min Pass Marks	Max Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Physical Geography	Arts 75 Science 50
Paper II	Geography of Rajasthan	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations. Each theory paper will have a teaching of 4 hours per week.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q. No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examination.

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Paper I: Physical Geography

Section A

Definition, scope and development of physical geography, geological history of the Earth; zoning of Earth's interior, rocks, origin of continents and oceans; continental drift theory and plate tectonics; concept of isostasy: views of Airy, Pratt, Joly and Holmes. Earth movements: epeirogenic and orogenic; mountain building theories: Kober, Jeffreys, Daly, Joly and Holmes and plate tectonics; denudation, cycle of erosion: views of W.M. Davis and W. Penck, erosional and depositional topographies: river, under groundwater, glacier, wind and oceanic waves.

Section B

Composition and structure of the atmosphere, insolation, air temperature, air pressure, pressure belts and planetary winds, monsoon and local winds, humidity, classification of clouds and precipitation, air masses, fronts and cyclones: tropical and temperate, classification of the world climates: Koppen and Thorthwaite, general climatic classification.

Section C

Surface configuration of oceans bottom: Pacific, Atlantic and Indian oceans, ocean deposits, horizontal and vertical temperature of oceans, oceanic salinity, tides, oceanic waves and currents, coral reefs and their origin: views of Darwin and Dana, W.M. Davis, Murray, classification of marine resources, biosphere and its components, ecosystems, plant community and animal kingdom, biomes: equatorial rainforest, monsoon, savanna and temperate grasslands.

Recommended Readings:

गौहान, वी.एस. व गौरहा, ए. 2005, भौतिक भूगोल (जीवमण्डल सहित)। रस्तोगी पब्लिकेशन्स मेरठ।

चाल, पी. 2012, भौतिक भूगोल। राजेश पब्लिकेशन्स, नई दिल्ली।

तिवारी, अलका 2012 : भौतिक भूगोल। रस्तोगी पब्लिकेशन, मेरठ।

Husain, M. 2001, Fundamentals of Physical Geography, Rawat Publication, Jaipur.

Tress, D. 2012: Physical Geography : A Landscape Appreciation, PHI Learning Private Limited, New Delhi, Mckmight's Tevit Edition.

Thullar, D.R. 2012: Physical Geography. Kalyani Publishers, New Delhi

ठे. सविन्द. 2005 : भू-आकृति विज्ञान। तारा पब्लिकेशन वाराणसी।

ह, सविन्द, 2011 भौतिक भूगोल का स्वरूप। प्रयाग पुस्तक भवन, इलाहाबाद।

. एस.एन., सी एल एन एण्ड सिंघ आर.एल. 2008 भौतिक भूगोल। पंचशील प्रकाशन जयपुर।

arma, R.C. and Vatal M. 1999 Oceanography for Geographers. Chaitanya Publishing use, Allahabad.

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Practicals

Scheme of Examination

Min. Pass Marks 18 Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field Survey and Viva voce	10+04	2½ hrs.
Record and Viva voce	08+04	

N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks. Each practical batch of 30 students will be allotted a teaching of 4 hours per week for practicals.

SYLLABUS

Section A

Definition and types of scale: simple, comparative, diagonal.
Graph: line graph, bar graph, combined line and bar graph, hythergraph and climograph; climatograph, water budget graph, wind rose.
Weather maps: weather symbols, representation of atmospheric features, interpretation of Indian daily weather maps (July and January), weather instruments.

Section B

Methods of showing different relief features: hachures, hill shading, bench mark, spot heights, formlines, contours and drawing of cross sections (conical hill and plateau, types of slopes, valleys, ridge and saddle ,gorge ,waterfall and rapids ,escarpment ,lake, spur , col ,meanders and cliff)
Profiles- serial, superimposed, projected and composite.

Section C

Surveying : meaning, classification and significance.
Chain and tape surveying: open and closed traverse.

Recommended Readings:

...न, पी.आर. 2008: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
...gh, L.R. 2006: Practical Geography. Prayag Pustak Publisher, Allahabad U.P.
...nkhouse, F. J. and Wilkinson, P.J. 1985 Maps and Diagrams. Methuen, London.
...gh, R.L. and Singh Rana P.B. 1991 Elements of Practical Geography. Kalyani Publishers, ...w Delhi
...kar, A. K. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata
...ल, ओ.पी. (2011) प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

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20. STATISTICS

Scheme:	Duration	Max Marks		Min. Pass Marks	
		Sc.	Arts	Sc.	Arts
Paper- I	3 hrs.	50	65	18	24
Paper-II	3 hrs.	50	65	18	24
Practical	3 hrs.	50	70	18	24
	Total	150	200	54	72

Note : In each question paper, 10 (ten) questions will be set having 2 (two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper- I Probability Theory

Unit I. Important concepts of Probability: Random experiment: Trial. Events and their types. Definitions of probability. Sample point and sample space. Axiomatic Approach of Probability and its properties. Addition and Multiplication theorems of probability. Conditional Probability. Bayes Theorem and its Applications (Simple Problems Only). 18 hours

Unit II. Random Variable: Definition with illustrations, Types of Random Variables. Probability Mass Function, Probability Density Function. Distribution Function and its properties. Joint Probability Distribution, Marginal and Conditional Probability Distributions and density functions (Continuous and Discrete Cases). Chebychev's Inequality and its applications. 18 hours

Unit III. Mathematical Expectation: Expectation of a random Variable and its simple properties. Addition and Multiplication Theorems of Expectation Conditional Expectation. Definition of Variance and Covariance and properties. Raw and Central Moments. Moment Generating Function and their properties. 18 hours

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Unit IV. Univariate Discrete Distributions and their properties: Bernoulli Distribution, Binomial Distribution, Poisson Distribution, Geometric Distribution. Idea of Hyper-geometric and Negative Binomial Distribution. 18 hours

Unit V. Univariate Continuous Distributions and their properties : Rectangular Distribution, Normal Distribution, Idea of Exponential Distribution, Cauchy Distribution, Gamma Distribution, Beta Distribution. 18 hours

References

1. Bhatt, B. R. Srivenkatramana, T and Rao Madhava K. S. (1997): Statistics: A, Beginner's Text, Vol. II, New Age International (P) Ltd., New Delhi.
2. Goon A.N., Gupta M. K., Das Gupta B. (1991).: Fundamentals of Statistics, Vol, II, World Press, Calcutta.
3. Kapoor V.K. & Gupta S.C. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
4. Mood A.M., Graybill F. A. and Bose, D. C. (1974) ; Introduction to the Theory of Statistics, McGraw Hill.

Additional References

1. Hoel P.G. (1971) : Introduction to Mathematical Statistics, Asia Publishing House.
2. David, S (1996) : Elementary Probability, Oxford Press.
3. Cooke, Cramer and Clarke: Basic Statistical Computing, Chapman and Hall.
4. Meyer P.L. (1970) : Introductory Probability and Statistical Applications. Addison Wesley.

Paper II : Descriptive Statistics

Unit I. Types and Presentation of Data: Concepts of a statistical population and data. Qualitative and Quantitative data; discrete and continuous data; frequency and non-frequency data. Geographical & Chronological Data. Primary Data and Secondary Data. Tabular presentation of data-Construction of tables, Types of tables. Frequency distribution - Discrete, grouped, continuous and cummulative Graphical presentation of data- Histogram, frequency polygon, fre-

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quency curve and ogives. 18 hours

Unit II. Statistical analysis of Quantitative Data: Different types of scales-nominal, ordinal, intervals and ratio, Univariate Data-Measures of central tendency, dispersion, moments and its computation from data. Absolute and relative measures of skewness and kurtosis based on quintiles and moments. Sheppard's Correction for moments (without Proof). 18 hours

Unit III. Curve fitting and Theory of Attributes: Principle of least squares, fitting of straight line, parabola and curves reducible to straight line (exponential and power curve). Class frequency, order of a class frequency, ultimate class frequency, consistency of data, independence and association of attributes. Various measures of association. 18 hours

Unit IV. Statistical Analysis of Bivariate Data: Correlation analysis-scatter diagram, Karl-Pearson's coeefficient of correlation and its properties. Correlation of bivariate frequency distribution, Spearman rank correlation. Regression analysis-Fitting of regression lines, regression coefficients and their properties. 18 hours

Unit V finite Differences: Operators E, Δ, ∇, their relationship and properties, factorial notation. Difference table fundamental theorem of finite differences. Estimation of one and to missing terms. Meaning of interpolation and extrapolation. Newton's forward and backward formulae for equal intervals, Lagrange's Formula and numerical problems. 18 hours

References

1. Bhatt B. R. Srivenkatramanna T and Rao Madhava K.S. (1997): Statistics: A Beginner's Text, Vol. I, New Age International (P) Ltd., New Delhi.
2. Croxton F.E., Cowden D. J. and Kelin S (1973) : Applied General Statistics, Prentice Hall of India, New Delhi.
3. Goon A. M., Gupta M. K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. I, World Press, Calcutta.

Additional References

1. Anderson T.W. and Sclove S.L. (1978): An Introduction to the Statistical Analysis of Data.
2 Cooke, Cramer and Clarke : Basic Statistical Computing, Chapman and Hall.

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3. Mood A.M. Gray bill F.A. and Bose D.C. (1974 Introduction to the theory of statistics Mc' Graw Hill New York.
4. Spiegel, M. R. (1967) : Theory & Problems of Statistics, Schaum's Publishing Series.

Paper III. Practical Paper:

1. Exercise on mathematical expectations and finding Mean, Variance, Skewness and kurtosis of Univariate probability distributions.
2. Fitting standard univariate discrete and continuous probability distribution.
3. Computation for Marginal and Conditional Distributions.
4. Presentation of data through Frequency Table, and Graphs.
5. Calculation of Measures of Central tendency, Dispersion, moments and Skewness and Kurtosis.
6. Computation of Correlation Coefficient of bivariate data and bivariate frequency distribution table.
7. Regression of two variables.
8. Fitting of curves by the least square method.
9. Computation of Spearman's rank correlation.
10. Construction of Difference table.
11. Interpolation Problems based on Newton and Langrange's Formulae.

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APPLIED STATISTICS

Scheme:	No. of hrs. per week	Max Marks Sc.	Max Marks Arts	Min. Pass Marks Sc.	Min. Pass Marks Arts
Paper- I	3 hrs.	50	65	-	24
Paper-II	3 hrs.	50	65	-	24
Paper-III (Practical)	4 hrs.	50	70	18	24
Total	10 hrs.	150	200	54	72

Note: In each question paper, 10 (Ten) questions will be set having 2(Two) from each unit. Candidates have to answer five questions in all taking not more than one from each unit.

Paper I : Probability Theory

Unit I: Functional relationship between two variables, Polyno-

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mials, exponential, logrithmic & Binomial functions and their expansions. Infinitesimal quantity. Idea of permutation and combination. Notion of limit, Rules for finding limits Continuity, Differential Coefficient and its physical interpretation as a rate measure. Standard results for differential coefficients of x^n, e^x, log x etc. (without proof). Rules for differentiation of sum, difference, product and quotient and function of a function (without proof). 18 hours

Unit II. Maxima and Minima. Integral Calculus: Definition and meaning of integration. General laws of integration, Integration of a continuous function. Definite integration. 18 hours

Unit III. Important Concepts of Probability: Random Experiment, Trial, Events and their types. Classical and Statistical definitions of Probability. Sample point and sample space. Axiomatic Approach to Probability and its properties. Addition and Multiplication theorems of probability. Conditional Probability. Baye's Theorem and its Applications (Simple Problems only). Chebychev's Inequality and its applications. 18 hours

Unit IV. Random Variable: Probability Mass Function, Probability Density Function. Distribution Function, Joint Probability Distribution, Marginal and Conditional Probability distribution (Continuous and Discrete case). 18 hours

Unit V. Mathematical Expectation: Expectation of a random Variable and its properties. Addition and Multiplication Theorems of Expectation. Conditional Expectation. Definition of Variance and Covariance, Moments, Skewness and Kurtosis. Moment Gen. ..ing Functions and their simple properties. Definitions of Binomial Distribution, Poisson Distribution, Normal Distribution, Gamma Distribution, Beta Distibutions their mean, Variance & mgf. 18 hours

References:

1. Bhatt B.R., Srivenkatramanna T, And Rao Madhava K.S. (1997): Statistics-A Beginner's Text. Vol-II, New Age International (P) Ltd.
2. Goon A.M., Gupta M.K., Das Gupta B. (1991): Fundamentals of Statistics, Vol-II, World Press, Kolkata
3. Kapoor V.K & Gupta S.C. : Fundamentals of Mathematical Statistics. Sultan Chand and Sons, New Delhi.

4. Mood A.M. Graybill F.A. Bose D.C. (1974): Introduction to the theory of statistics, McGraw Hill

Additional References:

1. Hoel P.G. (1971): An Introduction to Mathematical Statistics. Asia Publishing House.
2. David S. (1996): Elementary Probability., Oxford Press.
3. Cooke, Cramer and Clarke: Basic Statistical Computing, Chapman and Hall.
4. Meyer P.L. (1970): Introductory Probability and Statistical Applications. Addison Wesley.

Paper II : Descriptive Statistics

(The course contents are same as that of Subject-Statistics)

Paper III. Practical Paper:

1. Exercise on mathematical expectations and finding Mean, Variance, Skewness and kurtosis of Univariate probability distributions.
2. Fitting standard univariate discrete and continuous probability distribution.
3. Computation for Marginal and Conditional Distributions.
4. Presentation of data through Frequency Table, diagrams and Graphs.
5. Calculation of Measures of Central tendency, Dispersion, Skewness and Kurtosis.
6. Computation of Correlation Coefficient of bivariate data and bivariate frquency distribution table.
7. Regression of two variables.
8. Fitting of curves by the least square method.
9. Computation of Spearman's rank correlation.
10. Construction of Difference table.
11. Interpolation Problems based on Newton and Langrange's Formulae.

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22. PSYCHOLOGY

B.A. Part-I

SCHEME OF EXAMINATION:

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr. 18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Basic Psychological Processes	3 Hrs.	75	50
II	Social Psychology	3 Hrs.	75	50
III	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

For clarification the distribution of marks is tabulated as below:-

ARTS			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (Out of 7)	03	15
C	3 (With internal choice)	15	45
		Total Marks	75

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SCIENCE			
Section	No. of Questions	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	1
C	3 (With internal choice)	10	45
		Total Marks	75

Paper I - Basic Psychological Processes

Section-A

1. Introduction: Definition and Goals of Psychology; History- Structuralism, Functionalism, Behaviorism, Gestalt and Psychoanalysis; Modern Perspectives- Biological, Psychodynamic, Behavioral, Cognitive, Humanistic, Evolutionary and Socio-cultural; Methods- Observation, Case Study, Surveys and Experimental.
2. Biological Basis of Behavior: The Nervous System-Structure and Functions of Neuron. Structure and Functions of Central Nervous System and Peripheral Nervous System
3. Sensation and Perception: Sensation- Meaning, Sensory Receptors, Sensory Thresholds, Habituation and Sensory Adaptation. Perception- Meaning, Constancies- Size, Shape and Brightness, Gestalt Principles, Factors Influencing Perception.

Section-B

4. Learning: Definition and Theories- Classical Conditioning, Operant Conditioning, Cognitive Learning, Observational Learning.
5. Memory: Definition; Encoding, Storage and Retrieval Processes; Models- Level of Processing, Parallel Distributed Processing and Information Processing- Sensory, Short Term and Long Term Memory; Forgetting- Nature and Causes.
6. Motivation and Emotion: Motivation - Meaning and Approaches- Instinct, Drive–reduction,

   Arousal, Incentive and Humanistic. Emotion- Elements: Physiology, Expression and Subjective Experience; Theories- Cannon-Bard, James-Lange, Schachter-Singer, Opponent-Process.

Section-C

7. Cognition: Thinking- Mental Imagery and Concepts; Problem Solving- Trial and Error, Algorithms, Heuristics, Insight; Barriers to Problem Solving.
8. Intelligence: Definition and Theories- Spearman, Guilford, Cattell, Sternberg, Gardner; Meaning of IQ; Intelligence Tests.
9. Personality: Definition; Type Theories and Trait Theories - Allport, Cattell, McCrae and Costa; Personality Assessment- Self-report Inventories, Projective Tests and Behavioural Assessments.

Books Recommended:

- Baron, R.A. & Misra, G. (2015). *Psychology*. New Delhi: Pearson Education India.

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- Gerrig, R.J., Zimbardo, P.G., Svartal, F., Brennen, T., Donaldson, R. & Archer, T. (2013). *Psychology and Life*. New Delhi: Pearson Education India.
- Ciccarelli, S.K., White, J. N. & Misra, G. (2017). *Psychology*. New Delhi: Pearson Education India.
- सिह. अरुणकुमार (2017), आधुनिकसामान्यमनोविज्ञान, नई दिल्ली : मोतीलालबनारसीदास।

Paper II - Social Psychology

Section-A

1. Introduction: Meaning, Nature, Scope and Goals of Social Psychology. Methods of Social Psychology: Experimental and Non-Experimental Methods.
2. Social Perception and Person Perception: Social Perception- Meaning and Nature; Perceptual

   Defense, Perceptual Accentuation and Subliminal Perception. Person Perception: Meaning and Nature, Role of Non-verbal Cues; Perceivers' Characteristics and Role of Ongoing Interaction.
3. Attitudes: Nature, Functions, Formation, Change and Measurement.

Section-B

4. Prejudice and Discrimination: Nature and Origin; Reduction of Prejudice and Discrimination.
5. Interpersonal Attraction: Proximity and Affective basis, Acquaintance and Need to Affiliate; Effects of Observable Characteristics, Similarity and Mutual liking.
6. Leadership: Definition and Functions; Types of Leadership. Trait, Situational and Contingency Approaches.

Section-C

7. Communication: Meaning, Nature and Types: Verbal and Non-verbal; Barriers in Communication.
8. Pro-Social Behavior: Personal, Situational and Socio-Cultural Determinants. Explaining Pro-

   Social Behavior: Empathy, Altruism Hypothesis, Negative-State Relief Model, Emphatic-Joy Hypothesis and Genetic-Determinism Model.
9. Aggression and Social Problems: Aggression- Theories, Determinants, Prevention and Control; Social Problems –Meaning and Nature; Types of Social Problems - Poverty, Deprivation, Population Explosion, Economic Development; Solutions to Social Problems.

Books Recommended :

- Baron, R.A., Branscombe, N.R., Byrne, D. & Bhardwaj, G. (2012). *Fundamentals of Social Psychology,* Noida: Dorling Kindersley South Asia.
- Branscombe, N.R. & Baron, R.A. (2018). *Social Psychology*. Noida :Pearson India Education.
- Myers, D.G. (1994). *Exploring Social Psychology*. New York: McGraw Hill
- अरुणकुमारसिंह, (2002), समाजमनोविज्ञानकीरुपरेखा, मोतीलालबनारसीदास, दिल्ली

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Practical

1. Human Maze Learning
2. Measurement of Intelligence (Performance Test)
3. Experiment of Memory(Meaningful and Non-sense Syllables through Memory Drum)
4. Experiment on Figure Ground Reversal
5. Measurement of Emotions by Facial Expression
6. Measurement of Attitude
7. Measurement of leadership
8. Measurement of Aggression
9. Measurement of Altruism
10. Assessment of Social Support

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23 राजस्थानी

परीक्षा योजना

न्यूनतम उत्तीर्णांक : 72

	समय	पूर्णांक
प्रथम प्रश्न-पत्र	3 घंटे	200
द्वितीय प्रश्न-पत्र	3 घंटे	100

प्रथम प्रश्न-पत्र-अंक विभाजन

100

1. प्रथम प्रश्न-पत्र में पांच प्रश्न होंगे। कुल 100 अंकों का प्रश्न होगा।
2. प्रत्येक पाठ्यपुस्तक से कम से कम एक-एक व्याख्या करनी होगी। (3×12=36)
3. दोनों पुस्तकों में प्रत्येक से एक-एक आलोचनात्मक प्रश्न होगा। कुल तीन प्रश्न। (3×15=45)
4. अंतिम प्रश्न निम्नलिखित तीन भागों में विभक्त होगा—
(क) राजस्थानी भाषा में अनुवाद—7 अंक

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(ख) हिंदी से राजस्थानी भाषा में अनुवाद—7 अंक

(ग) राजस्थानी कहावतें अर्थ एवं प्रयोग—5 अंक

पाठ्य पुस्तकें :

1. राजस्थानी कहानियाँ—सम्पा. रावत सारस्वत, प्रेम जी प्रेम : प्रकाशक साहित्य अकादमी, रवीन्द्र भवन, नई दिल्ली। इस पुस्तक में से निम्नलिखित क्रम संख्या वाली 14 कहानियाँ 1, 9, 10, 12, 13, 14, 15, 16, 18, 20, 22, 23 तथा 28।

2. जयपुर की ज्योणार, ले. मदनमोहन सिद्ध (खण्ड एक से तीन) : प्रकाशक श्री सिद्ध हिन्दी प्रचारक कार्यालय जयपुर।

संदर्भ ग्रंथ

1. आधुनिक राजस्थानी साहित्य : प्रेरणा स्रोत और प्रवृत्तियाँ; लेखक डॉ. किरण नाहटा प्रकाशक चिन्मय प्रकाशन, चौड़ा रास्ता, जयपुर।
2. राजस्थानी गद्य साहित्य : उद्भव और विकास : लेखक डॉ. शिवस्वरूप अंचल, प्रकाशक : शार्दुल राजस्थानी रिसर्च इंस्टीट्यूट, बीकानेर।
3. राजस्थानी गद्य शैली का विकास : डॉ. रामकुमार गर्वा, प्रकाशक देवनाम प्रकाशन, जयपुर।

राजस्थानी द्वितीय प्रश्न-पत्र-राजस्थानी काव्य

अंक विभाजन—इस प्रश्न-पत्र में पाँच प्रश्न होंगे।

1. प्रत्येक पुस्तक से एक-एक व्याख्या। कुल तीन व्याख्या। (3×12=36)
2. प्रत्येक पुस्तक से एक-एक आलोचनात्मक प्रश्न।
   (कुल तीन प्रश्न) (18+18+16=52)
3. अलंकार : वैयण सगाई, उपमा, रूपक, उत्प्रेक्षा यमक, श्लेष।
4. छंद : दूहो, सोरठो, छप्पय, वेलियो।

संदर्भ ग्रंथ :

1. प्राचीन काव्यों की रूपक परम्परा-सम्पादक अमर चंद नाहटा, प्रकाशक भारतीय विद्या मंदिर शोध प्रतिष्ठान, बीकानेर।
2. अलंकार पारिजात—नरोत्तमदास स्वामी।
3. रघुनाथ रूंपक गीता रो—महताबचन्द खारेड, प्रकाश नागरी प्रचारिणी सभा वाराणसी।
4. राजस्थानी साहित्य—एक परिचय प्रकाशक नवयुग ग्रंथ कुटीर, बीकानेर।

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24 SHEEP AND WOOL

(To be offered by the collegiate students of Shri B.D. Toda College, Lakshmangarh, Sikar only)

Scheme :

Min. Pass Marks 48

Max. Marks 132

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Syllabus B.A. Part-I

Paper-I	3 hrs. duration	Max. Marks 66
Paper-II	3 hrs. duration	Max. Marks 66
Min. Pass Marks 24	4 hrs. duration	Max. Marks 68
Practical		

Paper-I : Elements of Sheep Husbandry

Livestock population in Rajasthan, India and place of sheep in rural economy of Rajasthan with particular reference to the area.

Historical background of the origin of sheep. Asiastic classification of the world sheep. Important breeds of Indian sheep particularly of Rajasthan.

Regionalisation of sheep in India.

Anatomical and Physiological aspects- Salient features of the skeletal, digestive, reproductive, respiratory, endoctrine system etc.

Physiological : Carbohydrate, Protein, Fat-metabolism.

Sheep : Management of flocks, sheepcare (different stages), housing, feeding etc.

Paper-II : Elementary Sheep Production

General Management : Counting, docking, castration, branding, tagging, tattoing, weaving, aging, classifying, cutting.

Breeding Management : Case of pregnant ewes, new bron lambs, and breeding rams.

Shearing Management : Time of shearing, washing, grading, packing, storage, shearing sheed equipment and management.

Health Management : Drenching, dipding, vaccination, spraying, mouth wash, foot bath, segregation, are of sick sheep.

Farm Records : Feeding breeding health, production and their mainteriance.

Wool Science : Definition of wool terms 'primary grading' physical and chemical properties of wool.

Types of Fibre : Comparison wool fibre with hair and textile fibre.

Practical :

Syllabus : Min Pass Marks-24 Max pass M. 68

1. Recognition of different breeds of sheep, local and state of Rajasthan, with reference to salient features of difference and utility of their products.

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2. Study of sheep skeleton.

3. Salient features of digestive organs, respiratory and reproductive organs (male and female)

4. General Management of sheep : Housing (different types of housing, floor area required etc.) Open and closed by stem of housing paddock and sheep. Yards, housing of different categories of sheep.

5. Farm equipments viz. feeding and watering thoughts shearing machines, weighting machines, hoof-pareara, castrating equipment drenching and dosing equipments, branding and tagging equipments etc.

6. General sheep management practices : Identification of animals, ear-tagging etc. Handling and securing of sheep, again by dentition, tagging hoof paring crutching and castration of sheep. Drenching, dosing and dipping of sheep, washing and shearing (hand shearing). Preparation of sheep (both male and female) for breeding purposes. Natural and artificial breeding of sheep viz use of breeding harness. Collection and insemination seman.

7. Lambing practices and rearing of young ones; Care and management of ewes at lambs and growing stock. Use of foot-bath and mouthwash.

8. Wool Science : Physical Properties of wool including microscopic study comparing it with hair and artificial fibers, Primary grading of wool; Microscopic study of fibers.

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25. LIVESTOCK AND DAIRYING

(To be offered by the Collegiate Students of Shri Pragya Mahavidyalaya, Bajaj Nagar and Government College, Rajgarh).

Scheme :

Min. Pass Marks 48		Max. Marks 132
Paper-I	3 hrs. duration	Marks 66
Paper-II	3 hrs. duration	Marks 66
Practical		
Min. Pass. Marks 24	4 hrs. duration	Marks 68

Paper-I : Principles of Animal Husbandry and Livestock Management

1. Livestock population of India with special reference to Rajasthan. Distribution of different categories of livestock according to

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the agroclimatic conditions of the state.

2. Contribution of animal and animal products in the economy of Rajasthan.

3. Characteristics of the following breeds of Livestock. Cattle Tharparker, Hariana, Gir, Nagauri, Rathi, Mewati, Shahiwal, Melvi, Jirsey, Hostein, Freisian, Red dane.

Buffallows—Murrah, Surti, Mehsana.

Goats—Sirohi, Alwar, Barbari, Jamunapuri, Beotal, Marwari.

Sheep—Sonodi, Chokia, Bikaneri, Marino, Rambouilet Camel-Rid Dmcru.

Populty-Phode Islanet Red, White, Leg Horn, wyite Roe.

4. Outline of anatomy of cattle and buffallows. Body Temperature, respiration and pulse rate.

5. Housing of Livestock, location, site sign construction. Arrangement / Groupings of different buildings.

6. General care of the animals grooming exercise bathing observation of oestrus, service care during pregnancy and at parturition, drying off.

7. Care of newly born calf. Marking, dooming, castration.

8. Important points for the management of bulls, goat, sheep and poully.

9. Livestock farm equipment, sanitary requirements, disposal of animal water.

10. Familiarity with common ailments and diseases of farm animals wounds. Navel ill, prolaose of natural and vagina; bloat, impaction, scour phenomena, mastits, milk fever. Anthrax, FMD, HS, RP, Black quarter, Enterotoximea, piarrhoea. Common external and internal parasites.

11. Maintenance of farm records.

12. Government Assistance and facilities available for Livestock.

Paper-II Principles of Feeding and Breeding Livestock

1. Digestive system of ruminants and its peculiarities.

2. Physiological role of good nutrients, their digestion, importance of scientific fooding.

3. Nutritional requirement of farm animals for different purposes.

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4. Common feeds and fodder and their nutritive value, Characteristics of ideal ration.

5. Feeding pregnant, lacting animals, breeding bulls and bullocks.

6. Production of different types of grasses and forge, making of hay and sliage.

7. Premuration of chease balanced ration for milk production.

8. Feeds supplements and additives.

9. Importance of scientific breeding system of breeding.

10. Male and female reproductive system, development of organs and their function, role of economic glands.

11. Signs of heat and time of breeding.

12. Natural service and artificial insemination, infertility in livestock.

13. Diagnosis of Pregnancy.

14. General hints on selection, score car, performance, pedigree and history sheets, culling.

15. Maintenance of breeding records.

Practicals

Min. Pass Marks 24 4 hrs. duration Max. Marks 68

1. Study of external parts of animal, handling and securing of animals hoof training.

2. Castration, dehorning, making and throwing.

3. Determination of body, weight and age.

4. Recording of temperature, pulse and respiration of animals.

5. Administration of medicines through different routs.

6. Communication of ration, blending food preparation of hay and silage.

7. Diagnosis of common ailments and first aid.

8. Collection of seman and artificial in semination.

9. Judging of animals on the basis of score card.

10. Washing dairy utensils, milking of animals.

11 Leaning and disinfection of dairy sheds.

12. Working out the building requirements for different animals

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26 ANTHROPOLOGY

B.A. Part-I Examination-2020

Paper-I — Max Marks-100, Min Marks-36

Paper-II — Max Marks-100, Min Marks-36

Note- Each Paper will contain nine questions having three questions from each Unit. Candidates are required to attempt five questions in all selecting atleast one question from each Unit.

Paper I- Introduction to Anthropology

Unit-I

Meaning and subject matter of Anthropology. History of Anthropology.
Branches of Anthropology:- (a) Social-Cultural Anthropology (b) Physical Anthropology (c) Archaeological Anthropology, (d) Linguistic Anthropology Relationship of Anthropology with Social Sciences, Natural Sciences and Medical Sciences.

Unit-II

Basic Concepts : Culture, Society, Community, Group, Institution.
Human Institutions:
Family: Definition and functions. Family as the corner stone of human society. Form and Types of family. Joint family system in India. Changes in the institution of family.
Marriage: Definition and function in society. Forms and types of marriage. Bridewealth and Dowry. Marriage regulation in India.

Unit – III

Kinship: Meaning of kinship and its role in society. Types of kins. Kin groups unilineal: lineage, clan, phratry , moiety. Kinship behaviour: Avoidance and Joking relationship.
Religion: Meaning and role of religion. Theories of origin of religion: Animism and Animatism. Relation of religion to other social institutions. Magic: Definition and types.

Readings Books :-

Beattie John, 1964, Other Cultures: Aims, Methods and Achievements in Social Anthropology, London, Routledge and Kegan Paul Ltd.

Fox Robin, (1983), Kinship and Marriage, Cambridge, Cambridge University Press.

Hasnain Nadeem, 1962, General Anthropology, New Delhi, Jawahar Publishers & Distributors.

Herskovits Melville Jean, 1948, Man and His works: The Science of Cultural Anthropology, New York, A.A. Knof.

Madan T.N. and Majumdar D.N., 1957, An Introduction to Social Anthropology, Bombay, Asia Publishing House (Hindi & English)

Mair Lucy, 1965, An Introduction to Social Anthropology, New Delhi, Oxford University Press.

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Paul Bohannan, 1963, Social Anthropology, New York, Mac Millan.
Srivastava ARN,1992, What is Anthropology, Calcutta, K.K. Publication.
जैन शोभिता,1985, भारत में परिवार, विवाह और नातेदारी, जयपुर रावत पब्लिकेशनस.
दुबे श्यामाचरण, 1993, मानव और संस्कृति, नई दिल्ली, राजकमल प्रकाशन प्रा. लि., ।

Paper- II Anthropology of Cultural Regions in Rajasthan

UNIT-I

Physiography of Rajasthan, Integration of Rajasthan. Cultural Regions: Marwar, Mewar, Dhoondhar, Vagad, Mewat, Haroti, Brij. Characteristics of the culture of Rajasthan.

UNIT-II

Concept of Tribe. Tribal scenario in Rajasthan. Ethnography of the following tribes of Rajasthan : Mina, Bhil, Garasia, Saharia, (Origin, Social ,Cultural, Economic, Political and Religious life)

UNIT-III

Places of religious importance: Pushkar, Ajmer, Nathdwara, Beneshwar.

Folk deities: Ramdevji, Tejaji, Kailadevi, Gogaji, Jambhoji.

Folk fairs and festivals: Teej, Gangaur.

List of Books

Doshi S.L. and N.N. Vyas, 1992, The Sahariya in Tribal Rajasthan:,Udaipur Sunshine on the Aravalli, Udaipur, Himanshu Publications.

Kapil F.K., 1999, Rajputana States (1817-1950), Jodhpur, Book Treasure.

Sharma S.K. and Sharma Usha, (eds.), 2000, History and Geography of Rajashthan, New-Delhi, Elegant Printers.

Singh K.S., 1998, People of India: Rajasthan, Mumbai, Popular Prakashan Pvt. Ltd., , Vol. XXXVIII (part one and Two)

Tod James, 1987,(Repr.) Annals and Antiquities of Rajasthan, Delhi ,Motilal Banarasi Dass, 3 Vol.

चंद्रमेहता प्रकाश, 1993, भारत के आदिवासी, उदयपुर, शिवा पब्लिशर्स डिस्ट्रीब्युटरर्स।

कल्ला डॉ. नन्दलाल, 2000, राजस्थानी लोक साहित्य एवं संस्कृति, जोधपुर, राजस्थानी ग्रन्थागार,

आहूजा डी.आर., 2002, राजस्थानः लोक संस्कृति और साहित्य, नई दिल्ली, नेशनल बुक ट्रस्ट, (अनुवादकः वागीश कुकार झा एवं राजेश कुमार झा)

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27 DRAMATICS 109

B.A. Part – I (Drama) Examination 2022-23

Paper-I Basics of Theatre (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

1. Basic introduction to theatre arts
   a. Evolution of theatre as an art form
   b. Development of dramatic art through ages

2. Influences and Relationship with Other Art Forms
   a. Introduction to different aspects of theatre
   b. Definition of theatre and drama
   c. Elements of theatre
   d. Difference between theatre and drama

3. Origin and evolution of Indian Theatre with reference to:
   a. Pre-Vedic Period
   b. Post-Vedic Period (up to Natyashastra)

Books Recommended:
1-The Indian theatre- Hemendra nath das gupta,gyan publishing house ,New delhi
2-Drishya vinyas –Dr Ravi chaturvedi, publication scheme, Jaipur

Paper – II Modern Indian Theatre (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Emergence of Modern Indian Drama
II. Different phases of modern indian theatre
   a. Pre independence theatre
   b. Indian Freedom Struggle and its impact on theatre

III. Post-independence theatre
A-Growth of Commercial Theatre in India with reference to Parsi Theatre
B-study of important parsi theatre groups and companies
C- Development and fall of Parsi theatre

IV. People's Theatre Movement

V. Basic aspects of play analysis

Books Recommended:
I. Bhartiya Rangmanch Ka Udbhav Evam Vikas – Dashrath Ojha
II. Bhartiya Rangmanch Ka Itihas – Dr. Agyat
III. Bhartiya Lok Natya Parampara – Dr. Kapila Vatsyayan
IV. Rand Darshan – Nemi Chand Jain

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110

A. Part – I (Drama) Practical Examination 2022-23

Applied Theatre Practice

PRACTICAL PAPER-I
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Practice of 15 Yogic Asanas
II. Practice of Mime and Movement Exercises
III. Practice of Acting Improvisations

PRACTICAL PAPER –II
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

IV. Production of short plays
V. Acting assignments
VI. Submission of workbook

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28. : PHYSICAL EDUCATION

Part I[st] Physical Education course shall consist of two theory paper carrying 60 marks each (Total 120 ...l Practical examination carrying 80 marks (Two games & Sports 40 marks each). A candidate shall have to secure 36% mark separately in theory and practical to pass the examination.
Note: Each theory paper will have ten questions, two from each of the five units. Candidates are required to answer one question from each unit.

PAPER I
HISTORY OF PHYSICAL EDUCATION

Time 3 hours

Maximum Marks : 60
Minimum Pass Marks : 22

Unit- I
1. Definition of Physical Education: Need importance, Misconception about Physical Education.
2. Principles of Physical Education
3. Aims & objectives of Physical Education
4. Scope of Physical Education
5. Career option in Physical Education.

Unit- II
1. Physical Education in Ancient India (Before 1947).
2. Physical Education in India after 1947.
3. Impact of Britain & U.S.A. on Physical Education in India.

Unit- III
1. Physical Education and Sports training Institutions in India.
2. Sports Authority of India, Scheme & Function.
3. Rajasthan State Sports Council, Function, Aims & objective.
4. Arjuna Awards, Dronacharya Awards, Maulana Abdul Kalam Azad trophy. National Sports Scholarship. Dhyan Chand and Guru Vashist, Rajiv Gandhi Khel Ratan.

Unit- IV
1. Modern Olympic Games: Start of Olympics,
2. Objectives of Olympic, olympic mascot.
3. Olympic Motto and flag.
4. Olympic Charter opening and Closing.
5. Indian Olympic Association, International Olympic Committee.
6. Ancient Olympic, differentiate Ancient and modern olympic.

Unit- V
1. Contribution of the growth of Physical Education by leaders & Movements.
2. National Physical Efficiency Drive.
3. All India council of Sports.
4. Turnverein Movement. Y.M.C.A. and its contribution Physical Education in U.S.S.R. the spartakiad.
5. Contribution in India; G.D. Sondhi; Rajkumari Amrit Kaur; B.P.De Coubertin, Dr. P.M. Joseph; Shri H.C. Buck; Prof. Karan Singh; Prof. Ajmer Singh; Asian Games, SAF Games, National Games, Winter Olympics, Para Olympic.

Books Recommended:-

1. Ajmer Singh etc. Basis of Physical education, Health & Sports B.A.Pt. I, Kalyani Publication Ludhiana
2. Ajmer Singh etc. Basis of Physical education, Health & Sports (B.A.Pt. II), Kalyani Publication Ludhiana
3. Ajmer Singh etc. Basis of Physical education, Health & Sports (B.A.Pt. III), Kalyani Publication Ludhiana
4. Ajmer Singh Aur Anya . Saririk Shiksha Swasthya evam Khelo ki Adhunik Pathyapustak B.A. Part I : Kalyani Publications Ludhiana
5. Ajmer Singh etc. Sarirak Shiksha Swasthya evam Khelo ki Adhunik Pathyapustak B A. Part II va III : Kalyani Publications Ludhiana
6. Sidhant Ashok Kumar . Sarirk Siksha Sidhant, Manovigyan evam Itihas Satyansh Publications Jaipur Kamlesh & Sanjeev Sarirk Siksha ke Sidhant va Itihas: Prakash Brothers Ludhiana
7. Yashpal, Jitender Pal Singh Sharirik Shiksha Sangthan va Prashasan Satyansh Publications Jaipur.

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Paper II

FOUNDATIONS OF PHYSICAL EDUCATION

[redacted] theory paper will have ten questions, two from each of the five units. Candidates are required to answer one question from each unit.

Time 3 hours

Maximum Marks : 60
Minimum Pass Marks : 22

Unit-I

Biological Foundation

1. Heredity & Environment & its effect
2. Stages of growth & Development.
3. Principles of growth and development, factor effecting growth & development.
4. Different between growth & development, Different between male & female
5. Chronological, Anatomical, Physiological and Mental ages of individuals - their implications in developing and implementing Physical Education Programmes.
6. Adolescent problems and their management.

Unit- II

Psychological Foundations:

1. Meaning of psychology, Importance of Psychology for Teacher.
2. Importance and implications of psychological elements in physical education
3. Notions about mind and body and psycho-physical unity
4. Learning, Learning theories; Law of learning, transfer of learning.
5. Psychological factors effecting sports performance.
6. Personality, its dimension and type, Role of sports in personality development.

Unit- III

Philosophical Foundations:

1. Idealism and Physical education
2. Pragmatism and Physical Education
3. Naturalism and Physical Education
4. Existentialism and Physical education

Unit- IV

Physiological Foundations:

1. Respiratory system
2. Circulatory System
3. Muscles & type of Muscles.
4. General benefits of exercises
5. Benefit of exercise to the various systems.

Unit- V

Sociological Foundations

1. Physical Education and Sports as a need of the society
2. Sociological Implications of Physical Education and Sports
3. Physical activities and sports as a man's cultural heritage
4. Role of social institution in development of personality through Participation in games & sports.
5. Role of leadership in personality.

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References :

1. Bucher, Charles A. Foundations of Physical Education St. Louis : The C.V. Hosby company, 1986 Dollar 9.50
2. Williams Jesus Fering : The Principle of Physical Education. Philadelphia : W.B. SaundersCompany 1964
3. Kamlesh M.L. Physical Edu. Facts & Foundations, P.D.Pub. Faridabad.
4. Ajmer Singh etc Basis of Physical Education, Health and Sports (B.A. Pt. I,II,III): Kalyani Publications Ludhiana
5. Ajmer Singh etc Sariirik siksha swasthya evam khelo ki Adhunik Pathyapustak B.A. I Kalyani Publications Ludhiana
6. Ajmer Singh etc Sariirik siksha swasthya evam khelo ki Adhunik Pathyapustak B.A. I, II, III Kalyani Publications Ludhiana
7. Sidhant [illegible] Sariirik Siksha Sidhant, Manoranjan Pustak Bhawan, Shivaji Pratima Agra
8. [illegible] Sariirik Siksha ke sidhant, Bihar Pustak Bhandar, Ludhiana
9. [illegible] Sariirik Siksha Evam Vyayam [illegible]

PRACTICAL (GAMES AND SPORTS)

The practical examination shall be conducted by a panel of two examiners to be appointed by the University. A candidate shall be required to show his/her fimilinrity (Rules & Techniques) and to give his performance in the following :-

1. Four period for theory
   (i) Ist Paper (ii) IInd Paper
2. Four period for practical work
   (i) Athletics : two periods (ii) Games : Two periods

(This shall carry 80 marks)

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INDIAN HERITAGE IN RURAL HANDICRAFTS

Scheme

	Max. Marks	Min. Pass Marks
1. Theory One Paper 3 hrs. duration	60	22
2. Practical	80	28
3. Submission	60	22
	200	72

Syllabus :

Paper I (Theory)

3 hrs. duration Max. Marks 60 Min. Pass Marks 22

FUNDAMENTAL OF HANDICRAFTS

1. Theory of colours-pigments and light theory-hue circle, modifications of colour - after image values and colour harmony-practical applications.

2. Basic principles of line, from and space - their interelationship.

3. Process of concept building - visual and structural relationships. Free hand drawing from nature study of different Indian motifs.

4. Introduction with local rural handicrafts. Brief study of the local handicrafts and various raw materials used for manufacturing them.

5. History of Indian handicrafts.

Note : The paper will contain 9 questions. Candidates are required attempt any five questions. Each question containing 12 marks.

Paper II (Practical)

3 hrs. duration Max. Marks 80 Min Pass Marks 28

1. Tie and dye (bandhej)

2. Soft toys

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3. Folk paintings.

4. Folk seulptures

Submission Works Max. Marks 60 Min. Pass Marks 22

Note (1) : Submission work will be submitted to the head of the department of Rural Handicrafts of the college 15 days before the commencement of examination. The marks in the submission will be Awarded by the subject teacher (Internal). How ever the external examiner shall be empowered to review the work of submission in case there is a drastic difference between the Marks of the examination and submission.

Note (2) : Candidates should pass in theory as well as in practical paper Separately.

Books recommended

1. Heritage of Indian Art : V.S. Agarwal.
2. Handicrafts of India : T.M. Abraham
3. 5000 years of Arts & Crafts of India : Shanti Swaroop.

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VOCATIONAL COURSE

30. COMPUTER APPLICATION

Scheme :	Min. Pass Marks	Max. Marks
Arts/Commerce	72 (Th. 47 Pr. 25)	200
Science	54 (Th. 36 Pr. 18)	150
Paper-I 3 hours duration	Computer Fundamentals and Introduction to IBM PC	Arts/Com. 65 Science 50
Paper-II 3 hours duration	Operating Systems and Business Data Processing	Arts/ Com. 65 Science 50
Paper-III Practical		Arts/Com. 70 Science 50

Paper I : Computer Fundamentals and Introduction to IBM PC

What is Computer ? An introduction. Uses of computers in modern society e.g. weather forecasting, census, oil exploration, speech recognition, banking, publishing, accounting, research etc.

Information concepts and processing - hardware, software- computer capabilities and limitations. Concept of files and directories.

Computer arithmetic and number systems. ASCH & EBCDIC character sets.

Elements of a computer processing system- hardware, software computer capabilities and limitations. Concept of files and directories.

Hardware features and use- CPU, I/O devices. Storage devices and media.

Introduction to networking, multiprocessing, time sharing, multitasking and real time computing.

Variety of hardware systems and features. Varius types of computers available in market. Micro, Mini and Main frames, Supercomputers.

Evolution of personnel computers, Commodore, Atari, Apple, IBM, PC, Basic block diagram of computer. Difference between personal and main frames- Simple operating system, Easy to use, Less Memory, Dedicated, Normally single user.

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Introduction to microprocessors and associated computers. Tim- display controllers, DMA controllers.

Block diagram of IBM PC. Introduction to 8086 and 8088. Functional description of various modules and cards.

Boot process in IBM PC. System files Self test.

Various types of displays and other peripherals used in IBM PCs.

Disk Operating System - Introduction. Batch files.

Configuration files. COM, EXE, SYS, BIN and TXT files. Introduction to programming in BASIC. Development of programs in Q. BASIC. Use of graphics facilities using Basic.

Diagnostics for IBM PC. Use of Norton Utilities and other packages for undeleting files and other system maintenance jobs.

Advance version of IBM and compatibles.

Paper II : Operating Systems and Business Data Processing

Introduction to various categories of softwares. Operating system and its functions. Interaction of operating system with hardware and user programs.

Various components of operating system with reference to DOS. Single user operating system. Task loader. Memory management.

File management, Directory structure in DOS. Moving, renaming, copying, deleting and undeleting files under DOS.

Practical

Visit to computer Lab. Introduction to various components of a computer. A simple documentation preparation and printing. Usage of printer and other components.

Physical inspection of IBM PC and internal cards. Introduction to nomenclature (COM1, COM2, etc.) Writing batch files for varius purposes. Modifying config. sys files. Creating RAM Disk. Diagnostics on IBM PC. Controlling PC hardware using BASIC Programs.

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SYLLABUS

B.A. Part-II

Examination - 2025

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B.A. Part-II Examination

(Under 10+2+3 Pattern)

R.11 (2)

The number of papers and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of Examination on against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/ paper, wherever prescribed, separately classification of successful candidates shall be as follows :

First Division 60%
Second Division 48%
} of the aggregate marks obtained at the Part I, II, & III Examination, taken together

All the rest will be declared to have passed the Examination if they obtain the minimum pass marks in each subjects, viz. 36%No division shall be awarded at the Part-I and Part-II examination.

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CONTENTS

Optional Subjects	(Any three of the following subjects to the restriction as mentioned in O. 203-I	
1.	English Literature	4-6
2.	Hindi Sahitya	7-10
3.	Urdu	11-12
4.	Persian	13-14
5.	Sanskrit	15-20
6.	Philosophy	21-22
7.	History	23-28
8.	Political Science	29-32
9.	Indian Music	33-39
10.	Public Administration	40-46
11.	Drawing & Painting	47-48
12.	Sociology	49-51
13.	Home Science	52-59
14.	Textile Craft	60-62
15.	Garment Production & Export Management	63-66
16.	Investigative Bio-Technology	67-71
17.	Mathematics	72-73
18.	Economics	74-76
19.	Geography	77-80
20.	Statistics	81-85
21.	Applied Statistics	86-88
22.	Psychology	89-91
23.	Rajasthani	92-93
24.	Anthropology	94-95
25.	Dramatics	96-97
26.	Physical Education	98-102
27.	Indian Heritage in Rural Handicrafts	103-104
28.	Computer Application	105-106

N.B. : 1. Candidates must Pass separately in each of the paper theory and Practical (wherever prescribed)

2. Common papers in the subjects of Statistics, Mathematics, Economics, Geography and Psychology will be set both in the Faculties of Social Science and Science. The allocation of marks will however be different as mentioned in the booklet of syllabus.

Raj Vaid

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1. ENGLISH LITERATURE

B.A. Part-II

The Syllabus aims at achieving the following objectives :

1. Interpretation and appreciation of selected texts from the genres of poetry, drama, prose and fiction.
2. Strengthening skills of note making, summarizing and dialogue writing.
3. Understanding texts with specific reference to genres, forms and literary terms.

Paper I: Poetry and Drama

Maximum Marks: 100

Duration: 3 hrs **Min. Pass Marks: 36**

Question No. 1: References to Context from unit A, B & C.

Candidate will be required to explain **four (4)** passages of Reference to Context out of **Eight (8)** of five marks each, with a total of **20 Marks.**

Question No. 2: Will also be compulsory. The student will be required to attempt 5 questions out of 10, to be answered in about 5 lines each. Each question will carry 4 marks to a total of **20 marks.**

The other 3 questions will be Essay-type questions of **20 marks** each, one from each section with internal choice.

SECTION A

Thomas Gray	:	Elegy Written in a Country Churchyard.
William Blake	:	London, Tiger
William Wordsworth	:	The World is Too Much with Us The Solitary Reaper
S.T. Coleridge	:	The Ancient Mariner
George Gordon Byron	:	There is a Pleasure in the Pathless Woods.
P.B. Shelley	:	Ode to the West Wind
John Keats	:	To Autumn

Reference Books :-

Strings of Gold Part I Ed. Jasbir Jain (Macmillan)
The Golden Treasury by Francis Turner Palgrave (OUP)
Poet's Pen: An Anthology of English Verse Paperback – by Dustoor P.E. (Author), Homai P.Dustoor (Author) (Oxford University Press)

The New Oxford Book of English Verse, 1250-1950 (Oxford Books of Verse) by Helen Gardner (Editor)

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SECTION B

Nissim Ezekiel:
a. Enterprise
b. Night of The Scorpion

Kamala Das:
a. My Grandmother's House
b. The Looking Glass

Arun Kolatkar:
a. An Old Woman
b. The Bus
c. Chaitanya

A.K. Ramanujan:
a. Of Mothers, Among Other Things
b. Obituary
c. A River

Grieve Patel:
a. On Killing a Tree
b. Servants

Reference Books :-

Ten Twentieth Century Poets ed. R. Parthasarathy (O.U.P.):
Indian Writing in English by K.R.Srinivasa Iyengar .Sterling Publishers Pvt.Ltd
A History of Indian English Literature by M.K.Naik Sahitya Akademi
The Golden Treasury of Indo-Anglian Poetry, 1828-1965 by Vinayak Krishna Gokak (Editor) Sahitya Akademi

SECTION C

Ibsen: *A Doll's House*
Tagore: *The Post Office*

Reference Books-

Henrik Ibsen: *A Doll's House.* Maple Press (1 August 2011)
Tagore: *The Post Office.* Hesperides Press (August 2014)

Paper II: Prose and Fiction

Maximum Marks: 100
Duration: 3 hrs **Min. Pass Marks: 36**

Question No. 1: References to Context from unit A only.

Candidate will be required to explain **four (4)** passages of Reference to Context out of **Eight (8)** of five marks each, with a total of **20 Marks.**

Question No. 2 will also be compulsory. The student will be required to attempt 5 questions out of 10, to be answered in about 5 lines each. Each question will carry 4 marks to a total of **20 marks.**

The other 3 questions will be Essay-type questions of **20 marks** each, one from each section with internal choice.

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SECTION A

S. Radhakrishnan:	The Gandhian Outlook
R.K. Narayan:	A Bookish Topic
J.B. Priestley:	Making Writing Simple
Virginia Woolf:	How Should One Read a Book?
Leo Tolstoy:	Three Questions
Pearl S Buck:	The Refugees
R.K. Narayan:	Under the Banyan Tree
Alice Walker:	Am I Blue?

Reference Books-

An Anthology of English Essays Edited by R.P. Singh (O.U.P.)
The Pointed Vision Edited by Usha Bande and Krishnan Gopal, (O.U.P.)

SECTION B

Chaman Nahal	:	Azadi
William Golding:	:	*Lord of the Flies*

Reference Books :-

Chaman Nahal	:	Azadi .Penguin Books Ltd (March 30, 2003)
William Golding:	:	*Lord of the Flies.* Penguin Books; 3 edition (October 1, 1999)

SECTION C

Note Making, Summarizing, Theme Writing

Recommended Readings :

Mohan, Krishna., Raman, Meenakshi. Effective English Communication. Tata McGraw Hill, New Delhi, 2009.

The Handbook of Creative Writing. Ed. Steven Earnshaw, Edinburgh University Press, London, 2007.

Pal, Rajendra & Korlahalli, J.S. Essentials of Business Communication. New Delhi: Sultan Chand & Sons: New Delhi, 2005

Mohan Das, N.K. Writing Today:Developing Skills in Academic an Workplace Writing (Orient Blackswan)

Vandana R. Singh: *The Written Word* (O.U.P.)

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बी.ए. ~~(ऑनर्स)~~ द्वितीय वर्ष – हिन्दी साहित्य

~~प्रथम~~ तृतीय

~~प्रथम~~ प्रश्न पत्र – रीतिकाल

पूर्णांक 100 उत्तीर्णांक 36

खण्ड – अ

1. केशवदास रामचन्द्रिका –सम्पादक – लाला भगवान दीन
रावण–अंगद संवाद

2. बिहारी – **बिहारी रत्नाकार – जगन्नाथ दास रत्नाकर**

1. मेरी भव बाधा हरौ.....
2. जम–करि–मुँह–तरहरि पर्‌यौ.....
3. कौन भाँति रहि है बिरदु.....
4. कहत नटत, रीझत, खिझत.....
5. नहि पराग नहि मधुर मधु.....
6. दीरघ साँस न लेहि दुख.....
7. थोरे ही गुन रीझते.....
8. तंत्री–नाद कवित्त–रस.....
9. या अनुरागी, चित्त की .....
10. जप माला छापा तिलक.....
11. भूसन भारू सम्भारि है.....
12. अंग–अंग नग जगमगत दीपशिखा सी देह.....
13. कहलाने एकत बसत अहि मयूर मृग बाघ.....
14. कौ कहि सकै बड़ेन सौ लखै बड़ी हू भूल.....
15. घरू–घरू डोलत दीन है.....
16. आवत जात न जानियतु.....
17. बडे न हूजे गुनन बिनु.....
18. कनक कनक ते सौ गुनी मादकता अधिकाय .....
19. तजि तीरथ हरि राधिका.....
20. जिन दिन देखे वै कुसुम.....
21. स्वारथु, सुकृतु न श्रम वृथा.....
22. नर की अरू नल–नीर की .....
23. कहत सबै, बेंदी दियैं.....
24. दृग उरझत, टूटत कुटुम.....
25. रनित भृंग–घंटावली.....

3. देव
– जाकै न काम न क्रोध विरोध.....
– कोऊ कहौ कुलटा कुलीन अकुलीन कहौ.....
– रावरौ रूप रहयौ भरि नैनन.....
– गंग तरंगिन बीच बरंगिनि.....
– ऐसे जु हौ जानत कि जैहे तु विषय के संग.....
– डार द्रुम पालना बिछौना नव पल्लव के .....
– जब तै कुंवर कान्ह रावरी कला–निधान.....
– राधिका कान्ह को ध्यान करै तंब कान्ह .....
– माखन सों मन दूध सौ जोबन.....
– को बचिहै यह बैरी बसन्त पै आवत.....

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4. भूषण
- साजि चतुरंग–सैन अंग मैं उमंग धारि सरजा सिवाजी जंग जीतन चलत है।
- बाने फहराने घहराने घंटा गजन के नाहीं ठहराने रावराने देसदेस के।
- बेद राखे बिदित पुरान परसिद्ध राखे राम–नाम राख्यो अति रसना सुघर में।
- उतरि पलँग तें न दियो हैं धरा पै पग तेऊ सगबग निसिदिन चली जाती हैं।
- ऊँचे घोर मंदर के अंदर रहनवारी ऊँचे घोर मंदर के अंदर रहाती हैं।
- अतर गुलाब चोवा चंदन सुगंध सब सहज सरीर की सुबास बिकसाती हैं।
- सोंधे को अधार किसमिस जिनको अहार चार अंक–लंक मुख चंदके समानी हैं।
- आपस की फूट ही तें सारे हिंदुवान टूटे टूट्यो कुल रावन अनीति अति करतें।
- भुज–भुजगेस की बैसंगिनी भुजंगिनी सी खेदि खेदि खाती दीह दारून दलन के।
- अति सौंधे भरी सुखमा सु खरी गुख ऊपर आइ रहीं अलकैं।

5. घनानंद –
1. छवि कौ सदन, मोदमंडित बदन–चन्द
2. भोर, ते सांझ लौ कानन ओर निहारति बावरी नैक न हारति
3. सोएँ न सोयबो, जागे न जाग, अनोखियै लाग सु अँखिन लागी
4. नित द्यौंस खरी, उर मांझ अरी, छवि रंग–भरी मुरि चाहनि की
5. अन्तर उदेग–दाह, अँखिन प्रवाह–आँसू
6. नैनन मैं लागै जाय, जागै सु करेजे बीच
7. दिननि के फेर सों, भयो है हेर–फेर ऐसौ
8. कौन की सरन जैये आप त्यों काहू पैये
9. जासौं प्रीति ताहि निठुराई सों निपट नेह,
10. मीत सुजान अनीत करौ जिन, हा हा न हूजियै मोहि अमोहि

6. आलम
1. रूचिर बरन चीरू चन्दन चरचि रुचि,.....
2. अँखियाँ भली जू ऐसे अँसुवनि धारै, नातो, ...
3. चाहती सिंगार तिन्हैं सिंगी को सगाई कहा, ...
4. बारैं तें न पलक लगत बिनु साँवरे ते, ...
5. सीत रिपु भीत भई छाती राती ताती तई, ...
6. लता प्रसून डोल बोल कोकिला अलाप केकि, ...
7. पालन खेलत नन्द ललन छलन बलि, ...
8. दैहों दधि मधुर धरनि धर्‌यो छोरि खैहैं, ...
9. नीके न्हाइ धोइ धूरि पैठो नेक बैठो आनि, ...
10. गोरस सुढौरी लिये संभु ताको मत दिये, ...

7. पद्माकर
1. कूलन में, केलिन, कछारन में, कुंजन में, ...
2. औरै भाँति कुंजन में गुंजरत भौंरे–भीर, ...
3. चंचला चमाकैं चहूँ ओरन तें चाह–भरी,.....
4. आयी हौ खेलन फाग इहाँ वृषभानपुरी तें सखी सँग लीने।.....
5. सीज ब्रज चंद पै चली यों मुखचंद जा को, ...
6. ऐसी न देखी सुनी सजनी धनी बाढ़त जात बियोग की बाधा।.....
7. तीर पर तरनि–तनूजा के तमाल–तरे, ...
8. फहरे निसान दिसानि जाहिर, धवल दल बक पांत से।.....
9. सिर कटहिं, सिर कटि धर कटहिं, धर कटि सुहय कटि जात हैं.....
10. किल किलकत चंडी, लहि निज खंडी, उमडि, उमंडी, हरषति है.....

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8. सेनापति

1. राखति न दोपै पोपै पिंगल के लच्छन कौं, ...
2. बानी सौं सहित सुबरन मुँह रहै जहाँ .....
3. करत कलोल स्रुति दीरघ, अमोल, तोल, ...
4. कालिंदी की धार निरधार है अधर, गन.....
5. सोहै सँग आलि, रही रति हु के उर सालि, ...
6. मालती की माल तेरें तन कौ परस पाइ, ...
7. मानहु प्रबाल ऐसे ओठ लाल लाल, भुज, ...
8. बरन बरन तरू फूले उपवन बन, ...

खण्ड – ब

रीतिकालीन साहित्य की प्रवृत्तियाँ

अंक विभाजन

1. कुल चार व्याख्याएं (एक कवि से केवल एक व्याख्या) (आन्तरिक विकल्प देय) 4 x 10 = 40 अंक

2. कुल तीन निबन्धात्मक प्रश्न (खण्ड – अ से) एक कवि से संबंधित एक ही प्रश्न (आन्तरिक विकल्प देय)

3 x 15 = 45 अंक

3. एक प्रश्न टिप्पणीपरक– (खण्ड – ब से) 2 x $7\frac{1}{2}$ = 15 अंक

दो विषयों पर टिप्पणियाँ (विकल्प देय)

(रीतिकाल की साहित्यिक प्रवृत्तियों से संबंधित

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बी.ए. (ऑनर्स) द्वितीय वर्ष – हिन्दी साहित्य (10)

द्वितीय प्रश्न पत्र – नाटक, एकांकी तथा कथेतर विधाएं

पूर्णांक 100 न्यूनतम उत्तीर्णांक – 36

खण्ड – 'अ'

1. नाटक – हानूष – भीष्म साहनी

खण्ड – 'ब'

2. एकांकी

रामकुमार वर्मा	–	उत्सर्ग
उपेन्द्र नाथ अश्क	–	तौलिये
हमीदुल्ला	–	हरितगंधा

कथेतर–गद्य

3. रेखाचित्र	–	प्रोफेसर शशांक – विष्णुकान्त शास्त्री
4. आत्मकथा	–	बिस्मिल का जीवन – रामप्रसाद बिस्मिल
5. संस्मरण	–	तीस बरस का साथी – रामविलास शर्मा
6. यात्रावृत्त	–	चीड़ों पर चांदनी – निर्मल वर्मा
7. रिपोर्ताज	–	अदम्य जीवन – रांगेय राघव

खण्ड – 'स'

नाटक, एकांकी तथा कथेतर विधाओं का उद्‌भव एवं विकास

अंक विभाजन

कुल चार व्याख्याएं –	दो नाटक से एक एकांकी से एक कथेतर गद्य से	9 x 4 = 36 अंक
कुल चार निबन्धात्मक प्रश्न दो प्रश्न नाटक पर (विकल्प देय) एक प्रश्न एकांकी पर (विकल्प देय) एक प्रश्न कथेतर गद्य पर (विकल्प देय)		14 x 4 = 56 अंक
खण्ड 'स' में एक विषय पर टिप्पणी (विकल्प देय)		8 अंक

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3. Urdu

B.A. Part-II

Paper-I Poetry and Critical Appreciation

Max.Marks 100 3 Hrs. Min. Pass Marks 36

Books Prescribed :.

1. Shahpare Published By Idara-e-Nashr-o-Ishayat, Allahabad University, Allahabad (1991 Edition)

The following are prescribed from the text Book :-

A) Ghazalyat: Dard, Momin, Nasikh

B) Qasida : Wah Wah Kya Motadil Hai Baghe Alam Ki Hawa of Zauq

C) Marsiya : Namake Khawane Takallum Hai Fasahat Meri of Meer Anis

Division of Marks :

Unit I	Ten short answer type questions.	20
Unit II	Explanation of Two Out of Three Ghazal/Qasida/Marsiya Passages.	20
Unit III	Critical Appreciation of Poet: Dard, Momin and Nasikh with Internal Choice	20
Unit IV	General Questions on Zauq & Anis..	20
Unit V	General question on Ghazal, Qasida and Marsiya.	20
		Total 100

Note: Attempt at least one question from each unit. All the short answer type question of unit I are compulsory.

Paper II (Prose)

Max.Marks 100 3 Hrs. Min. Pass Marks 36

Books Prescribed :

1. Intikhabe Nasr-Part-II Edited By Dr. Shabihul Hasan & Others (1990 Edition) The following lessons are Omitted From the Text Book;-

   A) Adab Ki Gharaz-o-Ghayat

   B) Natak

2. Afsana : 1. Kafan: Premchand

3. Novel : 1. Ziddi : Ismat Chughtai.

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Division of Marks :

Unit I	Ten short answer type questions.	20
Unit II	Explanation of Two Out of Three Prose Passages.	20
Unit III	Critical Appreciation of A Prose Writer with Internal Choice	20
Unit IV	Summary of A Prose Lesson with Internal Choice	20
Unit V	General Questions on Novel & Afsana.	20
		Total 100

Note: Attempt at least one question from each unit. All the short answer type questions of unit I are compulsory.

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4. Persian

B.A. Part-II

Scheme :

Min. Pass Marks: 72		Max. Marks: 200
Paper-I	3 hrs. Duration	100 Marks
Paper-II	3 hrs. Duration	100 Marks

Paper-I (Prose & Poetry)

M.M. : 100 3 hrs. Min. Pass Marks. 36

Books Prescribed :

1. Nisab-e-Jadeed Farsi Bara-e-B.A.

   (Hissa Nasar Wa Nazm) published by Jayyed Press Delhi.

Prose Section

1. Inlekhab-e-Zindigi-e-Man Kudki, Mah-e-Man
2. Dastan Hai Kotah

   Mohd. Hijazi

   (a) Idi (b) Khudkushi

Poetry Section

1. Qasaid Urfi

   Dar Wasaf Kashmeer

2. Intekab-e-Masnavi (Page No,: 118-129)
3. Rubaiyate Umar Khyyam 1 to 20 Rubaiyat

Division of Marks :

Unit-1	(A)Ten short answer type questions based on full paper.	10
	(B) Translation of two prose passages out of three into Urdu	20
Unit-2	Translation of two Poetry Passages out of three into Urdu	20
Unit-3	General Question on Prose Writer	15
Unit-4	General Question on Poetry Writer.	15
Unit-5	Summary of prescribed lessons.	20
	Total	100

Note: Unit-I Both A and B questions are compulsory.

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Paper-II

Fiction, History of Persian Literature and Translation

M.M. : 100 3 hrs. Min. Pass Marks. 36

Books Prescribed :

1. Nisab-e-Jadeed Farsi Bara-e-B.A. (Hissa-e-Nasr)
   Published By Jayyed Press, Delhi
   Only Intekhab-e-Haji-BABA
   (Upto Guftar Suwwum)

Books Recommended :

1. Sher-ulAjam Part I & II By Shibli Nomani
2. Tarikh-e-Adabiyat-e-Iran By Dr. Raza Zada Shafaq Translated in Urdu By Mubarizudin Rifat.

Division of Marks :

Unit-1	(A) Ten short answer type questions based on full paper.	10
	(B) Translation of two passages out of three prescribed Fiction into Urdu	20
Unit-2	General Question on Fiction/Character	20
Unit-3	History of Persian Literature (From Tahir Period to Safawid Period)	20
Unit-4	Question on Prescribed Lessons	20
Unit-5	Translation of five Urdu sentences into Persian out of ten	10
	Total	100

Note: Unit-I Both A and B questions are compulsory.

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Sanskrit

बी.ए. संस्कृत द्वितीय वर्ष

सामान्य निर्देश –

1. प्रत्येक परीक्षा में दो–दो प्रश्नपत्र होंगे।
2. प्रत्येक प्रश्नपत्र में न्यूनतम उत्तीर्णांक 36 तथा पूर्णांक 100 होंगे और समय 3 घण्टे का होगा।
3. परीक्षा का माध्यम हिन्दी/अंग्रेजी होगा , परन्तु प्रश्नपत्र केवल हिन्दी में बनाया जायेगा। परीक्षार्थी को छूट होगी कि वह हिन्दी,संस्कृत अथवा अंग्रेजी में किसी एक भाषा में उत्तर दे सके । यदि परीक्षक ने किसी प्रश्न विशेष के लिए भाषा का निर्देश कर दिया है तो उस प्रश्न का उत्तर उसी भाषा में देना अनिवार्य होगा।
4. संस्कृत केवल देवनागरी लिपि में ही लिखा जाना अपेक्षित है।
5. निर्धारित ग्रन्थ में से अनुवाद, व्याख्या, सरलार्थ एवं समालोचनात्मक प्रश्न पूछे जावेंगे।
6. प्रत्येक प्रश्नपत्र में 10 प्रतिशत अंक संस्कृत भाषा में उत्तर के लिये निर्धारित हैं।
7. प्रत्येक प्रश्नपत्र में दो भाग होंगे, जिसमें प्रथम 'अ' भाग लघूत्तरात्मक प्रश्नों का होगा। 'ब' भाग में निबन्धात्मक प्रश्न होंगे। 'अ' भाग में कुल 15 प्रश्न होंगे, जिनका पूर्णांक 30 होगा।

परीक्षा योजना–	न्यूनतम उत्तीर्णांक–72	पूर्णांक–200
प्रथम प्रश्न–पत्र		अंक–100
द्वितीय प्रश्न–पत्र		अंक–100

प्रथम प्रश्नपत्र

वैदिक साहित्य, गद्य साहित्य एवं व्याकरण

समय : 3 घण्टे अंक–100

प्रथम प्रश्न में निर्धारित ग्रन्थ में से लघूत्तरात्मक निबन्धात्मक, अनुवाद ,व्याख्या व समालोचनात्मक प्रश्न पूछे जायेंगे। 15 प्रश्न लघूत्तरात्मक होंगे जिनमें से प्रथम 5 प्रश्नों का उत्तर संस्कृत भाषा के माध्यम से देना होगा, प्रत्येक प्रश्न के लिए 2 अंक निर्धारित हैं। जिस प्रश्नपत्र में संस्कृत अनुवाद/ निबन्ध पूछे गए हैं वहाँ संस्कृत में उत्तर अपेक्षित नहीं हैं।

पाठ्यक्रम

1. वैदिक साहित्य

(क) ऋग्वेद के निम्नलिखित सूक्तों का अध्ययन– 20 अंक

अग्निसूक्त (1/1) वरुणसूक्त (1/25) इन्द्रसूक्त (2/12) क्षेत्रपतिसूक्त (4/57) विश्वेदेवासूक्त (8/58) प्रजापतिसूक्त (10/121) संज्ञानसूक्त (10/191)

इन सूक्तों के मंत्रों का अनुवाद, व्याख्यात्मक टिप्पणी एवं उक्त देवताओं का चरित्र, स्वरुप से सम्बन्धित प्रश्न निर्धारित हैं।

(ख) कठोपनिषद्– प्रथम अध्याय–प्रथम वल्ली 10 अंक

2. गद्य साहित्य– शुकनासोपदेश (कादम्बरी–बाणभट्ट से) 25 अंक

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3. वैदिक साहित्य का इतिहास 15 अंक

(वेद तथा प्रमुख ब्राह्मण ग्रन्थों का सामान्य परिचय)

4. व्याकरण– लघुसिद्धान्तकौमुदी–नामिक (अजन्त एवं हलन्त) 30 अंक

(क) अजन्त प्रकरण – 15 अंक

निम्नलिखित शब्दों की रूपसिद्धि एवं इनमें प्रयुक्त होने वाले सूत्रों का अर्थज्ञान– राम, सर्व, हरि, गुरु, रमा, नदी, ज्ञान, वारि

(ख) हलन्त प्रकरण– 15 अंक

निम्नलिखित शब्दों की रूपसिद्धि एवं इनमें प्रयुक्त होने वाले सूत्रों का अर्थज्ञान– विश्ववाह्, राजन्, भगवत्, विद्वस्, युष्मद्, अस्मद् और चतुर्, इदम्।

अंक– विभाजन

क्र.सं.	नाम पुस्तक	लघूत्तरात्मकप्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	अंक योग
1.	ऋग्वेद	लघूत्तरात्मक 2	04	02	16	4+16=20
2.	कठोपनिषद्	लघूत्तरात्मक 2	04	01	06	4+06=10
3.	शुकनासोपदेश	लघूत्तरात्मक 3	06	02	17	6+19=25
4.	वैदिक साहित्य का इतिहास	लघूत्तरात्मक 2	04	01	11	4+11=15
5.	लघुसिद्धान्त कौमुदी क– हलन्त	लघूत्तरात्मक 03	06	02	09	6+9=15
	ख–अजन्त	लघूत्तरात्मक 03	06	02	9	6+9=15
कुल योग		15	30	10	70	100

प्रश्न–पत्र का निर्माण निम्नानुसार होगा –

1. सभी प्रश्न अनिवार्य हैं।
2. प्रत्येक पुस्तक से लघूत्तरात्मक व निबन्धात्मक, व्याख्यात्मक प्रश्न पूछे जायेंगे । लघूत्तरात्मक प्रश्न के 2 अंक निर्धारित हैं।

निबन्धात्मक / व्याख्यात्मक प्रश्न

1.वैदिक साहित्य

ऋग्वेद

भाग अ में 2–2 अंक के दो लघूत्तरात्मक प्रश्न पूछे जायेंगे । 04 अंक

भाग ब

4 मन्त्र पूछकर उनमें से किसी 2 की सप्रसंग व्याख्या पूछी जायेगी। 10 अंक

देवताओं के स्वरूप सम्बन्धी प्रश्न में से किसी एक का उत्तर अपेक्षित है। 06 अंक

कठोपनिषद्

भाग अ में 2–2 अंक के दो लघूत्तरात्मक प्रश्न पूछे जायेंगे । 04 अंक

भाग ब

2 मन्त्र पूछकर किसी एक की व्याख्या अपेक्षित है। 06 अंक

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2. शुकनासोपदेश

भाग अ में 2–2 अंक के तीन लघूत्तरात्मक प्रश्न पूछे जायेंगे । 06 अंक

भाग ब

4 गद्यांश पूछकर उनमें से किन्हीं 2 की सप्रसंग व्याख्या पूछी जायेगी। 12 अंक

दो विवेचनात्मक प्रश्न पूछकर किसी एक प्रश्न का उत्तर देय होगा। 07 अंक

3. वैदिक साहित्य का इतिहास

भाग अ में 2–2 अंक के दो लघूत्तरात्मक प्रश्न पूछे जायेंगे । 04 अंक

भाग ब

2 विवेचनात्मक मन्त्र पूछकर 1 प्रश्न का उत्तर देय होगा। 11 अंक

4. लघुसिद्धान्त कौमुदी

(क) अजन्त

भाग अ में 2–2 अंक के तीन लघूत्तरात्मक प्रश्न पूछे जायेंगे । 06 अंक

भाग ब

4 सूत्र पूछकर 2 की व्याख्या अपेक्षित है। 05 अंक

4 शब्दों की सिद्धि पूछकर 2 की सिद्धि अपेक्षित है। 04 अंक

(ख) हलन्त

भाग अ में 2–2 अंक के तीन लघूत्तरात्मक प्रश्न पूछे जायेंगे । 06 अंक

भाग ब

4 सूत्र पूछकर 2 की व्याख्या अपेक्षित है। 05 अंक

4 शब्दों की सिद्धि पूछकर 2 की सिद्धि अपेक्षित है। 04 अंक

सहायक पुस्तकें :

1. वैदिक सूक्त मुक्तावली– डॉ. सुधीर कुमार गुप्त , हंसा प्रकाशन, जयपुर।
2. ऋक्सूक्त मंजरी– डॉ. सुभाष वेदालंकार, –अलंकार प्रकाशन, जयपुर।
3. ऋग्वेदसंहिता–एफ. मैक्समूलर–चौखम्बा प्रतिष्ठान दिल्ली।
4. ऋग्वेदसंहिता–डॉ.शारदा चतुर्वेदी–चौखम्बा प्रतिष्ठान दिल्ली।
5. ऋग्वेदसंहिता–वी.के.शर्मा–चौखम्बा प्रतिष्ठान दिल्ली।
6. कठोपनिषद्–वैजनाथ पाण्डेय–मोतीलाल बनारसीदास ,दिल्ली।
7. कठोपनिषद्–डॉ. राजेन्द्रप्रसाद शर्मा–जगदीश संस्कृत पुस्तकालय, जयपुर।
8. कठोपनिषद्–रचना प्रकाशन, जयपुर।
9. कठोपनिषद्(प्रथम वल्ली)– डॉ. सुभाष वेदालंकार, –अलंकार प्रकाशन, जयपुर।

<u>गद्य–साहित्य :</u>

1. शुकनासोपदेश– डॉ. सुभाष वेदालंकार, अजमेरा बुक कम्पनी , जयपुर।
2. शुकनासोपदेश–महालक्ष्मी प्रकाशन, आगरा।
3. शुकनासोपदेश–डॉ. श्रीकृष्ण ओझा, आदर्श प्रकाशन, जयपुर।
4. कादम्बरी– चौखम्बा संस्कृत प्रतिष्ठान, दिल्ली।

संस्कृत साहित्य का इतिहास :

1. संस्कृत साहित्य की रूपरेखा–चन्द्रशेखर पाण्डेय, चौखम्बा प्रकाशन , वाराणसी।

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2. संस्कृत साहित्य का नवीन इतिहास–डॉ. पुष्करदत्त शर्मा।
3. संस्कृत साहित्य का समालोचनात्मक इतिहास–डॉ. रामजी उपाध्याय, रामनारायण बेनीमाधव, इलाहाबाद।
4. संस्कृत साहित्य का इतिहास– श्री सत्यनारायण शास्त्री, आर्य बुक डिपो, दिल्ली।
5. संस्कृत साहित्य का इतिहास– डॉ. बलदेव उपाध्याय, चौखम्बा प्रकाशन, वाराणसी।
6. संस्कृत साहित्य का इतिहास– मंगलदेव शास्त्री, मोतीलाल बनारसीदास, दिल्ली।
7. संस्कृत साहित्य का इतिहास– प्रो. उमाशंकर शर्मा ऋषि, चौखम्बा प्रतिष्ठान दिल्ली।
8. संस्कृत साहित्य का इतिहास– डॉ रमाशंकर त्रिपाठी चौखम्बा प्रतिष्ठान दिल्ली ।
9. वैदिक साहित्य एवं संस्कृति का स्वरूप– ओम प्रकाश पाण्डेय, विश्व प्रकाशन।

लघुसिद्धान्त कौमुदी :

1. लघुसिद्धान्त कौमुदी–डॉ. अर्कनाथ चौधरी, जगदीश संस्कृत पुस्तकालय, जयपुर।
2. लघुसिद्धान्त कौमुदी– महेशसिंह कुशवाह–प्रथम व द्वितीय भाग, चौखम्बा संस्कृत प्रतिष्ठान दिल्ली।
3. लघुसिद्धान्तकौमुदी, श्रीश्रीधरानन्द शास्त्री, मोतीलाल बनारसीदास,दिल्ली।
4. लघुसिद्धान्तकौमुदी, विश्वनाथ शास्त्री, मोतीलाल बनारसीदास,दिल्ली।

द्वितीय प्रश्नपत्र

नाटक, छन्द, अलंकार एवं संस्कृत साहित्य का इतिहास

समय : 3 घण्टे अंक–100

प्रथम प्रश्न में निर्धारित ग्रन्थ में से लघूत्तरात्मक निबन्धात्मक, अनुवाद ,व्याख्या व समालोचनात्मक प्रश्न पूछे जायेंगे।

पाठ्यक्रम

1. अभिज्ञानशाकुन्तलम्– कालिदास 45 अंक
2. छन्द– अभिज्ञानशाकुन्तलम् के आधार पर निम्नलिखित छन्दों के लक्षण एवं उदाहरण–अनुष्टुप्, आर्या, उपजाति, भुजंगप्रयात, वसन्ततिलका, शिखरिणी, मालिनी, शार्दूलविक्रीडित, इन्द्रवज्रा, उपेन्द्रवज्रा, स्थोद्धता, हरिणी, स्रग्धरा, मन्दाक्रान्ता। 10 अंक
3. अलंकार– काव्यदीपिका(अष्टम शिखा) के आधार पर निम्नलिखित अलंकारों के लक्षण एवं उदाहरण–अनुप्रास, यमक, श्लेष, वक्रोक्ति, उपमा, रूपक, उत्प्रेक्षा, अतिशयोक्ति, अप्रस्तुतप्रशंसा, विभावना, विशेषोक्ति, व्यतिरेक, समासोक्ति, दृष्टान्त, दीपक, तुल्ययोगिता, संदेह, भ्रान्तिमान। 10 अंक
4. संस्कृत साहित्य का इतिहास 25 अंक

(क) वीरकाव्य : रामायण तथा महाभारत
(ख) महाकाव्य –कालिदास, अश्वघोष, भारवि, माघ।
(ग) गीति काव्य– कालिदास, भर्तृहरि, पण्डितराज जगन्नाथ।
(घ) गद्य काव्य– दण्डी, सुबन्धु, बाणभट्ट, अम्बिकादत्त व्यास।

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(ड) नाट्य साहित्य– भास, कालिदास, शूद्रक, विशाखदत्त।

(च) आधुनिक संस्कृत साहित्य (राजस्थान प्रान्त के विशेष संदर्भ में)
पं.गणेशराम शर्मा, पं. मधुसूदन ओझा, भट्ट मथुरानाथ शास्त्री, पद्मशास्त्री, श्री सूर्य नारायण शास्त्री।

5. अनुवाद (हिन्दी से संस्कृत) 10 अंक

अंक– विभाजन

क्र. सं.	नाम पुस्तक	लघूत्तरात्मक प्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	अंको का योग
1.	अभिज्ञानशाकुन्तलम्	लघूत्तरात्मक 05	10	03	35	10+35=45
2.	छन्द (अभिज्ञानशाकुन्तलम् के आधार पर)	लघूत्तरात्मक 01	02	01	08	2+08=10
3.	अलंकार (काव्यदीपिका अष्टम शिखा के आधार पर)	लघूत्तरात्मक 01	02	01	08	2+08=10
4.	संस्कृत साहित्य का इतिहास	लघूत्तरात्मक 08	16	01	9	16+9=25
5	अनुवाद			01	10	10
कुल योग		15	30	07	70	100

प्रश्न–पत्र का निर्माण निम्नानुसार होगा –

भाग 'अ' 30 अंक

प्रश्न–पत्र का निर्माण निम्नानुसार होगा –

1. सभी प्रश्न अनिवार्य हैं।

2. प्रत्येक पुस्तक से लघूत्तरात्मक व निबन्धात्मक, व्याख्यात्मक प्रश्न पूछे जायेंगे ।

लघूत्तरात्मक प्रश्न के 2 अंक निर्धारित हैं।

निबन्धात्मक / व्याख्यात्मक प्रश्न

1. अभिज्ञानशाकुन्तलम्

भाग अ में 2–2 अंक के पाँच लघूत्तरात्मक प्रश्न पूछे जायेंगे । 10 अंक

भाग ब

1 से 4 अंकों में से 4 श्लोक पूछकर उनमें से किन्हीं 2 की सप्रसंग व्याख्या पूछी जायेगी। 14 अंक

5 से 7 अंकों में से 4 श्लोक पूछकर उनमें से किन्हीं 2 की सप्रसंग व्याख्या पूछी जायेगी। 14 अंक

2 प्रश्नों में से 1 प्रश्न का उत्तर अपेक्षित है। 07 अंक

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2. छन्द

भाग अ में 2 अंक के एक लघूत्तरात्मक प्रश्न पूछा जायेंगा । 02 अंक

भाग ब

4 छन्द पूछकर 2 के लक्षण एवं उदाहरण अपेक्षित है। 08 अंक

3. अलंकार

भाग अ में 2 अंक के एक लघूत्तरात्मक प्रश्न पूछा जायेंगा । 02 अंक

भाग ब

4 अंलकार पूछकर उनमें से 2 के लक्षण एवं उदाहरण अपेक्षित है। 08 अंक

4. संस्कृत साहित्य का इतिहास

भाग अ में 2–2 अंक के आठ लघूत्तरात्मक प्रश्न पूछे जायेंगे । 16 अंक

भाग ब

2 विवेचनात्मक प्रश्नो में से 1प्रश्न का उत्तर अपेक्षित है। 09 अंक

5. अनुवाद (हिन्दी से संस्कृत)

10 वाक्यो मे किन्हीं 5 वाक्यों का संस्कृत में अनुवाद । 10 अंक

सहायक पुस्तकें

<u>अभिज्ञानशाकुन्तलम्</u>

1. अभिज्ञानशाकुन्तलम् डॉ. गंगासागर राय, चौखम्बा संस्कृत प्रतिठान, दिल्ली
2. अभिज्ञानशाकुन्तलम् जगदीशप्रसाद शर्मा– रचना प्रकाशन, जयपुर
3. अभिज्ञानशाकुन्तलम् सुवोधनचंद्र पंत– मोतीलाल बनारसी, दिल्ली
4. अभिज्ञानशाकुन्तलम् जगदीशलाल शास्त्री– मोतीलाल बनारसी दिल्ली
5. काव्यदीपिका– परमेश्वरानंद शर्मा, मोतीलाल बनारसी दिल्ली

<u>संस्कृत साहित्य का इतिहास :–</u>

1. संस्कृत साहित्य की रूपरेखा– चंद्रशेखर पाण्डेय एवं नानूराम व्यास, चौखम्बा प्रकाशन, वाराणसी
2. संस्कृत साहित्य का नवीन इतिहास– डॉ. पुष्करदत्त शर्मा, अजमेरा बुक कं. जयपुर
3. संस्कृत साहित्य का आलोचनात्मक इतिहास– डॉ. रामजी उपाध्याय, रामनारायणलाल बेलरमाणव, इलाहाबाद
4. संस्कृत साहित्य का इतिहास–श्री सत्यनारायण शास्त्री, आर्य बुक डिपो, दिल्ली
5. संस्कृत साहित्य की प्रवृत्तियॉ– डॉ. जयकिशनप्रसाद खण्डेलवाल, विनोद पुस्तक मंदिर, आगरा
6. संस्कृत साहित्य का इतिहास– ए.बी. कीथ, अनु. मंगलदेव शास्त्री – दिल्ली।
7. संस्कृत साहित्य का इतिहास– प्रो. राजवंश सहाय 'हीरा' चौखम्बा संस्कृत प्रतिष्ठान दिल्ली
8. संस्कृत साहित्य का प्राचीन एंव अर्वाचीन इतिहास– डॉ. रामसिंह चौहान, रितु पब्लिकेशन, जयपुर।

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6. Philosophy

B.A. Part-II

Scheme :

Two Papers	Min. Pass Marks 72	Max. Marks 200
Paper I	3 hrs. duration	Max. Marks 100
Paper II	3 hrs. duration	Max. Marks 100

General Instructions:

(1) There shall be two question papers: Paper I and Paper II.

(2) Both the question papers will be in two parts: Part I & Part II

(3) Part I of the question paper will be of 40 marks in total. This part will consist of twenty compulsory short questions, with 2 marks each. The word limit for these questions shall be upto 50 words. These questions will cover the entire units and there will be no unit wise division of the questions asked in this part.

(4) Part II of the question paper will be of 60 marks and students will required to write detailed answer in the answer sheet only. If syllabus (course contents) of a paper is divided into two units i.e. Unit A and Unit B, then in this part of the question paper six questions will be asked in total: three questions from each unit. Student will be asked to attempt three questions in total and at least one question from each unit. Each question will be of 20 marks. If syllabus (course contents) of a paper is divided into three Units i.e. Unit A, B & C then in the Part II of the question paper, which consist of Essay type questions, six questions will be asked in total: two questions from each Unit. Students will be required to attempt three questions in total and one question from each Unit. The ideal word limit for these questions is 500-600 words.

Paper I : Logic (Western)

Unit: A

1. Nature of Logic
2. Deduction and induction
3. Sentence and proposition
4. Truth and validity
5. Uses of language
6. Informal Fallacies
7. Laws of thought

Unit: B

1. Aristotelian classification of categorical propositions, square of opposition and the question of existential import, conversion, observation, contraposition.
2. Categorical syllogism: figures and moods, rules of validity, fallacies.
3. Boolean interpretation of propositions, Venn diagram technique of testing the validity of syllogisms.

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Unit: C

1. Truth-functions: negation, conjunction, disjunction, implications and equivalence.
2. Arguments and argument-forms, truth-table technique for testing the validity of arguments form and classification of statements forms.
3. Mill's methods of experimental enquiry
4. The method of deduction in propositional logic introduction of rules & simple derivation.

Suggested Readings:

I.M. Copi : *Introduction to logic* (Hindi Translation by Pandey and Mishra and another translation available from Pearson)

S.K. Seth and Nilima Mishra : *Tarkshastra,* Lokabharti, Allahabad

Paper II: Ethics (Indian and Western)

Unit: A

1. Introduction: Concerns and presuppositions, theory of karma.
2. Dharma: its meaning, definition, classification
3. Niskama Karma Yoga, Sthitprajna , Lokasamgraha
4. Purusarthas and their inter-relation, purusartha: sadhana and sadhaya Mulya.
5. Buddhist ethics: the four noble truths and the eight-fold path. Brahmaviharas
6. Jaina ethics : anuvratas and mahavratas, Tri ratna

Unit: B

1. Nature and scope of ethics.
2. Introduction: concerns and presuppositions; free will.
3. Teleological ethics: egoism; hedonism; utilitarianism.
4. Deontological ethics: Kant.
5. Intuitionism : Butler
6. Virtue ethics: Socrates, Plato and Aristotle.
7. Theories of punishment.

Suggested Readings :

I.C. Sharma : *Ethical Philosophies of India.*

S.K. Maitra : *The Ethics of the Hindus.*

Surama Dasgupta : *Development of Moral Philosophy in India.*

M. Hiriyanna : *The Indian Conception of Values.*

P.V. Kane : *The History of Dharmasastras Vol.I* (Hindi translation available)

W. Lillie : *An Introduction to Ethics.* Philippa Foot (ed.) Theories of Ethics.

J.N. Sinha : *A Manual of Ethics* (Hindi translation available)

दिवाकर पांडेय : *भारतीय नीतिशास्त्र*

संगमलाल पांडेय : *नीति दर्शन का सर्वेक्षण*

वेद प्रकाश वर्मा : *नीतिशास्त्र के मूल सिद्धान्त*

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7. : HISTORY

The scheme of examination will be as follows:

Scheme:

Maximum Marks 200		Minimum Pass Marks 72
Paper I	3 hrs. Duration	Marks 100
Paper II	3 hrs. Duration	Marks 100

Note: There shall be two papers in all in the subject of History, and each paper shall be of three hours duration and of 100 marks.

Each paper shall consist of two parts. Part I shall carry 40 marks and shall consist of two compulsory questions. The first compulsory question will be of 20 marks, comprising of 10 very short answer type questions of two marks each. The answer to each question should not exceed 20 words.

The second compulsory question will be of 20 marks. It will comprise of 10 short answer type questions of 04 marks each, the candidate will be required to answer any 05 questions. The answer to each question should not exceed 50 words.

The second part of the question paper shall be divided into three sections comprising of 06 essay type questions, containing 02 questions from each section, of 20 marks each. Candidate will be required to answer 03 questions, selecting one question from each section. This part of the question paper shall be of 60 marks.

परीक्षा योजना :

अधिकतम अंक 200		न्यूनतम उत्तीर्णांक 72
प्रथम प्रश्नपत्र	समय 3 घंटे	अंक 100
द्वितीय प्रश्नपत्र	समय 3 घंटे	अंक 100

नोट : इतिहास विषय के कुल दो प्रश्नपत्र होंगे, प्रत्येक प्रश्नपत्र तीन घंटे की अवधि का एवं 100 अंकों का होगा।

प्रत्येक प्रश्नपत्र के दो भाग होंगे। प्रथम भाग 40 अंको का होगा एवं इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंकों के प्रथम अनिवार्य प्रश्न में, दो–दो अंक के 10 अनिवार्य अतिलघुउत्तरात्मक प्रश्न होंगे। प्रत्येक उत्तर की शब्द सीमा 20 शब्द।

20 अंकों के द्वितीय अनिवार्य प्रश्न में, चार–चार अकों के 10 लघुउत्तरात्मक प्रश्न होंगे जिनमें से 05 प्रश्न करने होंगे। प्रत्येक उत्तर की शब्द सीमा 50 शब्द।

प्रश्नपत्र के द्वितीय भाग मे, पाठ्यक्रम के तीन खण्डों में से, प्रत्येक खण्ड से दो–दो प्रश्नों का चयन करते हुए, कुल 06 निबन्धात्मक प्रश्न होंगे। प्रत्येक प्रश्न 20 अंको का होगा। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए कुल 03 प्रश्न हल करने होंगे। प्रश्नपत्र का यह भाग 60 अंको का होगा।

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PAPER I : HISTORY OF MEDIEVAL INDIA (c. 1200–1761 A. D)

Section – A

A survey of the sources of the period of Delhi Sultanate. Turkish invasions and Rajput resistance. Establishment and consolidation of Delhi Sultanate. Khalji imperialism and Tughlaq innovations. Growth of Provincial kingdoms. Contribution of Bahamani and Vijayanagar kingdoms.

Section – B

A survey of the sources of the Mughal period. Foundations of the Mughal Empire. Rise of Sher Shah Suri and his administration. Expansion and consolidation of the Mughal empire under Akbar. Role of Nur Jahan 'Junta' in Mughal politics. Mughal policy towards Rajputs, Sikhs, Deccan kingdom, Marathas, Persia and Central Asia. Religious policy of the Mughals. Rise of Shivaji and expansion of the Marathas upto 1761. Fall of the Mughal Empire.

Section – C

A critical evaluation of the main features and processes of the polity, society, economy and culture during medieval times (c. 1200-1761 A.D). Nature of State. Growth of administrative and agrarian systems. Economy : agriculture, industry, trade, banking, urban centres. Society : social classes - ulema, nobility, peasantry, slavery. Status of women. Bhakti Movement, Maharashtra Dharma, Sufism, Sikhism. Developments in art, architecture, and literature. Efforts at cultural synthesis and growth of composite culture.

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प्रथम प्रश्नपत्र : मध्यकालीन भारत का इतिहास (1200–1761 ईस्वी)

खण्ड – क

दिल्ली सल्तनत के काल के स्रोतों का सर्वेक्षण। तुर्की आक्रमण एवं राजपूत प्रतिरोध। दिल्ली सल्तनत की स्थापना एवं सुदृढीकरण। खलजी साम्राज्यवाद एवं तुगलकी नवप्रवर्तन। प्रांतीय राज्यों का उदय। बहमनी एवं विजयनगर राज्यों का योगदान।

खण्ड – ख

मुगल काल के स्रोतों का सर्वेक्षण। मुगल साम्राज्य की स्थापना। शेरशाह सूरी का उत्कर्ष एवं उसका प्रशासन। अकबर के अधीन मुगल साम्राज्य का विस्तार एवं सुदृढ़ीकरण। मुगल राजनीति में नूरजहाँ 'जुन्ता' की भूमिका। राजपूतों, सिक्खों, दक्कनी राज्यों, मराठों, फारस एवं मध्य एशिया के प्रति मुगलों की नीति। मुगलों की धार्मिक नीति। शिवाजी का उत्कर्ष तथा 1761 ईस्वी तक मराठों का विस्तार। मुगल साम्राज्य का पतन।

खण्ड – ग

मध्यकाल (1200 से 1761 ईस्वी) में राजशासन, समाज, अर्थव्यवस्था एवं संस्कृति की मुख्य विशेषताओं का आलोचनात्मक मूल्यांकन। राज्य की प्रकृति । प्रशासनिक एवं कृषिपरक व्यवस्थाओं का विकास। अर्थव्यवस्था : कृषि, उद्योग, व्यापार, बैंकिंग, नगरीय केन्द्र। समाज : सामाजिक वर्ग – उलेमा, कुलीन वर्ग, कृषक वर्ग, दासप्रथा। स्त्रियों की स्थिति। भक्ति आंदोलन, महाराष्ट्र धर्म, सूफीवाद, सिक्ख धर्म। कला, स्थापत्य एवं साहित्य की प्रगति। सांस्कृतिक समन्वय हेतु प्रयास एवं सम्मिश्र संस्कृति का विकास।

Books Recommended (अनुशंसित पुस्तकें) :

K. S. Lal	:	*History of the Khaljis*, Allahabad, 1960.
	:	*Theory and Practice of Muslim State in India*, Delhi, 1999
Hermann Kulke (ed.)	:	*The State in India, 1000-1700 A.D.*, Delhi, 1997
A. Mahdi Husain	:	*The Tughlaq Dynasty.*
	:	*The Rise and Fall of Muhammad Bin Tughlaq*
Satish Chandra	:	*Medieval India – From Sultanate to the Mughals, Part I, Delhi Sultanate (1205-1526), Part II; Mughal Empire (1526-1748)* Delhi, 1997 (also in Hindi).
K. M. Ashraf	:	*Life and Conditions of the People of Hindustan (1200-1550 A.D)*, Delhi, 1970.
R. P. Tripathi	:	*Rise and Fall of the Mughal Empire* (also in Hindi), Allahabad, 1963
	:	*Some Aspects of Muslim Administration*, Allahabad, 1964

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Tapan Raychaudhuri Irfan Habib (ed.)		*Cambridge Economic History of India*, Vol. I, c. 1200-1750 A.D., Delhi, 1984
John F. Richards		*The Mughal Empire*, Delhi, 1993
Jadunath Sarkar	:	*Mughal Administation*, Delhi, 1972
Irfan Habib		*Agrarian System of Mughal India, 1526-1707*, Mumbai, 1963
S. R. Sharma	:	*Religious Policy of the Mughal Empire* (also in Hindi), Agra, 1972
Burton Stein	:	*Vijayanagar*, 1989
"	:	*Peasant State and Society in Medieval South India*, Delhi, 1980
H.K. Sherwani	:	*The Bahamani Kingdom*
G. S. Sardesai	:	*New History of the Marathas*, Vol. I
A. L. Srivastava	:	*Medieval Indian Culture* (also in Hindi), Agra, 1964
राधेशरण		*मध्यकालीन भारत का सामाजिक एवं आर्थिक इतिहास*, मध्यप्रदेश हिन्दी ग्रंथ अकादमी, भोपाल, 2000
राधेशरण		*मध्यकालीन भारत की सांस्कृतिक संरचना*, मध्यप्रदेश हिन्दी ग्रंथ अकादमी, भोपाल, 1998
झारखण्ड चौबे एवं कन्हैयालाल श्रीवास्तव		*मध्ययुगीन भारतीय समाज एवं संस्कृति*, उत्तरप्रदेश हिन्दी संस्थान, लखनऊ, चतुर्थ संस्करण, 2005
सतीश चन्द्र	:	*मध्यकालीन भारत : सल्तनत से मुगलों तक*, भाग एक – *दिल्ली सल्तनत (1206–1526)*, भाग दो – *मुगल सल्तनत (1526–1748)*
हरिश्चंद्र वर्मा (सं.)	:	*मध्यकालीन भारत*, भाग–1 *(750–1540)*, भाग –2 *(1540–1761)*, हिन्दी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविद्यालय, दिल्ली
ए.एल. श्रीवास्तव		*मध्यकालीन भारतीय संस्कृति* (अनुवाद)
घनश्याम दत्त शर्मा	:	*मध्यकालीन भारतीय सामाजिक, आर्थिक एवं राजनीतिक संस्थाएं* राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर

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PAPER II. MAIN TRENDS IN THE CULTURAL HISTORY OF INDIA

Section – A

Meaning of Culture. Essence and characteristics of Indian Culture. Religion and Culture : Vedic religion, Buddhism and Jainism, Vaishnavism and Saivism. Bhakti Movement. Islam and Sufism in India Philosophy and Culture : Upanishadic thought, Bhagvadgita.

Section – B

Literature and Culture : significance of Ramayana, Mahabharata and Puranas. Contribution of Kalidas, Tulsidas, and Ravindranath Tagore. Social Institutions and Culture : Social ideals of ancient India - *varna, ashrama, samskaras, purushartha.* Social Reform Movements of the 19th and 20th centuries.

Section – C

Art and Culture : Characteristics of Indian Art. Styles of temple architecture. A brief study of temples at Abu, Khajuraho, Orissa, Pallava and Chola temples. Painting through the ages - rock paintings, Ajanta paintings, Mughal painting. Science and Culture : Contributions of Aryabhatta, Varahamihira, Charaka and Susruta

द्वितीय प्रश्नपत्र : भारत के सांस्कृतिक इतिहास की मुख्य धाराएं

खण्ड – क

संस्कृति का अर्थ। भारतीय संस्कृति का प्रधान तत्त्व एवं विशेषताएँ। धर्म एवं संस्कृति : वैदिक धर्म, बौद्ध धर्म एवं जैन धर्म, वैष्णव धर्म एवं शैव धर्म। भक्ति आंदोलन। भारत में इस्लाम एवं सूफी मत। दर्शन एवं संस्कृति उपनिषदों का चिन्तन, भगवद्गीता।

खण्ड – ख

साहित्य एवं संस्कृति : रामायण, महाभारत एवं पुराणों का महत्त्व। कालिदास, तुलसीदास एवं रवीन्द्रनाथ टैगोर का योगदान। सामाजिक संस्थाएं एवं संस्कृति : प्राचीन भारत के सामाजिक आदर्श – वर्ण, आश्रम, संस्कार, पुरुषार्थ। 19वीं एवं 20वीं शताब्दी के समाज–सुधार आंदोलन।

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कला एवं संस्कृति : भारतीय कला की विशेषताए। मंदिर स्थापत्य की शैलियाँ। आबू, खजुराहो, उड़ीसा, पल्लव एवं चोल मंदिरों का संक्षिप्त अध्ययन। काल के प्रवाह में चित्रकला – शैल चित्रकला, अजंता चित्रकला, मुगल चित्रकला। विज्ञान एव संस्कृति – आर्यभट्ट, वराहमिहिर, चरक एवं सुश्रुत का योगदान।

Books Recommended (अनुशंसित पुस्तकें) :

G. C. Pande	:	*Foundations of Indian Culture*, Vol. I and II
	:	*Meaning and Process of Culture*
R. G. Bhandarkar	:	*Vaishnavism, Saivism and other Minor Religious Systems.*
Rajbali Pandey	:	*Hindu Samskara (The Social and Religious Study of the Hindu Sacraments)*, (also in Hindi), Varanasi
A. L. Srivastava	:	*Medieval Indian Culture* (also in Hindi).
V.S. Agrawala	:	*Indian Art*, Varanasi.
Krishna Dev	:	*Temples of North India* (also in Hindi), NBT, New Delhi
K. R. Srinivasan	:	*Temples of South India* (also in Hindi), NBT, New Delhi
A. L. Basham	:	*The Wonder that was India* (also in Hindi)
	:	*The Cultural History of India* (ed.)
गोविन्दचन्द्र पाण्डे		*भारतीय परम्परा के मूल स्वर*, नई दिल्ली, 1993
		भारतीय समाज – तात्त्विक और ऐतिहासिक विवेचन, नई दिल्ली, 1994
एन.के. देवराज	:	*भारतीय दर्शन*, लखनऊ, 1963
राजबली पांडे		*हिन्दू संस्कार*, वाराणसी
जयशंकर मिश्र		*प्राचीन भारत का सामाजिक इतिहास*, पटना, 1999
ए.एल. श्रीवास्तव	:	*मध्यकालीन भारतीय संस्कृति* (अनुवाद)
वासुदेव शरण अग्रवाल	:	*भारतीय कला*
पृथ्वीकुमार अग्रवाल		*प्राचीन भारतीय कला एवम् वास्तु*, विश्वविद्यालय प्रकाशन, वाराणसी, 2002
कृष्णदेव	:	*उत्तर भारत के मंदिर*, नेशनल बुक ट्रस्ट, नई दिल्ली
के.आर. श्रीनिवासन	:	*दक्षिण भारत के मंदिर*, नेशनल बुक ट्रस्ट, नई दिल्ली
सत्य प्रकाश		*प्राचीन भारतीय विज्ञान की परम्परा*
ए.एल. बाशम		*अद्भुत भारत* (अनुवाद)

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8. Political Science

B.A. Part-II

प्रश्न–पत्रों की रूपरेखा

राजनीति विज्ञान के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टे की अवधि का होगा तथा प्रश्न–पत्र के अधिकतम 100 अंक होंगे।

प्रत्येक प्रश्न–पत्र के तीन खण्ड होंगे। प्रथम खण्ड 20 अंको का होगा। इस खण्ड में दो अंकों के 10 अनिवार्य प्रश्न होंगे। जिनमें से प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20–25 शब्दों में देना होगा।

द्वितीय खण्ड 20 अंकों का होगा। इस खण्ड में 05 अंकों के 04 अनिवार्य प्रश्न होंगे, जिनमें से प्रत्येक का उत्तर 150 शब्दों में अपेक्षित होगा।

तृतीय खण्ड 60 अंकों का होगा। इस खण्ड में तीन भाग होंगे। जिनमें प्रत्येक में 20 अंको के दो निबंधात्मक प्रश्न होंगे। परीक्षार्थी से प्रत्येक खण्ड में से एक प्रश्न का उत्तर अपेक्षित होगा। प्रत्येक खण्ड से एक प्रश्न का चयन करते हुए कुल 03 प्रश्नों का उत्तर अपेक्षित होगा।

Scheme of Question Papers

There shall be two papers of political Science. Each question paper shall be of three hours duration and of 100 marks.

Each Question Paper shall consist of three Parts. Part I shall carry 20 marks and shall consist of 10 compulsory questions of 2 marks each to be answered in 20-25 words each.

Part II shall carry 20 marks and shall consist of 4 compulsory questions of 5 marks each to be answered in 150 words each.

Part III of the question paper shall carry 60 marks. This part shall be divided into 3 sections each comprising of 2 essay-type questions of 20 marks each. Candidates will be required to attempt one question from each section (3 questions in all, one from each section)

प्रथम प्रश्न– पत्रः प्रमुख राजनीतिक व्यवस्थाएँ

विद्यार्थियों से अग्रांकित देशों की राजनीतिक प्रणालियों के महत्वपूर्ण पक्षों–विधायिका, कार्यपालिका, न्यायपालिका, राजनीतिक दल एवं वर्तमान प्रवृतियों का विशलेष्णात्मक और तुलनात्मक दृष्टिकोण से अध्ययन करने की अपेक्षा की जायेगी।

खण्ड'क'

ब्रिटेन।

खण्ड'ख'

संयुक्त राज्य अमेरिका।

खण्ड'ग'

चीन, जापान, स्विट्जरलैण्ड।

अनुशंसित पुस्तकेः–

इकबाल नारायण : विश्व के संविधान।

Raj | Jai

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प्रभुदत्त शर्मा : संविधानों की दुनिया।
बाबूलाल फडिया : विश्व के प्रमुख संविधान।
पी.के. चड्ढा : विश्व के प्रमुख संविधान।
पुखराज जैन : विश्व के प्रमुख संविधान।
ए.सी. कपूर : मेजर कान्स्टीट्यूशन्स।
के.एल.कमल : चीन का सविंधान एवं राजनीति

Paper-I : Selected Political System

Student will be expected to study the salient aspects-Legislature, Executive, Judiciary, Political Parties of the political systems of the following countries with an analytical and comparative perspective.

Section –A

Britain

Section –B

U.S.A.

Section –C

Peoples Republic of China, Japan and Switzerland.

Suggested readings:

- Ogg & Zink : Modern Foreign Governments.
- Babulal Fadia : Vishwa Ke Pramukha Samvidhan.
- Iqbal Narain : Vishwa ke Samvidhan
- Chaddha , P.K : Vishwa Ke Pramukha Samvidhan(Adarsh Prakashan, Chaura Rasta, Jaipur).
- A.C Kapoor : Major Constitutions.
- R.C. Agarwal : World Constitutions.

द्वितीय प्रश्न–पत्रः भारतीय राजनीतिक व्यवस्था

खण्ड'क'

भारत में राष्ट्रीय आंदोलन– भारत में राष्ट्रवाद का उदय, भारतीय राष्ट्रीय कांग्रेस एंव मुस्लिम लीग की स्थापना, उदारवादी और उग्रवादी, गांधी व राष्ट्रीय आंदोलन, भारत में संवैधानिक विकास– भारत में शासन अधिनियम, 1919 (द्वैध शासन के विशिष्ट संदर्भ में), भारत शासन अधिनियम, 1935 (प्रांतीय स्वायत्तता के विशिष्ट संदर्भ में), संविधान निर्मात्री सभा।

खण्ड'ख'

संविधान की प्रस्तावना, संघीय व्यवस्था, मौलिक अधिकार, राज्य नीति के निदेशक तत्त्व, संघीय कार्यपालिकाः राष्ट्रपति, प्रधानमंत्री व मंत्रिपरिषद, संघीय संसद, उच्चतम न्यायालय व न्यायिक पुनरावलोकन, न्यायिक सक्रियता, जनहित याचिका, संविधान सशोंधन की प्रक्रिया, संघ– राज्य सम्बन्ध, संवैधानिक एवं विधिक आयोग–निर्वाचन आयोग, संघ लोक सेवा आयोग, राष्ट्रीय मानवाधिकार आयोग।

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राज्यों का शासनः राज्य व्यवस्थापिका, राज्य कार्यपालिकाः राज्यपाल, मुख्यमंत्री एंव मंत्री परिषद, कतिपय राज्यों को विशेष दर्जा और उसके प्रभाव, दलीय व्यवस्था, भारत में पंथनिरपेक्षता की प्रकृति, भारतीय राजनीतिक व्यवस्था के सम्मुख प्रमुख चुनौतियाँ–क्षेत्रवाद, जातिवाद, साम्प्रदायिकता, नक्सलवाद, आंतकवाद, पंचायती राज एवं नगर निकाय, 73 वें व 74 वें संविधान संशोधन की महत्ता।

अनुशंसित पुस्तकें:–

N.D Palmer : The Indian Political System, Houghton Mifiling, Boston, 1971
R.L. Hardgrave, Jr. : Indian Government and Politics (Harcourt Brance and World, Inc, New York, 1970)
Basu, D.D : Introduction to Constitution of India
Kashyab, Subash : Our Parliament
Zoya Hasan, E. Sridharan, R.Sudarshan (Edtiors): India's Living Constitution, Permanent Black, New Delhi, 2006
रजनी कोठारीः भारत में राजनीति, ओरिएन्ट लॉंगमेन्स, नई दिल्ली, 1972
गोविन्द रामः भारतीय राज्य व्यवस्था
बी. एल. फडियाः भारतीय राज्य व्यवस्था
एस. एम. सईदः भारतीय राज्य व्यवस्था
बी. के. शर्माः भारतीय संविधान
पी. के. चड्ढाः भारतीय राजनीतिक प्रणाली, आदर्श प्रकाशन, चौडा रास्ता, जयपुर
बासूकी नाथ चौधरी, युवराजकुमारः भारतीय शासन एवं राजनीति, ओरिएन्ट, ब्लेकस्वान, नई दिल्ली, 2011

Paper (II) – Indian Political System

Section – A

National Movement in India, Rise of Nationalism in India, Foundation of the Indian National congress and Muslim League, Moderates and Extremists, Gandhi and National Movement.

Constitutional Development in India : Government of India Act 1919 (with special reference to Dyarchy) and Government of India Act 1935(with special reference to Provincial Autonomy)Constituent Assembly.

Section-B

Preamble of the Constitution, Federal system, Fundamental Rights, Directive Principles of State Policy, Union Executive: President, Prime Minister and the Council of Ministers, Union Parliament, Supreme Court and Judicial Review, Judicial Activism, PIL, Method of Amendment in the Constitution, Centre – State Relation, Constitutional/Statutory commission- ECI, UPSC, NHRC.

Section –C

Governance of States: State Legislature, State Executive: Governor, Chief Minister, Council of Minister, Special status to certain states and its implications, Party System, Nature of Secularism in India, Major challenges before the Indian Political System : Regionalism, Casteism, Communalism, Naxalism and Terrorism, Panchayati Raj and Municipalities, significance of 73rd and 74th constitutional amendment acts.

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Suggested Readings:-

N.D Palmer : The Indian Political System, Houghton Mifiling, Boston, 1971

R.L. Hardgrave, Jr. : Indian Government and Politics (Harcourt Brance and World, Inc, New York, 1970)

Basu, D.D : Introduction to Constitution of India

Kashyap, Subash : Our Parliament

Zoya Hasan, E. Sridharan, R.Sudarshan (Edtiors): India's Living Constitution, Permanent Black, New Delhi, 2006

रजनी कोठारीः भारत में राजनीति, ओरिएन्ट लॉंगमेन्स, नई दिल्ली, 1972

गोविन्द रामः भारतीय राज्य व्यवस्था

बी. एल. फडियाः भारतीय राज्य व्यवस्था

एस. एम. सईदः भारतीय राज्य व्यवस्था

बी. के. शर्माः भारतीय संविधान

पी. के. चड्ढाः भारतीय राजनीतिक प्रणाली, आदर्श प्रकाशन, चौडा रास्ता, जयपुर

बासूकी नाथ चौधरी, युवराजकुमारः भारतीय शासन एवं राजनीति, ओरिएन्ट, ब्लेकस्वान, नई दिल्ली, 2011

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B.A. PART II

INDIAN MUSIC(VOCAL)

Paper - I	**3 hrs.duration**	**Max.Marks 40**	**Min. Marks 15**
Paper – II	**3 hrs.duration**	**Max.Marks 40**	**Min. Marks 15**
Practical	**1 hr. per candidate**	**Max. Marks120**	**Min. Marks 43**

Teaching Hours

Practical

6 Hours Per Week

Theory

Paper -I 2 Hours Per Week

Paper -II 2 Hours Per Week

Total Teaching Hours for practical – 06, Theory - 04 Hours Per Week

Note : (1) Each theory paper will contain nine questions having three question in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

(2) Candidate must pass separately in each of the theory and practical.

❖ Candidates must pass separately in each of the paper Theory and Practical wherever prescribed.

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Important

B.A. Part -II Examination
(under 10+2+3 Pattern)

The number of papers and maximum marks for each paper altogether with the minimum marks required for passing are shown in the Scheme of Examination on against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of this subject/ paper, wherever prescribed, separately. Gradation of successful candidate shall be as follows:

First division	60%	of the aggregate marks obtained in Pt.I., Pt-II and Pt. III Examinations taken together.
Second division	48%	

Rest of the candidates will be declared as passed. Minimum pass percentage is 36% No division shall be awarded at the Pt. I and Pt. II Examination.

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Theory:-

Paper – I

Principles of Indian Music (Vocal)
Common with Instrumental

Section –A

Paper: I **3 hrs. duration**

Max. Marks-40 Min. Marks-15

(a) Definitions and explanations of the following terms: Ragalap Roopakalaap, Alpatva, Bahutva, Alapti, Avirbhav and Tirobhav, Swasthan Niyam &Aadhunik aalap gayan.

(b) Shruti and Swarsthanas according to Bharat and Pt. Bhatkhande.

(c) Placement of Shuddha swaras on the wire of veena according to Pt. Ahobal and Pt. Bhatkhande.

(d) Comparative study of the swaras of North and South Indian Music.

Section –B

(a) To write the thekas with dugun and chaugun in the following talas : Dhamar, Tilwada, Ektal, Chautal, Rupak, Punjabi, Sooltal, Jhumra, Tivra.

(b) Critical and comparative study of the ragas prescribed for practical course: Malkauns, Vrindavani-Sarang, MiyanMalhar, Bahar, Bhairav, Ramkali, Shuddha-Kalyan, Jaijaiwanti, Khamaj and Hameer.

Section –C

(a) Define the terms of Gat, Jhala, Ghaseet,Jod-alap, Jamjama, Krintan, Meend, Khatka, Murkiand Gamak.

(b) Notation writing in prescribed ragas.

(c) Writing Alaps and Tanas / Todas in different Ragas.

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(d) Recognition of Ragas from given notes.

Theory:-

Paper – II

History of Indian Music (Vocal)
Common with Instrumental

Paper: II **3 hrs. duration**
Max. Marks-40 Min. Marks-15

Note : The paper will contain five questions, having three questions in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

N.B. Candidate must pass separately in each of the theory and practical paper.

Section – A

(a) Study of Gram Moorchana.
(b) Modern Shudha Scales of Karnatak and Hindustani Music.
(c) Major and Minor Scales of Western Music.
(d) Staff Notation.

Section –B

(a) Frequencies of the Musical notes.
(b) Classification of Ragas according to Rag-RaginiPaddhati.
(c) Life sketches, contribution and style of the following musicians : Allauddin Khan,Amir Khan, KesarBaiKerkar, Pt, OmkarNath Thakur, Vilayat Khan, Nikhil Banerjee.

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Section –C

(a) Theory of Mela and Janya ragas and 72 Melas of Pt. Vyankatmukhi, 10 Thatas of Bhatkhande, 32 Thatas according to the Swaras of Hindustani Music.

(b) Use and description of the following instruments pakhawaj, Veena and flute.

(c) A short essay on any subject of general musical interest.

Practical Vocal

There shall be one practical paper. (conducted by two different Examiners : External and Internal)

(Non-collegiate candidates have to attend compulsory a practical course of forty eight hours at university allotted centres)

Presentation of Ragas & Viva-voce

Duration of Exam. : 1 hour per candidate

Max. Marks 120, Min. Marks. 43

(Critical and Comparative study of Ragas & Tala and to sing or play all the Ragas according to syllabus).

Detailed Course:

1. To sing given musical piece and to recognize the ragas &swaras when sing.
2. To show the difference of ragas throughswarvistar in all the ragas.
3. Knowledge of bolas and Thekas on Hand Palm and to recognize on Tabla prescribe Talas in syllabus as - Dhamar, Tilwara, Jhaptal, Punjabi, Sooltal, Jhoomra, Ektal, Chautal, Teevra and Roopak.
4. To sing Aroh, Avroh, Pakad and Swar Vistar of the following ragas- Malkauns, Vrindavani-Sarang, MiyanMalhar, Bahar, Bhairav, Ramkali, Shuddha-Kalyan, Jaijaiwanti, Khamaj, Tilak-Kamod, Hameer.

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5. With the accompaniment of Tabla to sing BadaKhyal and ChhotaKhyal with sufficient varieties ofTanasin the following four ragas: Malkauns, Vrindavani-Sarang, Bhairav, Miyan-Malhar.
6. With the accompaniment of Tabla tosing Tarana /Chhotakhyal with tana and in any four ragas of the following.
   (i) Kharnaj (ii) Bahar (iii) Tilak-Kamod (iv) Ramkali
   (v) ShuddhaKalyan (vi) Jaijaiwanti.
7. With the accompaniment of Tabla to song a composition, composed in other than Trital with Tanas, in any two ragas mentioned in clause 4, but not selected under clause 5 & 6.
8. To sing Bhajan in any Ragas to prescribe insyllabus.

Books Recommended :

(1) Kramik Pustak Malika parts 2,3 and 4 Sangeet Karyalaya, Hathras.
(2) Tan Malika parts 2 and 3 (Purvardh) by Raja Bhaiya Poochwale, Sangeet Karyalaya, Hathras.
(3) Tan Sangrah by S.N. Ratanjankar.
(4) Sitar Marg by S.Bandopadhyaya.
(5) Sitar Shiksha by B.N. Bhatt.
(6) Sitar Parts 1 to 3 by B.N. Bhimpure.
(7) Saral Violin Parichaya by G.N. Goswami, Goswami Printers, Narahi, Lucknow.
(8) Ragvigyan by N.V. Patwardhan, Part 1 and part II, Sangeet Karyalaya, Hathras.
(9) A Short survey of the Music of the Northern India by Pt. V.N. Bhatkhande.
(10) संगीत के जीवन पृष्ठ by S.Rai.
(11) Vadya Shastra by Shri Harish Chandra Srivastava.
(12) Hamare Sangeet Ratna, Sangeet Karyalaya, Hathras.
(13) Sangeet Visharad by Basant.
(14) Comparative study of the Music of the 15th , 16th and 17th Centuries by Pt. V.N. Bhatkhande Sangeet Karyalaya, Hathras.
(15) Sangeet Kaumudi-Vikramaditya. Singh Nigam.
(16) Tan Malika Pt. III (Uttararddha) by Raja Bhaiya Poochwale.
(17) Hindustani Music- Its physics and aesthetics by G.S. Ranade, Sangeet Karyalaya, Hathras.

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(18) Origin of Ragas – Bandopaddhyaya.
(19) The Music of India by H.A. Popley.
(20) Hindustani Sangeet Paddhati (Shastra) by Pt. Bhatkhande, Parts 1 to 4.
(21) Sangeet Mani Part-I,II- Maharani Sharma
(22) SangeetSwarit- Ramakantdivedi
(23) Swaranjali- Dr. Sharda Mishra
(24) RaagRoopanjali- Prof. PushpaVasu

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10. Public Admn

UNIVERSITY OF RAJASTHAN

Subject - Public Administration

Scheme	Max. Marks	Mini Pass. Marks	Time
Two Papers	200	72	
Paper – I	100		3 Hrs.
Paper – II	100		3 Hrs.

Note : Each Paper shall consist of two parts.

Part-I would contain 10 compulsory short answer questions of 4 marks each to be answered in 50 words. Total Marks: 40

Part-II divided into three sections – each section contains 2 descriptive type question of 20 marks each. The candidates are required to attempt three questions selecting ne question from each section. Total Marks: 60

llabus

Paper-I : Administrative Institutions in India

Section - A

Administrative Institutions in a Democratic and Socialist Society. e concepts of Loissez Faire, Welfare State and Administrative ute.

Organization of Government : Legislature—its role and reasons decline in modern times; Executive : Types and Relationship with gislature.

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Judiciary : Functions and Role with special reference to the Power of Judicial Review, Judicial Activism.

Section - B

Democracy and Administration, Features of Democratic Administration. Role of Bureaucracy, Political Parties and Pressure Groups and their interaction with each other.

Organization and administrative working of Finance Commission, Planning Commission of India and the National Development Council. Election Commission and the administration of elections in India.

Section - C

Organization and working of following Administrative Institutions

(1) University Grants Commission, (2) U.P.S.C., (3) Railway Board, (4) Reserve Bank of India, (5) Central Social Welfare Board.

Books Recommended :

A. Core Books :

1. Waldo : Administrative State.
2. Field : Government in Modern Society.
3. Paranjape : Planning Commission.
4. I.I.P.A. : Organisation of the Government of India.
5. जियाउद्दीन खाँ एवं अंतर सिंह : प्रशासनिक संस्थाएँ
6. Dr. H.C. Sharma : Prashasnik Sansthayen.
7. Report of Finance Commission of India.
8. M.G. Gupta : Modern Government.

B. Books for Reference :

1. Garbin : Systematic Politics.
2. Salt : Political Institution A Preface.

C. Journal :

1. Indian Journal of Public Administration, New Delhi.

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प्रथम खण्ड

प्रजातांत्रिक तथा समाजवादी समाज में प्रशासनिक संस्थाएँ, अहस्तक्षेपवादी राज्य, कल्याणकारी राज्य तथा प्रशासकीय राज्य की अवधारणाएँ, सरकार का संगठन : व्यवस्थापिका—इसकी भूमिका तथा आधुनिक समय में इसके ह्रास के कारण; कार्यपालिका प्रकार तथा व्यवस्थापिका से सम्बन्ध; न्यायपालिका : कार्य तथा भूमिका-न्यायिक [illegible] की शक्ति के विशेष संदर्भ में, न्यायिक सक्रियता।

द्वितीय खण्ड

लोकतंत्र तथा प्रशासन, लोकतांत्रिक प्रशासन के लक्षण, नौकरशाही की भूमिका। राजनीतिक दल तथा दबाव समूह तथा इनकी पारस्परिक अन्तर्क्रिया, भारत में वित्त आयोग, योजना आयोग ~~तथा सहकारी विकास परिषद् का~~ संगठन व प्रशासनिक कार्य प्रणाली, निर्वाचन आयोग तथा भारत में निर्वाचन का प्रशासन।

तृतीय खण्ड

निम्नांकित प्रशासनिक संस्थाओं का संगठन तथा कार्य प्रणाली : 1. विश्वविद्यालय अनुदान आयोग, 2. संघ लोक सेवा आयोग, 3. रेलवे बोर्ड, 4. भारतीय रिजर्व बैंक, 5. केन्द्रीय समाज कल्याण बोर्ड।

अनुशंसित पुस्तकें :

(अ) मुख्य पुस्तकें :

1. वाल्डो : एडमिनिस्ट्रेटिव स्टेट
2. गिल्ड : गवर्नमेंट इन मार्डन सोसायटी
3. [illegible] : प्लानिंग कमीशन
4. [illegible] आई.पी.ए. : आर्गेनाइजेशन ऑफ द गवर्नमेंट ऑफ इण्डिया।

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5. जियाउद्दीन खा एव अंतर सिंह : प्रशासनिक संस्थाएँ
6. डॉ. एच.सी. शर्मा : प्रशासनिक संस्थाएँ
7. रिपोर्ट ऑफ फाइनेन्स कमीशन ऑफ इंडिया
8. एम.जी. गुप्ता : मॉडर्न गवर्नमेंट

(ब) संदर्भ पुस्तकें :

1. गार्बिन : सिस्टेमेटिक पॉलिटिक्स
2. साल्ट : पॉलिटिकल इंस्टीट्यूशन : ए प्रीफेस

(स) पत्रिकाएँ

1. इंडियन जर्नल ऑफ पब्लिक एडमिनिस्ट्रेशन, नई दिल्ली।

Paper-II : State Administration in India

Section - A

Present Status of State Administration in India. General background of State Administration in India. States with special reference to the State of Rajasthan.

The Office of the Governor—Powers, Functions and Role in State Administration, Relationship with Council of Ministers.

The Office of the Chief Minister—Powers, Functions, Role and Importance of the Office, Relationship with Council of Ministers.

Organization of the State Secretariat. Organization and working of the Departments of Home, Finance and Agriculture in Rajasthan. Chief Secretary—its Role and Significance in State Administration.

Section - B

Organization and working of the following Boards Companies and Directorates in the State of Rajasthan :

(a) Revenue Board
(b) Rajasthan State Electricity : Companies
(c) Directorate of Agriculture
(d) Directorate of Education.

Section - C

Personnel Administration : Role of the State Civil Services in Rajasthan (R.A.S., R.P.S. etc.), Organization and working of the Rajasthan Public Service Commission, Training of State Civil Services, Organisation and Functions of State Training Institutes in Rajasthan, Rajasthan Civil Service, Appellate Tribunal.

District Administration : Organization of District Administration. District Collector : Functions and Position.

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Revenue Administration at the District and below level, the role of S.D.O., Tehsildar and Patwaris.

Books Recommended :

A. Core Books :

1. S.R. Maheshwari : Indian Administration.
2. S.S. Khera : District Administration in India.
3. M.V. Pylee : Indian Constitution (Hindi also).
4. A.R.C. : Report on State Administration.
5. A. Zabier & Gupta : Organization of Government of Uttar Pradesh.
6. Dr. H.C. Sharma : Bharat Mein Rajya Prashasan.
7. सी.एम. सिंह एवं अन्य : राजस्थान में राज्य प्रशासन।

B. Reference Books :

1. D.P. Singh : Readings in Indian Administration.
2. S.L. Verma : Revenue Board in Rajasthan.
3. I.I.P.A. : Revenue Board.
4. Rajasthan Government Secretariat Manual.
5. Rajasthan Government : Report of Administrative Reforms Committee (Mathur Committee Report, 1963).
6. Rajasthan Government : Report of the Committee on Training, 1963.
7. H.C.M. Institute : Management of Higher Personnel of Public Administration.
8. I.I.P.A. : Indian Journal of Public Administration (State Administration Special Number July-September, 1976).
9. J.D. Shukla : State and District Administration in India.
10. B. Mehta : Dynamics of State Administration.
11. Annual Report of the Departments of the Government of Rajasthan, Jaipur.

C. Journals :

1. Indian Journal of Public Administration (New Delhi).
2. Prashashnika : H.C.M.R.I.P.A., Jaipur.
3. Management in Government, Delhi.

पाठ्यक्रम :

द्वितीय प्रश्न पत्र : भारत में राज्य प्रशासन

प्रथम खण्ड

भारत में राज्य प्रशासन की वर्तमान स्थिति, राजस्थान के विशेष संदर्भ में, भारत में

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केन्द्रीय प्रशासन की सामान्य पृष्ठभूमि। राज्यपाल : कार्य, शक्तियाँ तथा राज्य प्रशासन में [illegible] मंत्रिपरिषद् से संबंध। मुख्यमंत्री : शक्तियाँ, कार्य, भूमिका तथा इस पद का महत्त्व [illegible] मंत्रिपरिषद् से संबंध।

राज्य सचिवालय का संगठन, राजस्थान में गृह, वित्त तथा कृषि विभाग का संगठन तथा कार्यप्रणाली, मुख्य सचिव : राज्य प्रशासन में इसकी भूमिका तथा महत्त्व।

द्वितीय खण्ड

राजस्थान में निम्नलिखित मण्डलों, कम्पनियों तथा निदेशालयों का संगठन एवं कार्यप्रणाली :

(अ) राजस्व मण्डल

(ब) राजस्थान राज्य विद्युत कम्पनियाँ

(स) कृषि निदेशालय

(द) शिक्षा निदेशालय

तृतीय खण्ड

सेवीवर्गीय प्रशासन : राजस्थान राज्य में लोक सेवाओं (आर.ए.एस., आर.पी.एस. इत्यादि) की भूमिका, राजस्थान लोक सेवा आयोग का संगठन तथा कार्यप्रणाली, राज्य लोक सेवाओं का प्रशिक्षण, राजस्थान में राज्य प्रशिक्षण संस्थानों का संगठन एवं कार्य; राजस्थान सिविल सेवा अपीलीय न्यायाधिकरण जिला प्रशासन, जिला प्रशासन का संगठन, जिलाधीश—कार्य तथा पद स्थिति, जिला एवं अधीनस्थ स्तरीय राजस्व प्रशासन; एस.डी.ओ., तहसीलदार तथा पटवारी की भूमिका।

अनुशंसित पुस्तकें :

(अ) मुख्य पुस्तकें—

1. एस.आर. माहेश्वरी : इण्डियन एडमिनिस्ट्रेशन
2. एस.एस. खेरा : डिस्ट्रिक्ट एडमिनिस्ट्रेशन इन इंडिया
3. एम.वी. पायली : इंडियन कॉन्स्टीट्यूशन (हिन्दी संस्करण भी)
4. ए.आर.सी. : रिपोर्ट ऑन स्टेट एडमिनिस्ट्रेशन
5. ए. जबीर एवं गुप्ता : उत्तर प्रदेश सरकार का संगठन
6. डॉ. एच.सी. शर्मा : भारत में राज्य प्रशासन
7. डॉ. सी.एम. सिंह एवं अन्य : राजस्थान में राज्य प्रशासन
8. रमेश के. अरोड़ा व गीता चतुर्वेदी : राज्य प्रशासन
9. सुरेन्द्र कटारिया : राज्य प्रशासन

(ब) संदर्भ पुस्तकें :

1. डी.पी. सिंह : रीडिंग्स इन इंडियन एडमिनिस्ट्रेशन
2. एस.एल. वर्मा : रेवेन्यू बोर्ड इन राजस्थान

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3. आई.आई.पी.ए. : रेवेन्यू बोर्ड
4. राजस्थान गवर्नमेंट सैक्रेटेरिएट मैनुअल
5. राजस्थान गवर्नमेंट रिपोर्ट ऑफ एडमिनिस्ट्रेटिव रिफार्म्स कमेटी (माथुर कमेटी)
6. राजस्थान गवर्नमेंट : रिपोर्ट ऑफ दी कमेटी ऑन ट्रेनिंग, 1963
7. एच.सी.एम. इंस्टीटयूट : मैनेजमेंट ऑफ हायर पर्सोनेल ऑप पब्लिक एडमिनिस्ट्रेशन
8. आई.आई.पी.ए. : इंडियन जर्नल ऑफ पब्लिक एडमिनिस्ट्रेशन स्पेशल नम्बर; जुलाई-सितम्बर, 1976
9. जे.डी. शुक्ला : स्टेट एण्ड डिस्ट्रिक्ट एडमिनिस्ट्रेशन इन इंडिया
10. बी. मेहता : डायनेमिक्स ऑफ स्टेट एडमिनिस्ट्रेशन
11. एनुअल रिपोर्ट ऑफ द डिपार्टमेंट ऑफ द गवर्नमेंट ऑफ राजस्थान, जयपुर

(स) पत्रिकाएँ :

1. इंडियन जर्नल ऑफ पब्लिक एडमिनिस्ट्रेशन (नई दिल्ली)
2. प्रशासनिका : एच.सी.एम. रीपा, जयपुर
3. मैनेजमेंट इन गवर्नमेंट, दिल्ली

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B.A. Part – II

11 DRAWING & PAINTING

SCHEME :

Theory Paper I	Duration	M.M.	Min. Pass Marks
History of Indian Painting and Sculpture	3 hrs.	90	32 1/2
Practical Paper II			
Part A- Study from Bust (Portrait)	3 hrs.	45	32 1/2
Part B-Creative Portrait (Rendering)	3 hrs.	45	
Submission of Practical Works(A & B)		20	07
	Total	**200**	**72**

Paper I : History of Indian Painting and Sculpture

Note : The paper consist of two parts :-
Part –I: Carries 30 marks and consist of 15 short type questions of 2 marks each.
Part –II: Carries 60 marks divided into three sections 4 questions of 15 marks each with internal choice. Candidates are required to attempt four questions selecting one question from each section. Each answer should be limited in 700-800 words.

Section – A

Prehistoric Rock Paintings, Art of Indus Valley Civilization, Jogimara, Ajanta, Bagh, Sigiriya Cave Paintings.
Pal and Apbhransh Painting.
Rajasthani School – Mewar, Kishangarh, Jaipur and Bundi style of painting.
Pahari School – Basohli and Kangra style of Painting.

Section – B

Company School
Raja Ravi Varma, Bengal School Abnindranath Tagore, Nandlal Bose
Other Indian Artist – Yamini Roy, Rabindranath Tagore and Amrita Shergil

Section –C

History of Indian Sculpture – Maurya Period – Ashoka Pillars, Yakshni of Didarganj and Yaksh Murtishilp.
Sunga Period – Sanchi
Kushan Period, Gandhara and Mathura Sculpture.
Sculptures of Gupta Period.

Books Recommended:

1. Studies in Indian Art - V.S. Agarwal, Varansi, 1965
2. History of Fine Arts in India & Ceylon - Vincent A. Smith (edited by K. Khomalalwala), Bombay, 1930
3. History of Indian and Indonesian Art - A.K. Coomaraswamy, London, 1927
4. Indian Painting - Percy Brown. Calcutta, 1918
5. Survey of Indian Sculpture - S.K. Saraswati, Calcutta, 1657
6. Kala Vilas - Dr. R.A. Agarwal. D.S.A. Books international, Meerut, 2015
7. Fundamental of Indian Arts - S. Das Gupta.
8. भारतीय चित्रकला का संक्षिप्त इतिहास – शर्मा, लोकेश चन्द्र, कृष्ण प्रकाशन मीडिया (प्रा.लि.)
9. भारतीय मूर्तिकला – राय कृष्ण दास, नागरी प्रचारिणि सभा, काशी
10. भारतीय चित्रकला का संक्षिप्त इतिहास – अविनाश बहादुर वर्मा, प्रकाश बुक डिपो, बरेली,1968
11. भारतीय चित्रकला – राय कृष्ण दास, भारती भोमदार लीडर प्रेस, इलाहाबाद, 2023 ए.डी.
12. भारतीय चित्रकला – वाचस्पति गैरोला, मित्र प्रकाशन प्राइवेट राय कृष्ण दास, नागरी प्रचारिणि सभा, काशी

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Paper- II Part-A : Study from Bust (Portrait)

Medium –Water/ Oil Colour — Size ½ Imperial
Duration : 4 hrs. — Max. Marks : 45
Study from bust (Portrait Painting) showing broad masses of light and shade, clearly bringing out the modelling of the figure and drapery.

Part – B : Creative Portrait (Rendering)

Two Dimensional Creative Portrait should be rendered with emphasis on stylization, colour scheme and textures etc.
Medium –Any Medium — Size ½ Imperial
Duration : 2 hrs. — Max. Marks : 45

Books Recommended :

1. Anatomy and Drawing by Victor Perard, Publisher J.V. Navlakhi, Bombay.
2. Human figure by Vanderpol, Publisher J.V. Navlakhi, Bombay.

Note : Life Model will sit in front of the candidate for four hours with a rest of 10 minutes when required by the model. First session of four hours should be devoted for the study of portrait. There will be a break of one hour after first session. Second session will be of two hours for practical of Creative Portrait (Rendering). Both the parts should be completed on the same day. The student should be allowed to use any style of composition in the examination.

Submission of Practical work : — Max. Marks : 20
Min. Pass Marks : 7

(a) Five plates from bust study in colour and three plates form bust study in pencil or charcoal.
(b) Five Plates form creative portrait in colour and three plates form creative portrait in pencil or charcoal.
(c) A sketch book of not less than 50 sketches.

Instruction for submission :

Note : Submission work will be submitted to the Head of the Department of Drawing and Painting of the College fifteen days before the commencement of examination. The marks in the submission will be awarded by the subject teacher (internal). However, the external examiner shall be empowered to review the work of the submission in case there is a drastic difference between the marks of the examination and submission. Submission work will be retained till the declaration of the result and returned to the Candidate from the Department thereafter. If no claim is made within two months of the declaration of the result, the submission will be destroyed.

Note:

(a) Candidate should pass in theory as well as in practical paper separately.
(b) There should be minimum 10 hours for the regular study including two hours for sketching.
(c) Minimum three demonstrations should be arranged by the subject expert during the session for each practical paper.
(d) The Department should also arrange for an Educational tour to Ancient Art centres like Ajanta, Ellora, Elephanta, Khujraho, Mahabalipuram etc. once a year.
(e) Practical examination will be conducted at the centres and the practical work will be examined by external examiner. The examiner will examine the answer books in consultation with and internal examiner who is the subject teacher of the Department of Drawing and Painting. University may centralize the practical examinations at few well equipped Departments to hold examination economically.

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12. Sociology

B.A. Part-II

Scheme :

Min. Pass Marks 72		Max. Marks 200
Paper-I	3 hrs. duration	Marks 100
Paper-II	3 hrs. duration	Marks 100

नोट : समाजशास्त्र के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टों में विभाजित होगा। प्रत्येक प्रश्न–पत्र के दो भाग होंगे। प्रथम भाग 40 अंको का होगा। इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंको के एक प्रश्न में, एक–एक अंक के 20 लघु प्रश्न होंगे तथा प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20 शब्दों में देना होगा। दूसरे अनिवार्य प्रश्न के अंतर्गत दो–दो अंको के 10 प्रश्न होंगे। प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 40 शब्दों में देना होगा। निर्धारित शब्द सीमा से अधिक शब्दों में उत्तर देने पर अंक काटे जा सकेंगे। प्रश्न–पत्र के लिए निर्धारित कुल 3 घण्टों की अवधि में से अधिकतम 1 घंटे की अवधि प्रश्न–पत्र के इस भाग के लिए निर्धारित होगी।

प्रश्न–पत्र के इस प्रथम भाग के दोनों प्रश्न, 3 घण्टों में विभाजित पाठ्यक्रम के तीनों खण्डों से संबंधित होंगे। अर्थात् प्रश्न–पत्र के इस भाग में पूरे पाठ्यक्रम से संबंधित प्रश्न होंगे।

प्रश्न–पत्र के द्वितीय भाग में, पाठ्यक्रम के तीनों खण्डों में से प्रत्येक में से दो–दो निबन्धात्मक प्रकृति के प्रश्न होंगे। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए, कुल 3 प्रश्न हल करने होंगे। प्रत्येक प्रश्न 20 अंकों का होगा। प्रश्न–पत्र का यह भाग 60 अंको का होगा।

Note: There shall be two papers in all, and each paper shall be of three hours duration and of 100 marks. Each paper shall consist of two parts. Part I shall carry 40 marks. There shall be 2 questions in Part-I, first question will consist of 20 short questions of 1 mark each, carrying a word limit of 20 works. The second question will consist of 10 questions of 2 marks each, carrying a word limit of 40 words. Marks may be deducted if the word limit is exceeded. This part of the question paper will be given maximum one hour duration and shall relate to all the three sections covering thereby the entire course.

Part-II of the question paper shall be divided into three sections comprising 6 essay type questions of 20 marks each. Candidates will be required to attempt 3 questions selecting one question from each section. This part of the question paper shall be of 60 marks.

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Paper I: Social Research Methods

Max Marks: 100

Unit 1: Understanding Social Research

- Philosophy of Science
- Nature of Science
- Scientific Method
- Issues of objectively & Subjectivity in Social Science
- Ethnography and Sociological Research

Unit 2: Methods of Research in Sociological Enquiry

- Types of Research : Pure & Applied
- Types of Sociological Method : Empirical, Historical, Evolutionary, Comparative
- Types of Research Design : Descriptive, Exploratory, Explanatory, Experimental
- Difference between Survey & Research

Unit 3: Tools and Techniques of Data Collection and Analysis

- Sampling Procedure : Types, Probability Non-Probability
- Tools of Data Collection : Observation, Questionnaire, Schedule, Interview Guide
- Source of Data : Primary and Secondary
- Nature of Central Tendency: Mean, Median, Mode.

Essential Readings: (in English) :

1. Ahuja, Ram. 2002: Research Methods, Jaipur: Rawat Publications
2. Bajaj & Gupta, 1972: Elements of Statistics. New Delhi: S. Chand and Co. Publication
3. Goode, W.G. and Hatt, P.K. 1952: Methods in Social Research, New York.
4. Kothari, C.R. 1989: Research Methodology: Methods and Techniques, Bangalore: Wiley Eastern.
5. Mann, Peter H. 1988: Methods of Social Investigation, Delhi: Disha Publications.
6. Punch, Keith. 1996: Introduction to Social Research, London: Sage.
7. Selltiz, C. & Jahoda, M. & Others, 1965: The Theory and Methods of Social Research, London.
8. Shipman, Martin. 1988: The Limitations of Social Research. London: Sage.
9. Willkinson, T.S. & Bhandarkar, P.L. 1977: Methodology & Techniques of Social Research, Bombay: Himalaya Publishing House.
10. Young, P.V. 1988: Scientific Social Surveys and Research, New York.

Essential Readings: (in Hindi) :

1. रावत, हरिकृष्ण, 2013: सामाजिक शोध की विधियां, जयपुर: रावत पब्लिकेशन्स
2. शर्मा, वीरेन्द्र प्रकाश, 2009: समाजशास्त्रीय अनुसंधान के तर्क एवं पद्धतियाँ, जयपुर: पंचशील प्रकाशन
3. नागर, कैलाश नाथ, 2010, सांख्यिकी के मूल तत्व, मेरठ: मीनाक्षी प्रकाशन

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Paper II: Sociology of Village

Max Marks: 100

Unit 1: Introduction to Rural Sociology

- Concept of Rural Sociology & its Development
- Basic Concepts : Village, Peasant Society, Agrarian Structure, Little, Great & Multiple traditions, Rural-Urban Continuum
- Features of Economy & Polity in relation to village

Unit 2: Social Structure of Village

- Family, Caste, Kinship and Gender
- Religion and Village Life
- Formal and Informal Administrative Structures : Village Panchayats, Caste Panchayat

Unit 3: Change in Indian Village Structure

- Agrarian Distress in Villages : Suicide, Indebtedness, Poverty
- Agrarian Movement in India
- Impact of Urbanization & Globalization in Village Systems

Essential Readings: (in English) :

1. Desai A.R., 1959: Rural Sociology India, Popular Prakashan, Bombay.
2. Rao M.S.A., 1874: Urban Sociology in India, Orient Longman, New Delhi.
3. Desai A.R., 1979: Rural Sociology . India in Transition, Popular Prakashan, Bombay.
4. D'Souza Alfred, 1978: The Indian City, Poverty, Ecology and Urban Development, Manohar Publication, New Delhi.
5. Ramkrishana Mukarjee, 1957: The Dynamics of Rural Society, Berlin.

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13. Home Science

Examination Scheme :

- Each Theory paper will contain nine questions having three questions from each unit. Candidates are required to attempt five questions in all selecting at least one question from each unit. Each question will be of 10 marks.

BA Home Science Part II

Paper	Subjects	Duration of exam	Maximum marks	Minimum marks	No. of hrs/wk
Theory Paper III	Human Development	3hrs	50	18	4
Practical III	Human Development	3hrs	50	18	2
Theory Paper IV	Textiles and Clothing	3hrs	50	18	4
Practical IV	Textiles and Clothing	3hrs	50	18	2
		Total	200	72	12

B.A. PART-II

HUMAN DEVELOPMENT (THEORY PAPER III)
Maximum Marks: 50
Minimum marks: 18
Teaching workload: 4 hrs /week
Total teaching workload: 96

Human Development and Family Studies is concerned with the study of the human lifespan from conception and onwards. In this program students would study various stages of life; prenatal, Infancy childhood, adolescence, adulthood and ageing. There is a special reference to ECCE, developmental disorders, family relationships and its dynamics. This program covers the biological and environmental, psychological and social factors that are understood to explain patterns of human behavior over the lifespan.

The program helps in understanding how people develop throughout their lives, and how Heredity and Environment can influence possibilities for individuals. This is important and useful knowledge for everyone.

Basic knowledge of Human Development is an important background for those wishing to go into professions such as social work, nursing and teaching. There is a need for more research in the context of family and lifespan development in our country, and we are looking for students

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with vision and innovative ideas to join us in innovative studies when they reach postgraduate level.

Objectives:-

1. To acquaint the student with the scope and foundation of human development.
2. To understand development through different life span stages.
3. To learn regarding the significant developmental tasks of each stage.

Contents	Hours
UNIT I	
• Definition and scope of Human Development as a field of study.	6
• Principles of development	4
• Role of Heredity and environment and learning and maturation in development.	4
• Factors affecting development.	6
UNIT II	
Development from conception to adolescence:	
• Physical development	6
• Motor development	5
• Socio-emotional development	8
• Language and cognitive development	8
UNIT III	
• Importance and objectives of early childhood education; impact of deprivation and early stimulation	8
• Definitions, functions and types of families; changing roles and challenges faced by Indian Families	8
• Understanding differently abled children; definitions, meaning and classification	10
• Major development tasks, achievements and problems of adulthood and aging. Need for care and support for aging individuals.	10

References :

1. Santrock JW (2007). Lifespan Development. Tata – McGrawHill. New Delhi. 3rd Ed.
2. Bee H (1995). The developing child. Harper Collins College Publisher.
3. Berk L (2006). Child development. Allyn & Bacon. New York.
4. Cole M and Cole SR (1996). The Development of Children. W.H. Freeman and Company.
5. Rice F (1992). Human Development: A Life Span Approach. Prentice Hall.
6. Rice FP. Marriage and Parenthood. Allyn and Bacon Inc. Toronto.
7. Vidhya Bhushan and Sachdeva (2000). Introduction to Sociology.

HUMAN DEVELOPMENT – PRACTICAL III

Maximum marks: 50

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Minimum marks: 18
Teaching workload: 1 practical/ week (2 hours/ practical)
Total teaching workload: 24 practicals/ batch

Learning Outcomes

Students will gain insight into the growth patterns, developmental characteristics and activities of children in a practical situation. They will also learn to understand significant issues related to adolescents, adults and ageing people.

Objectives :

1. Students will gain insight into the growth patterns, developmental characteristics and activities of children in a practical situation.
2. They will also learn to understand significant issues related to adolescents, adults and ageing people.

Contents	Hours
1. Anthropometric measurement of children from birth to 6 years. Plotting and interpretation of data as per WHO norms.	4
2. Interviewing mothers of young infants regarding breast feeding schedules, supplementary foods and weaning practices.	3
3. Organizing and conducting play and creative activities of children in a nursery school.	3
4. Preparation and conduction of various activities to enhance overall development of children: physical, motor, language, cognitive, social and emotional.	4
5. Focus group discussion with adolescents to understand their aspirations, educational and career choices.	3
6. Market survey of story books and toys for children. Assessment of the above in terms of quality, cost, durability, safety, attractiveness and developmental appropriateness.	2
7. Preparation of a brief questionnaire to identify the problems faced by adults and aging people in communities. Report the information as individual case profile.	3 2
8. Preparation of a scrap book on relevant issues of human development.	

Examination scheme :

1. **Major problem** - 20 Marks
   Planning and preparation of various activities to enhance overall development.
   Preparation of interview schedule of feeding for interviewing's mothers of infants.
   Organizing and conducting play.
2. **Minor Problem** – 10 Marks
   FGD
   Preparation of a brief questionnaire to identify problems of ageing peoples.
   Plotting of graph on the basis of anthropometric measurements of children from 02-06 years and its interpretations
3. **Internal** – 20 Marks

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TEXTILES & CLOTHING (THEORY PAPER IV)

Maximum Marks: 50

Minimum Marks: 18

Teaching workload: 4 hrs /week

Total teaching workload: 96 hours/year

Learning outcome:

After completing the course the student will possess the basic knowledge of different processes involved from the raw material to the finished textiles, along with the properties and use which will further help them in the selection of clothes. Knowledge of technical textiles helps in broadening their vision as usage of textiles is not only limited to apparel wear. The course helps the students in selection of apparel for themselves and others. With the backing of knowledge of design principles and elements, a base is prepared for the subject and arouses the interest to further pursue in the area. The students also become aware of the rich traditional heritage of Indian textiles.

After finishing the course the students will have the basic knowledge in the area of textiles and clothing and will be able to identify her own specialization in the field

Objectives:

The course will lead to :

1. Acquaint students with basic knowledge of textiles and clothing.
2. Familiarize the students to make purchase decisions in selection of clothing.
3. Update the students with the recent innovations in the field.
4. Impart knowledge regarding traditional textiles and embroideries of India

Contents	Hours
Unit – I **Textile Study**	
1. Fiber • Classification • Properties and their importance to the consumer with special reference to the care. • Natural Fibers (a) Cotton (b) Wool (c) Silk (d) Jute • Manmade Fibers (a) Polyester (b) Polyamide (c) Rayon	15
2. Yarn • Simple Yarn • Novelty yarn	3

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• Textured yarn	
3. Fabric : Different construction methods :	10
• Weaving	
• Parts of loom	
• Steps in weaving	
• Types of weaves: Plain Twill Satin	
• Knitting	
• Felting	
• Lacing	
• Braiding	2
4. Technical textiles	
• Categories and use in daily life	
i. Mobiltech	
ii. Agrotech	
iii. Geotech	
iv. Meditech	
Unit – II **Apparel Selection and Care**	
5. Finishing	
Basic Finishes	10
• Bleaching	
• Sizing	
• Desizing	
• Singeing	
• Tentering	6
Functional finishes	
• Wash and wear	
• Mercerising	
• Sanoforizing	
• Flame retardant	10
• Water resistant	
• Moth proofing	
6. Dyeing and Printing	
• Classification of dyes	
i. Natural	5
ii. Synthetic	
• Classification of printing	
i. Direct	
ii. Resist	3
iii. Discharge	
7. Selection of suitable fabrics and garments for different ages – infants, toddlers, pre-school children, school going children, adolescents	2

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8. Climate, occasion, occupation, fashion, figure 9. Clothing for people with special needs: maternity and lactation, old age and physically challenged. 10. Selection of readymade garments • Appearance– Size, design, line and colours, • Fabric- Durability, ease of care • Workmanship- Cutting, sewing and finishing • Cost & Fitting 11. Labelling • Textile fiber symbols • Care labelling symbols 12. Care and storage of • Cotton • Silk • Wool	
Unit – III **Designing & Traditional Textiles**	
13. Elements of design –Line, form, colour and texture. 14. Principle of design – Proportion, Harmony, Balance and Emphasis 15. Traditional textile • Woven: Brocade • Printed ; Sanganer, Bagru, Kalamkari • Dyed ;Bandhani,Patola • Embroidered ;Kasuti, Kantha, Phulkari, Chikankari, Kutch	15 15

References :

1. Susheela Dhantyagi "Fundamentals of Textiles and their care"Orient Longman Ltd.4 th edition 1983 Reprinted1994
2. Shrivastave. K.N and Gupta.M "Paramparagat Bhartiya Vastra" Hindi Granth Academy, 2011
3. Bela Bhargava (2003)" Vastra Vigyan avam dhulai kriya" University Book House Jaipur
4. Joseph, M. L. (1988), Essentials of Textiles, 5th edition, Holt Rinehart andWinston, New York.
5. Ruby Jain (2006). "Basic Stitching Processes" CBH Publications

TEXTILES AND CLOTHING (PRACTICAL IV)
Maximum marks: 50
Minimum marks: 18
Teaching workload: 1 practical/ week (2 hours/ practical)
Total teaching workload: 24 practical/ batch

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Course Outcome: The beneficiary of the course will be equipped to differentiate between different types of fabrics. They will be able to master the art of garment construction as they will have hands on experience in all basic seams, finishing of edges in form of hems and curves and fullness techniques. They will also be able to do surface ornamentation with embroidery and tie and dye.

Objectives

Contents	**Hours**
Textiles Make a Scrap book of the following 1. Fiber samples • Cotton fiber from - (Muslin, 2x2 Rubia , 2x1 poplin, Khadi) • Silk fiber from -(Georgette, Chiffon, Crepe, Tussar, Mulberry,) • Wool fiber from - Felt (wool) • Jute fibre from Gunny Bags & Ropes • Nylon fibre from Plastic Cord • Polyester fibre from Sewing Thread • Rayon fibre from Artificial Silk Dupatta 2. Yarn : Ply, textured and metallic yarn 3. Fabric Samples: Woven, Knitted and Non woven - Felt (wool) 4. Collection of care labels washing, ironing, dry-cleaning, bleaching 5. Fiber symbols (cotton, wool, silk) 6. Technical textiles : Bandages & Scotch Brite	5 10
Clothing 7. Clothing techniques (sample of each) • Simple stitches – hemming and tacking • Seam – plain, French and run and fell • Dart – straight and curve • Tucks – Pin tucks • Pleat – knife, box • Gathers – simple gathers • Finishing of curve – piping and facing • Placket opening – continuous wrap & two piece placket • ix Garment construction - 'A' line frock with any sleeve and Collar • x Embroider the frock using few basic stitches 8. Tie & dye prepare two sample through any 2 techniques 9. Product design – construction of any one product • Two cushion covers • Shoulder Bag with any fastener • Pouch with zip	 3 6

Examination scheme

Major problem – 20marks

Construct any one garment

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Drafting and cutting of a garment -

Stitching and finishing of a garment –

Minor Problem – 10 marks

Identification of textile yarn / fabrics –

Tie and dye one sample using two colours and twodifferent techniques / two samples of any clothing techniques -

Internal - 20 marks

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14. Textile Craft

B.A. Part-II

SCHEME : B.A/B.Com PART-II

			Duration	Max mark	Min mark
1.	Theory:	Paper-I	3Hrs	30	22
		Paper-II	3 Hrs	30	
2.	Practical :	Paper-I	3Hrs	35	25
		Paper-II	3 Hrs	35	
3.	Submission	Paper-I		35	25
		Paper-II		35	

Paper-I : Weaving Theory-I

UNIT-I

Yarn numbering system –Indirect (cotton, metric, woollen and worsted count) and Direct (Tex and Denier)

Yarn Twist and their types, Balance of fabric

Methods of fabric construction: Braiding &Lacing, knitting, felting and weaving

UNIT-II

Types of loom- Shuttle & Shuttle less; introduction to shuttleless looms- airjet, waterjet, projectile and rapier loom

Preparation of Warp and Weft for weaving

Draft, Peg plan, Weave, Repeat, Design

UNIT-III

Derivatives of Plain weave- Rib and Basket
Derivative of twill weave- Regular, Irregular, Left hand, Right hand,
Pointed and curved twill
Fabric defects, Selvedge, Types of Selvedge's

Paper-II: Dyeing Theory –I

UNIT-I

Difference between dyeing and printing
Mechanical finishes- basic process of beating, singeing, napping, calendaring and embossing.

UNIT-II

Stages of Dyeing (fibre, yarn & fabric)
Wool dyeing and silk dyeing
Dyeing machines- Jigger and Winch dyeing machine

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UNIT-III

Steps of printing- preparation of cloth & colour
Methods of Direct printing- Block & Roller printing
Thickeners and types of thickeners

Practical (Paper-I)

1. Thread count and Balance of the cloth
2. Weave samples of derivatives of plain and twill weave

Practical (Paper-II)

1. Introduction to motif, repeat and layout
2. Block printing- samples preparation
3. Batik-spot, crack, scratch and painting (samples)

Submission (Paper-I)

1. Assessment of samples
2. Preparation of weave samples

Submission (Paper-II)

1. Any one article using block
2. Any one article using batik

Examination Scheme:

One Major Problem: 20 Marks
One Minor Problem: 15 Marks

Reference books :

Sahnai, V.A. (1989) Theory of Dyeing, Sevak publications. Mumbai

Trotman, E.R. (1985) Technology of Dyeing, John wiley & sons Inc London. London

Pryag, R.S. (1994) Technology of Printing, India publisher.

Pryag, R.S. (1995) Technology of Finishing, India publisher.

Bucker, (1998) Textiles, Abhishek spublications.

Kulkarni, M.M., Weaving technology, Virindra publication, Jalgon

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Unit 3: Homogeneous linear differential equations, Simultaneous differential equations. Exact linear differential equations of nth order. Existence and uniqueness theorem.

Unit 4 : Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/the independent variable, Factorization of operators, Method of variation of parameters, Method of undetermined coefficients.

Unit 5: Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution. Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Reference Books :

1. R.S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
2. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
3. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.

Paper – III: Numerical Analysis and Vector Calculus

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: (i) This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.
(ii) Non-Programmable Scientific Calculators are allowed.

Unit 1: Differences. Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation. Divided differences. Newton's divided difference, Lagrange's interpolation formula.

Unit 2: Central differences.Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae. Numerical integration, Derivations of general quadrature formulas, Trapazoidal rule. Simpson's one-third, Simpson's three-eighth and Gauss's quadrature formulae.

Unit 3: Relation between the roots and coefficients of general polynomial equation in one variable, transformation of equations, Descarte's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferari's method.
Numerical solution of Algebraic and Transcendental equations, Bisection method, Secant method, Regula-Falsi method, Iteration method, Newton- Raphson Method (derivation of formulae and rate of convergence only).

Unit 4: Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic equations. Partial Pivoting method, ill conditioned systems, Numerical solutions of ordinary differential equations of first order with initial condition using Picard's, Euler and modified Euler's method.

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15. Garment Production & Export Management

B.A. Part-II

B.A/B.Com.– Maxmium Marks 40 Hrs.3
B.Sc. Maxmium Marks 50

THEORY PAPER – 1
Fashion and Apparel Design

OBJECTIVES : -

1. To Develop Sensitivity & Understanding towards Historical World Costumes.
2. To Focus on Design Elements & Principles and their Details on Garments.
3. To Create Awareness About the Techniques of Pattern Making & Principle of Fittings.

SECTION –A

TRADITIONAL COSTUMES

1. Study of traditional costumes of various regions of India.
2. History of costumes of Indian civilization.
3. Brief knowledge of world costumes ; French , German, Greek, European

SECTION –B

TECHNIQUES IN PATTERN MAKING

4. Eight head theory – principles and advantages.
5. Pattern making techniques- drafting, draping, flat pattern.
6. Colour and colour schemes, psychological effects of colour on clothes.
7. Fitting – principles of fitting, factors to be considerd while fitting, common fitting problems, remedying fitting defects of bodice, sleeves, and skirts.

SECTION – C
DESIGN

8. Classification of design – structural and decorative
9. Elements and principles of design.
10. Layout of design of fabric in cutting - floral , checks, plaids, lines.

References :

1. Erwin, M. D., Kinchen, L.A. & Peters, A. (1979). Clothing for moderns. Macmillan publishing new York.
2. Jo, K. M. (1985). Clothing construction I&II. Prentice Hall.
3. Mathews, M. (1974). Practical clothing construction part I & II. Chennai,Cosmic press.
4. Doogaji, & Deshpandey, R. (1988). Basic process and clothing construction. Raaj Prakashan.

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THEORY PAPER – II

ELEMENTS OF MARKETING AND FINANCE

B.A./B.Com.-Maxmium Marks 40 Hrs. – 3

B.Sc. – Maxmium Marks 50

OBJECTIVES :

1. To create awareness about the procedures to select, proceed & start the Small Scale Industry.
2. To guide the process of product development according to the market needs.
3. To become familiar with the methods of payment in foreign trades & about types or bills.

SECTION A

1. Market structure- Types of market, market survey, elements of cost.
2. History of readymade garment industry, Problem and prospects in global market
3. Branded versus non -branded market.
4. Types of garments exported.

SECTION B

5. Elementary knowledge of working capital factors affecting working capital, operating cycle.
6. Sources of finance.
7. Letter of credit
8. Methods of payment in foreign trade
9. Various typed of bills.
10. Insurance

SECTION C

Brief study of ;

11. ECGC (export credit and guarantee corporation)
12. EIC (export inspection council)
13. IIP (Indian institute of packaging)
14. ICA (Indian of arbitration)

References :

1. Srivastav, & Aggarwal. (). Vipdan prabandh.
2. Mamoria, C.B., Joshi, R. L. & Mulla, N.I. (2003). Principles & practice of marketing in india. Kitab Mahal distributers.
3. Satya narayan; Sales management.
4. Daver R.S. (2009). Salesmanship and Publicity. Vikas publishing house Pvt Limited.

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B.Sc./ B.A/B.Com/ PART –II

PRACTICAL- 1

APPAREL DESIGNING

B.A/B.Com.–Maxmium Marks 60 Hrs.- 4

B.Sc. – Maxmium Marks 25

OBJECTIVES :

To familiarize with basics of color

To develop expertise in drawing croquis and draping dresses on them.

Contents:

1. Colour wheel and colour scheme.
2. Introduction to eight head theory and stick figure 9.5", 10.5".
3. Developing an adult croquis from block figure.
4. Draping of garments on croquis (at least 8 sheets) using different colours schemes and occasions.
5. Preparation of a portfolio.

Examination Scheme :

B.A.\B.COM:-Max Marks:-60	B.SC:-Max Marks:-25
1. Major Problems-30	1. Major Problem:-10
2. Minor Problems:-20	2. Minor Problems:-10
Internal:-10	Internal:-5

PRACTICAL – II

CLOTHING CONSTRUCTION

B.A./B.Com.–Maxmium Marks 60 Hrs- 4

B.Sc. – Maxmium Marks - 25

OBJECTIVES :

1. To be able to make basic drafts of bodice, sleeve and collar.
2. To learn the knowhow of stitching and all basic processes and ornamentation techniques.

Contents :

1. Pattern making
   1. Child basic block and sleeve block.
   2. Sleeve variations; slash and spread method-puff, bell, legomutton, bishops sleeves.
   3. Sleeve bodice combination; Magyar, raglan, dolman sleeves.
   4. Different types of collars.
   5. Different types of yokes.

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2. Stitching of each sleeve, collar and yokes on bodice block.
3. Fashion designing (5 each) on sheet baby frocks, a line frocks , rompers. sun suits skirts and tops, bush -shirts with shorts.
4. Redesigning of old garment using the idea such as; to consider factors such as money, creativity, individuality, skills, needs,
   (i) Patchwork
   (ii) Ornamental fabric.
   (iii) Decorative embroideries
   (iv) Trims
   (v) Paints and dyes
   (vi) Introduction of fashion designing in fashion shows.
5. Introduction fashion designing in fashion shows.

References :

1. Jo, K.M. & Beazley. (1985).The sewing book of a complete guide. Prentice Hall.
2. Ireland, P. J. (1982). Fashion designing drawing and presentation. Batsford Ltd. 4th Revised edition.
3. Chase, R.W. (1997). CAD for fashion design. Prentice Hall; Pap/DSKT edition.

Examination Scheme :

B.A.\B.Com.-Max Marks:-60	B.Sc:-Max Marks:-25
1. Major Problems-30	1. Major Problem:-10
2. Minor Problems:-20	2. Minor Problems:-10
Internal:-10	Internal:-5

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16. INVESTIGATIVE BIO-TECHNOLOGY

Scheme :	Min. Pass Marks	Max. Marks
Paper-I	40	
Paper-II	40	
Paper-III	40	
Practical	120	

Paper–I: Bio Chemistry and Systemic Bacteriology Max. Marks–40

Section – A

Bio-Chemistry II

1. Blood sugar and its regulation
2. Chemical examination of urine
3. Glucose tolerance test
4. Diabetes emllitus, Ketosis, Diabetic coma
5. Non-protein nitrogenous compounds
6. The Plasma Proteins and A.G. Ratio
7. Lipids
8. Enzymes
9. Tests of Gastric Function. Occult Blood
10. Test in Liver and Biliary Tract Disease
11. Tests in Pancreatic Disease, Steatorrhoea
12. Acid Base Regulation
13. Basal Metabolism, Blood Oxygen
14. Regulation of pH in blood and body fluids
15. Vitamins and their tests
16. Chemical Examination of Cerebrospinal fluid
17. Milk Analysis

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18. Stones (Urinary and Gall bladder)
19. Faecal Pigments
20. Drugs and Poisons, alcohol
21. Water management and its analysis.

Section – B

Systemic Bacteriology and other microbes

1. Classification of bacteria
2. Normal bacterial flora and its importance
3. Introduction and Laboratory methods of identification of:
   (i) Staphylococci
   (ii) Streptococci
   (iii) Pneumococci
   (iv) Neisseria
   (v) Diphtheria
   (vi) Anthrax
   (vii) Clostridia
   (viii) Enteric Gram Negative Rod
   (ix) Cholera
   (x) Pseudomonas
   (xi) Haemophillas and Borde-tella
   (xii) Spirochetes
   (xiii) Spirillum and Leptospira
   (xiv) Ricetsial and Chalmydia
4. Mycology : General characters of Fungi : Yeast like fungi and their diseases; Dermatophytoses
5. Virology : general characters and classification, Diagnostic methods, materials collected for virus isolation and preservation of material.
6. Bacteriology of water, milk and food.

Paper-II : Serology and General Pathology Max. Marks : 40

Serology :

1. Antigens and antibodies
2. Complement and fixation text
3. Aggultination
4. Precipitation
5. Flocculation
6. Neutralization
7. Immunofluorescence

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8. Immune electrophoresis
9. Serology of Syphillis
10. Haem Aggulution and Haem Aggulution Inhibition
11. Skin Tests

Section – B

General Pathology

1. Introduction to pathology (Morbid Anatomy and Histology)
2. Degeneration, Necrosis and gangarene and how to recognise them
3. Infection, Thrombosios and Embolism
4. Inflammation
5. Neopiasia, Benign and Meligiaant tumors

Practical (75×3 periods) Max. Marks 120

Unit-I

Bio-Chemistry

1. Cholesterol, Triglycorides, H.D.L., L.D.L.
2. Enzymes, S.G.O.T., S.G.P.T., L.D.H.
3. Alkaline and Acid phosphatase
4. F.T.M. Gastric analysis
5. Serum Electrolytes
6. Principle and application of Spectrophotometer, Turbidimeter and chromatography.

Unit-II

A. Haematology :

1. Erythrocyte Sedimentation Rate (E.S.R.) and Packed Cell Volume (P.C.V.) and Total R.B.C. count
2. Red cell indices and their calculation
3. Staining of Reticulocyte and their counting
4. Total Eosinophil Count
5. Cyto chemical stains used in bone Marrow and P.B.F. for diagnosis.
6. Blood Grouping and Rh typing and cross matching.
7. Anti "D" Titresw in Maternal blood.
8. Coomb's Test.
9. Demonstrations of collection of Blood for transfusion.

B. Serology and Bacteriology:

1. Cleaning and sterilisation
2. Widal Test

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Unit 2: Real sequences- Limit and Convergence of a sequence, Monotonic sequences. Cauchy's sequences, Subsequences, Cauchy's general principle of convergence. Properties of continuous functions on closed intervals.

Unit 3: Properties of derivable functions, Darboux's and Rolle's theorem. Notion of limit, continuity and differentiability for functions of several variables. The directional derivative, the total derivative, expression of total derivative in terms of partial derivatives.

Unit 4: Riemann integration – Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus. Functions of bounded variations. Introduction, properties of functions of bounded variations, total variation.

Unit 5: Sequence and series of functions – Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions, Uniform convergence and Continuity of series of functions, Term by term differentiation and integration.

Reference Books :

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd.., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition),2011.
4. S. Kumaresan, Topology of Metric Spaces, Narosa Publishing House, Second Edition 2011.
5. G. F. Simmons, Introduction to Topology and Modern Analysis, Mcgraw-Hill, Edition 2004.

Paper – II: Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations which can be made exact.

Unit 2: First order but higher degree differential equations solvable for x,y and p. Clairaut's form and singular solutions with Extraneous Loci. Linear differential equations with constant coefficients, Complimentary function and Particular integral.

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3. Brucella Aggultination.
4. Alberts Stain and Neisser Stain.
5. A.F.B. Stain
6. Concentration method of A.F.B.
7. Smears of Leprosy (Nasal Smear Slit Smear)
8. Staining and examination of prepared smears of Pus, Sputum conjunctive etc. by GRAMS-A.F.B. (R.N. Method)
9. Demonstration of instruments for sterilization.
10. Composition of common laboratory cultures media.
11. Demonstration of some common types of growth of micro organism on different media.
12. Preparation and Staining of Smears from cultures.
13. Demonstration of Special Biochemical tests used in identification of organisms.
14. Collection of urine for culture from females, males and children, taking of throats swabs/conjunctival swabs.

C. Cytology and Histology :

1. Microscopy of urine and C.S.F.
2. Semen exmaination for sperms count and motility.
3. Demonstration of the paraffin embedding, sectioning for histopathology.
4. Himotoxyline and eosine staining of paraffin section and taking and staining of smears for sex chromation.
5. Making and fixing of smears from urine, sputum and Vaginal etc. for cytology.
6. Staining of smears for exfoliative cytology.

Practical - Bases on Theory syllabus - Max. marks 50

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17. Mathematics

B.A. Part-II

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical

Examination Scheme:

	Min.Pass Marks		Max. Marks
	Science – 54 Arts – 72		150 200
		Duration	Max.Marks
Paper – I	Real Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Differential Equations	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Numerical Analysis	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.
4. Each candidate has to pass in Theory and Practical examinations separately.

Paper – I: Real Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Real numbers as complete ordered field, Limit point, Bolzano-Weierstrass theorem, closed and Open sets. Concept of compactness and connectedness. Heine-Borel theorem. Holder inequality & Minkowski inequality, Metric space – Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set in metric space.

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Unit 5: Scalar and Vector point functions. Differentiation and integration of vector point functions. Directional derivative. Differential operators. Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

Reference Books :

1. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2. C. F. Gerald and P. O. Wheatley, App;ied Numerical Analysis, Pearson Education, India,7th edition, 2008.
3. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.

Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination Scheme: **Duration: 2 Hours**

	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks (13 Marks each)	26
Practical Record	=	05 Marks	07
Viva-voce	=	05 Marks	07
Total Marks	=	30 Marks	40

The paper will contain TWO practical. The candidates are required to attempt both practical.

Practicals with Computer Programming in C Language.

Programming languages and problem solving on computers, Algorithm, Flow chart, Programming in C- Constants, Variables, Arithmetic and logical expressions, Input-Output, Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Group A:

1. Printing n terms of Fibonacci sequence.
2. Finding $n!$, $\sum n, \sum n^2$ etc.
3. Defining a function and finding sum of n terms of a series/sequence whose general term is given (e.g. $a_n = \frac{n^2+3}{n+1}$).
4. Printing Pascal's triangle.
5. Finding gcd and lcm of two numbers by Euclid's algorithm.
6. Checking prime/composite number.
7. Finding number of primes less than n, $n \in Z$.
8. Finding mean, standard deviation and ${}^nP_r$, ${}^nC_r$ for different n and r.

Group B:

1. Numerical integration using Trapezoidal, Simpson's 1/3, 3/8 and Waddle rules.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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18. Economics

B.A. Part-II

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150

Each paper shall be of three hour duration and of 100 marks for Arts students and of 75 marks for Science students.

Paper – I Introductory Macro Economics

Paper – II (a) Elements of Statistics and Mathematics
(b) History of Economic Thought

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No I consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) question. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Part A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

Paper-I

Introductory Macro Economics

Section- A

Macroeconomics, Meaning, Subject matter and Importance. Basic tenets of Classical, Keynesian, New-Classical and New –Keynesian economics, Macrocosmic variables, Circular flow of Income, National Income: Basic concepts, Measurement, Sectoral Accounts, Nominal and Real Aggregates.

Money function. Demand and Supply Quantity Theory of Money Transaction Approach. Cash Balance Approach. Keynes reformulation of the Quantity Theory of Money inflation Meaning and Impact. Theories of Inflation- Demand Pull (Keynesian and modern), Demand Push. Structural Theories of Inflation.

Section-B

Income and Employment Determination : Classical Modal and Keynesian Model, Consumption Function: Psychological Law of Consumption, Determinants of Consumption, Paradox of, Thrift, Investment Function: Determinants of investment, Marginal Efficiency of Capital and Marginal Efficiency of Investment, Concept of Multiplier and Accelerator.

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Section-C

Central Bank: Organizational set-up and functions of Central Bank (with special reference to RBI). Commercial Bank: Functions, Modern trends of Commercial Banking. Quantitative and Qualitative Credit control by RBI. Money Supply: Meaning & Definition, four measures (M_1 M_2 M_3 and M_4) Monetary Policy: Objectives, Targets and Indicators, Transmission Mechanism.

Recommended Books :

1. G.S. Gupta Macro Economics, Theory and Application, 4th Ed, McGraw Hill, New Delhi.
2. Dornbusch, Fisher and Startz: Macroeconomics, XI Edition, Indian Reprint, Tata McGraw-Hill, Publishing Company Ltd. New Delhi.
3. N. Gregory Mankiw, Macroeconomics, Worth Publishers (Latest Edition).
4. H.L. Ahuja. (Hindi and English edition) Macro Economics, Theory and Policy; S. Chand & Co. Ltd, New Delhi.
5. Suraj B. Gupta: Monetary Economics, S. Chand and Co. Ltd.
6. L.N. Nathuranmka, Prarambhik Samashti Arthshastra, Ramesh Book Publishing House, Jaipur
7. Rana and Verma: Macroeconomic Analysis, Vishal Publications,
8. Richard T. Froyen, Macroeconomics, Theories and policies, (X Edition), Adapted by Pearson Education.

Paper –II (a): Elements of statistics and Mathematics

Duration: 3 hrs **Max Marks: 100**

Section- A

Surds, Indices, Quadratic Equation, Logarithms, Permutation and Combination, Binomial Theorem, Arithmetic progression, Geometric Progression and Harmonic Progression, Analytical Geometry: Straight Line, Parabola and Hyperbola, Matrices and Determinants, solution of Simultaneous equations by Cramer's rule and Matrix Inverse. Simple differentiation, Partial differentiation (involving two independent variables). Maxima, minima point of inflexion. Simple Integration involving one independent variable, Application in Economics (Elasticity, Average, Marginal Concepts)

Section – B

Statistics-definition, nature and importance, Uses and relevance of statistical methods, Census and Sample survey, Methods of data collection and tabulation, Diagrammatic and Graphical representation of data; Measures of Central Tendency: Arithmetic Mean, Mode, Median, Geometric Mean, Harmonic Mean. Concept and Measures of Dispersion and Skewness.

Section – C

Simple Correlation: karl Pearson's and Rank Correlation, Regression analysis, Fitting of Linear Regression lines using Least Square Method, Analysis of Time Series, Determination of trend by straight line trend equation, Index numbers, Interpolation (Binomial Expansion and Newton's method), Association of Attributes.

(**Note:** Use of non-programmable calculator is permitted)

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Books Recommended :

1 B.C. Mahta and G.M.K Madanani Elementary Mathematics for use in Economics Laxmi Narain Agarwal, Agra
2 S.C. Gupta. Statistical Methods. Sultan Chand and Sons. New Delhi
3 Murray R. Spiegel Theory and Problems of Statistics McGraw Hill Book London
4 S.C. Gupta and V.K. kapoor Fundamentals of Applied Statistics. S Chand and New Delhi
5 Salvatore. D Mathematies and Statistics. Schaum's Series. Tata McGraw Hill
6 G.S. Monga Mathematics and Statistics for Economics, Vikas Publishing House. New Delhi
7 बी सी मेहता एंव जी एस के मदनानी अर्थशास्त्र में प्रारम्भिक गणित लक्ष्मीनारायण अग्रवाल आगरा।
8 कैलाशनाथनागर सांख्यिकी के मूलतत्व मीनाक्षीप्रकाशन मेंरठ।

Paper- II (b) History of Economic Thought

Section –A

Mercantilism Views on Trade Money, Prices. Wages and Employment Physiocracy:Natutal Order. Primacy of Agriculture. Net Product and Circulation of Wealth.Theory of taxation and role of government. Classical School : Adam Smith.Views on Division of Labour. Theory of Value, Capital accumulation Distribution, International trade, Economic Development Critiques of Adam Smith T.R. Malthus .Theory of Population .Theory of gluts. David Ricardo. Theory of Valve and Distribution. Foreign Trade, Economic Development and Theory of Rent

Section-B

Critities of the Classical School – Sismondi. Robert Owen, Friedrich List.
J.S. Mill theory of value. Views on Production and Distribution Karl Marx: Efforts at Scientific Socialism Theory of Money Labor Theory of Value, Theory of Capital Accumulation and crisis Distribution. German Historical School and the Development of Marginalism. Neo-classical School: Marshall-Price Determination and Elasticity. Consumer Surplus costs: Economics Rent and Profit

Section C

Economic of Kautilya, Economic thought of Dadabhai Naroji, Mahatma Gandhi, G.K. Mehta, Deendayal Upadhayaya.

Books Recommended :

1. Louise Haney, History of Economic Thought, Surjit Publication, New Delhi
2. Enc Roll: History of Economic Thought, Faber and Faber (Rupa)
3. Gide and Rist: History of Economic Doctrine
4. M.R. blaug, Economic Theory in Retrospect: History of Economic Thought from Adam Smith to J.M. Keynes. (5th Edition), Cambridge University Press, Cambridge.
5. T.N. Hajela. History of Economic thought, Ane's Student Edition, Daryaganj, New Delhi.
6. B.N. Ganguli, Indian Economic Thought: A 19th Century Perspective, Tata McGraw Hill, New Delhi.
7. J.A. Schumpeter, History of Economic Thought. Oxford University Press.

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19. Geography
BA/BSc - Pt - VI

Scheme of Examination

Faculty	Min. Pass Marks	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Resources Geography	Arts 75 Science 50
Paper II	Human Geography	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q. No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examinations.

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Paper I: Resources Geography

Section A

Nature, scope and significance of resources geography, definition and classification of resources: renewable and non renewable resources, resource classification of Zimmerman. Natural Resources: Distribution, exploitation, uses and conservation of forest, water, soils, fisheries, mineral resources, energy resources (coal, petroleum, natural gas and non-conventional energy resources).

Section B

Human resources: Population growth, distribution and density, causes of inequalities, population-resources relationship and problems, Agricultural resources: fisheries and cereal crops: rice, wheat, maize and barley; beverages: tea, coffee and tobacco, commercial crops: cotton, rubber, jute, sugarcane, silk and artificial fibres. Agricultural regions of the world.

Section C

Concepts of Resources utilization, their conservation. environmental and cultural constraints in resource utilization, water conservation and rainwater harvesting, soil and forest resources conservation, land capability classes, resources regions of the world, resources regions of the India, economic regions of the India, sustainable development.

Recommended Readings:

Alexander, E.W. 1988: Economic Geography. Prentice Hall India, New Delhi.
Bunting B.C., 1987: The Geography of Soil. Prentice hall; New York.
कौशिक, एस.डी. 2010: संसाधन भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
माथुर, बी. 1998: संसाधन भूगोल। रस्तोगी प्रकाशन, मेरठ।
Mitchell, Bruce. 1979: Geography and Resource Analysis. Longmans, London.
Park, C.C. 2001: The Environment-Principles and applicatons. Routledge, London.
Robinson, G.W. 1932 : *Soils, their Origin, Constitution* and *Classification*. London.
Shafi, M. 2004: Agricultural Geography. Pearson India.

Paper II: Human Geography

Section A

Definition, aims and scope of human geography, relation of human geography with other social sciences. Principles of human geography, essential facts of human geography

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according to Brunhes and Huntington, schools of man-environment relations: determinism possibilism and neo determinism

Section B

Human races: evolution and migration, zone-strata theory, classification of races: types, characteristics and distribution, human races in India, tribes of the world: eskimos, bushman, pigmy, masai, badduien and khirgiz; tribes in India: bhils, nagas, santhal, gond, gujjar of Jammu and Kashmir and toda. Population growth and theories, distribution and density of world population.

Section C

Migration of population: causes, types and impact: population regions and population policies in India. Rural settlements: factors affecting development of rural settlement, types and patterns of rural settlements, building materials and house types, urban settlements: process of urbanization, urban problems in India, impact of human activities on environment.

Recommended Readings:

Chandna, R.C. 2000: Geography of Population. Kalyani Publishers; New Delhi.

Dohrs, F.E. and Summners, L.W. (eds.) 1967: Introduction to Geography. Thomas Crowell Co., New York.

Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity, Readings in Human Geography. Blackwell Publishers Ltd., Oxford.

Fellmen, Getis and Getis, J. 1998: Human Geography-Landscape of human activities. Longman, London.

Husain, M. 2012: Human Geography. Rawat Publications, Jaipur.

हारून, एम. 2006: संसाधन भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Leong, G.C. and Morgan, E.C. 1982: Human and Economic Geography. Oxford University Press, Oxford 2nd Edition.

कौशिक, एस.डी. 2012: मानव भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।

मौर्य, एस.डी. 2005: जनसंख्या भूगोल। शारदा पुस्तक भवन, एलाहबाद।

पण्डा, बी.पी. 2001: जनसंख्या भूगोल। मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, भोपाल।

राव, वी.पी. एवं श्रीवास्तव, वी.के. 2006: मानव भूगोल। वसुन्धरा प्रकाशन, जयपुर।

Singh, R.L. 2005: Fundamentals of Human Geography. Sharda Pustak Bhawan, Allahabad.

Practicals

Scheme of examination

Min. Pass Marks: 18 — Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field survey and viva voce	10+04	2½ hrs.
Record and viva voce	08+04	

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N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks.

Section A

Definition of cartography, types of cartographic symbols and their uses, drawing instruments and materials, classification and representation of data with the help of squares, rectangles, circles, spheres, ring, pyramids, wheel diagrams, traffic flow diagram , isochronic chart.

Section B

Classification and uses of maps, drawing of isopleth, choropleth, chorochromatic, choroschematic and dot maps (simple, multiple and multi colour), measures of central tendency and dispersion: mean, median, mode, quartiles, standard deviation.

Section C

Elements of map reading. History of topographical maps in India, Scheme of topographical mapping in India as per National Map Policy, 2005. Conventional symbols and interpretation of physical and cultural features on topographical maps.
Prismatic Compass survey: equipments, methods of measurement of bearings, correction of bearings, record of survey closing error and its corrections.

Recommended Readings:

Monkhouse, F. J. and Wilkinson, F.J. 1985: Maps and Diagrams. Methuen, London
Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi (fourth revised edition).
Raisz, E. 1962: General Cartography. John Wiley and Sons, New York. 5th edition.
Singh, R.L. and Singh, Rana, P.B., 1991: Elements of Practical Geography. Kalayani Publishers, New Delhi.
Sarkar, A. K. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
शर्मा, जे.पी. 2011 प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्से, मेरठ।
Singh, L.R 2006: Fundamentals of Practical Geography. Sharda Pustak Bhawan, Allahabad.
Venkatrameiah, C., 1997: A Text book of Surveying. University Press, Hyderabad.

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20. STATISTICS

Marks Scheme

Paper	Nomenclature	Marks Science	Marks Arts
Paper I	Statistical Inference	50 mark	65 marks
Paper II	Statistical Applications in Society and Industry	50 mark	65 marks
Paper III	Practical based on Paper I,II	50 mark	70 marks
	Total	**150**	**200**

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I

(Statistical Inference)

Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution: Definition, Derivation, Moments, MGF, C.G.F., Mode & Skewness Limiting and Additive Property. Distribution of ratio of Chi-square variates.

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Testing Normal Population variance, Test for Goodness of fit; Contingency table & Independence of attributes, yate's correction 18 hours

Unit-II

t-Distribution : Definition of Student's t & Fisher's t Statistic and derivations of their distributions, Constants, Limiting Property of 't' distribution. Applications-Testing of Single mean: Difference of two means; paired t-test and sample correlation coefficient. F-Distribution : Definition, Derivation, Constants, Application- Testing of equality of two variances. Relationship between t, F and Chi-sqare Distributions. 18 hours

Unit-III

Theory of Estimation: Point Estimation-Concept and Problem for Point Estimation; Criterion of a good estimator (Unbisedness, Consistency, Efficiency, Sufficiency). MVUE. Method of moments Methods of Maximum Likelihood Interval Estimation-Concept, Confidence Interval, Confidence Coefficient, Construction of Confidence Interval for Population Mean, Variance, Difference of Population Means & Ratio of Variances of Normal Distributions. 18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region BCR, Neyman-Pearson's Lemma for BCR. BCR in case of Binomial, Poisson, Normal and Exponential Population. 18 hours

Unit-V

Large sample tests Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test one sample and two sample cases. Run Test, Median test. 18 Hours

REFERENCES:

1. Goon A.M. Gupta M.K., Das Gupta B. (1991): Fundamentals of Statistics, Vol.I, world Press, Calcutta
2. Hodges J.L. and Lehman E.L. (1964): Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill
4. McGraw Hill

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5. Freund J E. (2001): Mathematical Statistics, Prentice Hall of India.
6. S.C Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Bhatt B.R Srivenkatramana T and Rao Mahhava K.S. (1997): Statistics A Beginner's Test,. Vol.II New Age International (P) Ltd.
2. Rohatgi V.K (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G. (1967): Statistical Methods: Iowa State University Press.
4. E.J. Dudewicz & S.N. Misra: Modern Mathematical Statistics John Wiley and Sons.

Subject : Statistics Paper II

(SATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY

(Also Common with Subject: Applied Statistics)

Unit-I

Demographic Methods: Sources of demographic data-census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features. Mortality rate and probability of dying. Relation between different columns of life table Uses of life table and its limitations. Measurement of fertility: Crude birth rate. General fertility rate, Specific fertility rate, Total fertility rate. Gross reproduction rate, Net Reproduction Rate.

18 hours

Unit-II

Economic Statistics: Index numbers-Defination, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives, Problems involved in computation of index number, Use of averages, Simple aggregative and Weighted average methods Laspeyre's Paasche's and Fisher's index number, Tests for index numbers. Consumer price index. 18 hours

Unit-III

Time Series Analysis: Definition its different components, illus-

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trations. additive and multiplicative models Different Methods for determination of trend & seasonal fluctuation alongwith their merits & demerits. 18 hours

Unit-IV

Educational Statistics: Methods of standardization of scales and tests. Z-scores. t-scores Standard scores. Percentile score, Intelligence Quotient and its measurement and uses. validity of test scores reliability of scores and their determination. 18 hours

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality, General theory of control charts. control limits, sub-grouping, Summary of out-of control criteria. Control charts for variables: Construction of Mean and Range charts Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and demerits. 18 hours

REFERENCES:

1. Croxton F.E. ,Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.
3. Goon A.M. Gupta M.K. Das Gupta: B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Grant E.L. (1964): Statistical Quality Control. Mc Graw Hill.
5. Guilford J.P. & Fruchter B.: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.
6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srivataya O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. S.C. Gupta & V.K. Kapoor: Fundamentals of Appliedl Statistics. Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.
2. Gupta and Mukhopadhyay P.P.: Applied Statistics, Central Book Agency.
3. Pressat R(1978): Statistical Demography. Methuen and Co

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Subject : Statistics Paper III

Practical Paper

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient, use of Z transformation.
2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.
3. Non parametric tests: Sign, Run, Median (for large samples)
4. Computation of mortality and fertility rates. Construction of life table.
5. Construction of Index Numbers by Laspeyre's, Paasche's, Fisher's, Chain Base Indices. Consumer price index.
6. Tests for Index numbers.
7. Determination of trend in a time series and construction of seasonal indices.
8. Drawing of $\bar{X}$, R, np, p and C-Charts.

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21. APPLIED STATISTICS, Pt-II, 2021

Marks Scheme

Paper	Nomenclature	Marks per week Science	Marks per week Arts	No. of hours per week
Paper I	Statistical Inference	50 mark	65 marks	3 hours
Paper II	Statistical Applications in Society and Industry	50 mark	65 marks	3 hours
Paper III	Practical based on Paper I.II	50 mark	70 marks	4 hours
	Total	150	200	10 hours

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Subject : Applied Statistics

Paper I (Statistical Inference)

Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution

moments.

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proof) Applications.-Testing Normal Population variance, Test for Goodness of fit; Contingency Table & Independence of attributes. Yate's correction. 18 hours

Unit-II

t-Distribution : Definition of Student's -t & Fisher's -t Statistic. Property and Applications of t-distribution for testing-Single mean, difference of two means, observed sample correlation coefficient Paired t-test., F-Distribution : Definition, Mean, Variance & mode. Application of F distribution- Testing of equality of two variances. Relationship between t, F and Chi-square Distributions. without proof. 18 hours

Unit-III

Theory of Estimation: Point Estimation- Problems for Point Estimation; Criterion of a good estimator (Unbiasedness, Consistency, Efficiency, Sufficiency). MVUE. Method of moments. Methods of Maximum likelihood Interval Estimation-. Comfidence Interval for mean, variance, difference of means and ratio of variances for normal populations. 18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region, BCR, Neyman-Person's Lemma (statement only) and its application. BCR in case of Binomial, Poisson, and Normal Population. 18 hours

Unit-V

Large sample test-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test for one sample and two sample cases. Run Test. Median test. 18 hours

REFERENCES:

1. Goon A.M Gupta M.K., Das Gupta B.(1991): Fundamentals of Statistics, Vol.I. World Press, Calcutta.
2. Hodges J.L. and Lehman E.L.(1964): Basic Concepts of Probability and statistics, Holden Day
3. Mood A.M., Graybill F.A. and Boes D.C. (1974): Introduction to the Theory of Statistics, Mc Graw Hill.
4. Freund J.E. (2001): Mathematical Statistics, Prentice Hall of India.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand andrsons. New Delhi

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ADDITIONAL REFERENCES:

1. Bhatt B.R. Srivenkatramana T. and Rao Madhava K.S. (1967): Statistics: A Beginner's Text. Vol.II New Age International (P) Ltd.
2. Rohatgi V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G. (1967): Statistical Methods. Iowa State University Press.
4. E.J. Dudewicz & S.N. Misra: Modern Mathematical Statistics John Wiley and Sons.

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Subject : Applied Statistics

Paper II

(SATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY)

Courses contants are same as that of subject statistics.

PAPER III

Practical Paper

22. PSYCHOLOGY

B.A. Part-II

SCHEME OF EXAMINATION :

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr.18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Abnormal Psychology	3 Hrs.	75	50
II	Psychological Statistics	3 Hrs.	75	50
	Practical	3 Hrs.	50	50

NOTE:

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

For clarification the distribution of marks is tabulated as below:-

Arts			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (out of 7)	03	15
C	3 (with Internal Choice)	15	45
		Total marks	75

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Science			
Section	No. of Question	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (with internal choice)	10	30
		Total Marks	50

2. Use of simple calculator will be allowed for statistical portions of all papers.

Paper I - Abnormal Psychology

Section: A

1. Mental Disorder : Definition, Indicators of Abnormality, DSM-5 and ICD - 10 Classification Systems, Mental Health Professionals.
2. Causal Factors and Viewpoints : Risk Factors and Causes; Necessary, Sufficient and Contributor y causes; Diathesis - Stress Models, Biological, Psychological and Social perspectives.
3. Clinical Assessment and Diagnosis : Basic elements in Assessment, Physical and Psychosocial Assessment.

Section: B

4. Anxiety, Obsession Compulsion and Trauma and Stress or Related Disorders : Types, Clinical Picture and Causal Factors.
5. Mood Disorders and Suicide : Types, Clinical Picture and Causal Factors.
6. Somatic Symptoms and Dissociative Disorders : Types, Clinical Picture and Causal Fact ors

Section: C

7. Feeding and Eating D is orders : Types, Clinical Picture and Causal Factors.
8. Schizophrenia and Other Psychotic Disorders : Types, Clinical picture and Causal Factors.
9. Psychological Treatment / Therapies : Behavioral Therapy, Cognitive and Cognitive –Behavioral Therapy, Humanistic–Existential Therapies, Psychodynamic Therapies.

Books Recommended :

- Butcher, J . N . , Hooley, J . M . & Mineka , S. (2017) . *Abnormal Psychology* , Noida : Pearson India Education.
- Oltmanns, T . F. & Emery, R . E . (2017) . *Abnormal Psychology* . Noida : Pearson India Education.
- David, B . H . & Durand V. M . (2007) . *Abnormal Psychology : An Integrated Approach* . New Del hi : Thomson .
- Ray, W . J . (2015) . *Abnormal Psychology* . New Del hi :Sage.

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Paper II - Psychological Statistics

Section-A

1. Introduction: Nature and Scope of Statistics and Psychological Data; Application of Statistics in Psychology; Nature and Levels of Measurement - Categorical and Continuous Variables.
2. Frequency Distribution: Drawing of Frequency Distribution. Bivariate Frequency Distribution, Graphical Representation of Grouped Data-Histogram, Polygon.
3. Measurement of Central Tendency: Purpose and Types; Characteristics and Computation of Mean, Median and Mode.

Section-B

4. Measures of Variability: Concept and Uses; Characteristics and Computation of Range, Quartile Deviation, Average Deviation and Standard Deviation.
5. Correlation: Concept and Types- Pearson's Product Moment Correlation (for Ungrouped Data by Assumed Mean and Actual Mean); Spearman's Rank Order Correlation.
6. Hypothesis Testing and Inferences Making: Population and Sample, Types of Sampling, Standard error of Mean, 't' test (Independent group), Interpretation of 't' values, levels of Significance.

Section-C

7. Non Parametric Tests: Nature and Assumptions of Distribution-free Statistics; Chi-Square; Equal Probability, 2 x 2 Contingency Table; Median Tests.
8. ANOVA: Purpose and Assumptions of ANOVA. One way ANOVA
9. Computer Analysis: Preparation of Data, Uses of SPSS.

Books Recommended :

- Broota K.D. (1992): *Experimental design in behavioural research.* New Delhi: Wiley Eastern.
- Garrett, H. (1981). *Statistics in psychology and education.* Mumbai: Vakil Febber and Simons.
- Minimum, E.W., King, B.M. & Bear. G. (1993). *Statistical Reasoning in Psychology and Education.* New York: John Wiley.
- Siegel. S. (1994). *Non-parametric Statistics.* New York: McGraw Hill..

Practical

1. Assessment of Mental Health
2. Assessment of State and Trait Anxiety
3. Measurement of Depression
4. Measurement of Coping – Styles
5. Assessment of Family Pathology
6. Word – Association Test
7. Eight-State Questionnaire
8. Neuropsychological Assessment
9. Stress: Measurement and Analysis of Group Data (Mean and Median)
10. Stress: Measurement and Analysis of Group Data ('t'test)

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23. राजस्थानी

स्कीमः इस परीक्षा में दो प्रश्न पत्र होंगे। प्रथम मध्यकालीन राजस्थानी गद्य, द्वितीय मध्यकालीन राजस्थानी काव्य।

न्यूनतम उत्तीर्णांक 72

अधिकतम अंक 200

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...य प्रश्न पत्र	समय 3 घंटे	अधिकतम 100
...तीय प्रश्न पत्र	समय 3 घंटे	अधिकतम 100

प्रथम प्रश्न पत्र : मध्यकालीन राजस्थानी गद्य

(क) एक प्रश्न व्याख्या से संबंधित। प्रत्येक पुस्तक से एक (तीन व्याख्याएँ) 3×12=36

(ख) तीन पुस्तकों पर एक-एक आलोचनात्मक प्रश्न (कुल तीन प्रश्न) 3×16=48

(ग) एक प्रश्न—मध्यकालीन गद्य विधाओं और साहित्य पर। 1×16=16

पाठ्य पुस्तकें :

1. राजस्थानी बात संग्रह, सम्पादक मनोहर शर्मा, साहित्य अकादमी, रवीन्द्र भवन, नई दिल्ली। इस संग्रह की निम्नलिखित 15 बातें—
   2,7,15,20,21,23,29,32,35,36,37,44,46,48
2. मारवाड़ रा उमरावां री बातां, संपादक—सौभाग्य सिंह शेखावत।

संदर्भ ग्रंथ :

1. राजस्थानी साहित्य की गौरवपूर्ण परम्परा—अगरचंद नाहटा, राधाकृष्ण प्रकाशन, दिल्ली
2. राजस्थानी बात साहित्य : डॉ. मनोहर शर्मा, राजस्थानी शोध संस्थान, चौपासनी, जोधपुर
3. राजस्थान बात साहित्य : डॉ. पूनम दइया, राजस्थानी भाषा, साहित्य एवं संस्कृति अकादमी, बीकानेर
4. राजस्थानी गद्य—उद्भव और विकास—डॉ. अचल, सार्दूल राजस्थानी रिसर्च इन्स्टीट्यूट, बीकानेर।

द्वितीय प्रश्न-पत्र : मध्यकालीन राजस्थानी काव्य

इस प्रश्न पत्र में पाँच प्रश्न होंगे।

(क) प्रत्येक पुस्तक से एक-एक व्याख्या (कुल तीन व्याख्याएँ) 3×12=36

(ख) प्रत्येक पुस्तक पर एक-एक आलोचनात्मक प्रश्न (कुल तीन प्रश्न) 3×16=48

(ग) मध्यकालीन राजस्थानी काव्य विधाओं और साहित्य पर एक प्रश्न 1×16=16

पाठ्यपुस्तकें :

1. झालां झालां री कुण्डलियाँ—संपादक डॉ. मोतीलाल मेनारिया, राजस्थानी ग्रंथागार,

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24. ANTHROPOLOGY

B.A. Part-II

Paper-I — Max Marks-100, Min Marks-36

Paper-II — Max Marks-100, Min Marks-36

Note- Each Paper will contain nine questions having three questions from each Unit. Candidates are required to attempt five questions in all selecting atleast one question from each Unit.

Paper-I Introduction to Physical and Archaeological Anthropology

UNIT-I

Meaning, subject matter and scope of Physical Anthropology. Branches of Physical Anthropology. Relationship of Physical Anthropology with other Sciences.

Meaning, subject matter and scope of Archaeological Anthropology. Relationship of Archaeological Anthropology with other Natural and Social Sciences.

UNIT-II

Human evolution: Lamarckism, Darwinism and Synthetic Theory. Human Genetics: Mendelian Principles. Human Variation: Definition of Race.

UNIT-III

Major stone tool typology and technology. Palaeolithic: (Lower, Middle, Upper), Mesolithic and Neolithic Cultures. Study of Indus Valley Civilization: expansion, features and decline.

List of Books:

B.R.K. Shukla and S. Rastogi, Physical Anthropology and Human Genetics: An Introduction, New Delhi, Palka Prakashan.

Barnouw Victor, 1989, Physical Anthropology and Archaeology, California, Wadsworth.

Beals Ralph L. and Harry Hoijer, 1965, An Introduction to Anthropology, 3rd ed., New York, Macmillan Co.

Bhattarcharya, D.K., 1966, An Outline of Indian Pre-history, Delhi, Palika Prakashan.

Das B.M., 1980, Outlines of Physical Anthropology, Allahabad, Kitab Mahal.

Sankalia, H.D., 1964, Stone Age Tools: Their Techniques, Names, and Probable Functions, Pune, Deccan College.

ए.आर.एन. श्रीवास्तव, 1992, शारीरिक मानवविज्ञान, पटना, ज्ञानदीप प्रकाशन

मार्टिमर व्हीलर, 1990, पृथ्वी से पुरातत्व, दिल्ली, हिंदी माध्यम कार्यान्वय

गार्डन चाइल्ड, 1991, मानव प्रगति की कहानी, लखनऊ, उत्तरप्रदेश हिंदी संस्थान

डॉ. ए.एन. शर्मा एवं डॉ. (श्रीमति) एन.एम. शर्मा, 1966, शारीरिक मानव विज्ञान, इलाहाबाद, अभिव्यक्ति प्रकाशन,

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Paper-II Research Methodology

UNIT-I

Meaning, relevance and types of Research. Science and Scientific method. Nature of Anthropological Research. History of field work in Anthropology.
Formulating a research problem: importance and source.

UNIT-II

An introduction to major theoretical perspectives:
Evolutionism: Basic idea, contributions of major theorists (L.H.Morgan, E.B.Tylor).
Diffusionism: British, German Austrian school and American Distributionism .
Functionalism: B. Malinowski's Contribution, Theory of Needs).

UNIT-III

Data : meaning and types. Sources of data: Primary (meaning, types, advantages and limitations of - Interview, Observation, Questionnaire), Secondary (Census, Historical documents and Personal documents).

Lists of Books

Bernard, H.R., 2008, Research Methods in Anthropology, New Delhi, Rawat Publications.

Danda, Ajit, 1992, Research Methodology in Anthropology, New Delhi, Inter-India.

Goode & Hatt, 1983, Methods in Social Research, McGraw Hill International.

Pritchard, E.E. Evans,1966, Social Anthropology and Other Essays, New York, Free Press.

Srivastava, V.K. ed., 2004, Methodology and Fieldwork, New Delhi, Oxford University Press. .

Wilkinson, T.S. & Bhandarkar, P.L., 1994, Methodology and Techniques of Social Research, Bombay, Himalaya Publishing House.

Young, Pauline, 1984, Scientific Social Surveys and Research, New Delhi, Prentice Hall of India.

पाण्डेय, गया, मानवशास्त्रीय सिद्धान्तः शास्त्रीय एवं आधुनिक, नई दिल्ली, कान्सेप्ट पब्लिशिंग हाऊस

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25 DRAMATICS (96)

B. A. Part – II (Drama) Examination 2022-23

Paper-I Acting and Speech (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Introduction to acting, Definition and its elements

II. History of acting in Special reference to Indian theatre:
A-Chaturdik abhinay siddhant
B-Introduction to Rasa and bhava

III. Applied Acting Techniques and Training
a. Mime and Movement
b. Improvisation

IV. Dramatic Speech – Mechanism and Technique:
a. Voice production Mechanism
b. Development of dramatic Speech
c. Study of meter and rhythm
d. Punctuation and speech exercises

IV. Play production as communion art and its requirement (Group work, stage ethics, etc.)

Books Recommended:
1. Natyashastra – Bharatmuni (Tr. Babu Lal Shastri)
2. Bhartiya Natya Saundarya – Manohar Kale
3. Parsi Theatre – Ranbir Singh
4. Acting is Believing: A Basic Method – Charles McGraw
5. Voce and the Actor – Cicely Berry

Paper-II Dramaturgy (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Salient features of Sanskrit Plays
II. Selective study of Dasarupak of Dhananjaya
III. Structural aspects of parsi theatre plays
IV. Detailed study of following plays:
a. Sanskrit plays
1. Mrichchhkattikam
2. Urubhangam
3. Abhigyan Shakuntalam
b. Parsi plays
1. Yahudi Ki Ladki – Aga Hashra Kashmiri
2. Veer Abhimanyu – Radhey Shyam Kathavachak
3. Ramayana – Narayan Prasad Betab
c. Modern Indian Plays
1. Andha Yug
2. Ashadh Ka Ek Din
3. Khamosh Adalat Jari Hai

Books Recommended:
1. Natyashastra – Bharatmuni (Tr. Babu Lal Shastri)
2. Dasarupak – Dhananjay (Tr. Govind Trigunayat)
3. Bhartiya Natya Saundarya – Manohar Kale
4. Parsi Hindi Rangmanch – Laxmi Narayan Lal
5. Bhartiya Rangmanch Ka Udbhav Evam Vikas – Dashrath Ojha
6. Natya Samikha – Dashrath Ojha
7. All the plays prescribed in Ch. IV

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B. A. Part – II (Drama) Practical Examination 2022-23

PRACTICAL PAPER –I
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. 15 new yogic Asanas and psycho Games.
II. Improvisations with given motives.
III- Practice of emotions based on Rasa and bhava

PRACTICAL PAPER –II
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Voice & Speech – Various exercises
II. Participation in the production
III. Submission of work Book and special assignments.

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26. PHYSICAL EDUCATION

There shall be two theory papers of 60 marks each and a practical examination carrying 80 marks. A candidate must pass in theory and practical exam. separately.

Paper : I Anatomy and physiology of Exercise

Time : 3 hours Max. Marks : 60 Min. Pass Marks

Unit I : Introduction

(A) Meaning and concept of Anatomy, Physiology and Exercise

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Physiology, its need and importance in Physical Education and Sports.

(B) Definition of cell, tissue, organ and systems. Microscopic structure of cell.

Unit II : Skeletal and Muscular System

(A) Elementary knowledge of skeleton system, teridnology of various movements around joints.

(B) Types of muscles (Voluntary, Involuntary and Cardiac) General characteristic (Properties) of Muscles (Elasticity, Contractibility and Irritability).

Unit III : System

(A) Brief Introduction and structure of various systems of the body (Cardio-vascular, Respiratory, Digestive, Nervous System)

(B) i. Pumping action of heart
ii. Mechanism of respiration
iii. Role of Glands in growth, development and body function.

Unit IV : Physical Fitness and Training

(A) Physiological Concept of Physical fitness, training warming up, conditioning and fatigue.

(B) Physiological aspects of development of strength enhance, skill, speed and agility.

Unit V : Physiology of Exercise

(i) Effect of exercises on respiratory circulatory muscular system.

(ii) Nuro Muscular Co-ordination

(iii) Second wind, Oxygen dept. and binesthetic sense.

(iv) Stich and Cramps

(v) Obesity and body weight control.

Books for Reference :

1. Morehouse & M Physiology of Exercise : C.V. Mosby Co., St. Louis.
2. Srivastava etc. : Textbook of Practical Physiology, Scientific Book Agency, Calcutta.
3. Cuyton A.C.: Functions of Human Body : W.B. Saunders Co. London.
4. Pearce Evelyn C : Antomy and Physiology of Nurses : Faber & Faber Ltd. London.

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5. Karpovich and Sinnser : Physiology of Muscular Activity : W.B Saunders Co. London.
6. Pearce J.W. : Anatomy for students and teacher of physical Education . Edward Arnold & Co., London.
7. Duvel Ellen Neill Kinesiology : The Anatomy of Motion.
8. देशपाण्डे सुरेश : मानव क्रिया विज्ञान : लुगान व्यायाम मण्डल, अमरावती।
9. सिंह टी.के. : शरीर रचना एवं शरीर क्रिया विज्ञान : दीपक प्रकाशन, जोधपुर।
10. आर्मस्ट्रांग व जैकसन : नर्सों के लिए शरीर सम्बन्धी ज्ञान : एन.आर. ब्रदर्स, इंदौर।
11. कंवर रमेश चन्द : शरीर क्रिया विज्ञान व स्वास्थ्य शिक्षा : अमित बदर्स, नागपुर।
12. ध्यानी वी.एस. : शरीर क्रिया विज्ञानीया : चौखम्भा ओरियन्टल, वाराणसी।
13. पाण्डेय के. और वर्मा पी. : शरीर क्रिया विज्ञान, हिन्दी मा.का. निधेशालय, दिल्ली।
14. अजमेर सिंह और अन्य : शारीरिक शिक्षा स्वास्थ्य एवं खेलों की आधुनिक पाठ्य पुस्तक (बी.ए. पार्ट II, III) : कल्यानी पब्लिकेशंस, लुधियाना।

Paper-II : Managements & Methods of Physical Education

Time : 3 hours Max. Marks : 60 Min. Pass Marks : 22

Unit I : Introduction

1. Meaning and Importance of "Teaching Methods", Factors to be considered in determining the methods of teaching.
2. Types of Teaching Methods.
3. Principles of Teaching.

Unit II : Organisation

Organisation of Sports and National, State, District and village Level for Educational Institutions, Open tournaments & Annual Sports Meet

Unit III : Tournaments

Meaning, types of Tournaments, Method of drawing fixtures, Merits and Demerit of various types of Tournaments.

Unit IV : Facilities and Equipments

1. Need and importance of equipments for Physical Education.
2. An ideal list of equipments for Physical Education.
3. Realistic approach in purchases, purchases procedures.
4. Development of improvised equipment and storekeeper.

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Unit V : Office Management and Budget.

(a) Maintenance of Records, Filing and Office correspondence.

(b) Physical Education Budget and its preparation, Maintenance of Accounts, Income & Expenditure (Sources).

Books Recommended :

1. G. Tirunarayanan & S. Hariharan : Methods in Physical Education, Alagappa College of Physical Education, Alagappauram Karaijudi.
2. Hari Shankar Sharma : Physical Education - Organisation, Administration and Supervision (Hindi).
3. Knapp Clyde and Hagman, E.P. : Teaching Methods for Physical Education, New York : Mc Graw Hill Book Co. 1984.
4. Bucher C.A. : Administration of Physical Education and Atuletic Programmes. The C.V. Kosby Company, London, 1983.
5. Zelgler, E.F. And Bowiew G.W. : Management Competency Development in sports and physical education, Lea and Feblger, Philadelphia, 1983.
6. कंवर आर.सी. : शारीरिक शिक्षा संगठन एवं प्रशासन, अमित ब्रदर्स, नागपुर।
7. अरोड़ा पी.के. : शारीरिक शिक्षा में संगठन, संचालन एवं मनोरंजन, प्रकाश ब्रदर्स, लुधियाना।
8. कमरकर ए.के. और श्रीवास्तव ए.के. : शारीरिक शिक्षा संगठन, प्रशासन, पर्यवेक्षण एवं शिविर, सुयोग प्रकाशन, अमरावती।
9. मोहम्मद वाहिद और दीक्षित एम.के. : शारीरिक शिक्षा में शिक्षण विधियाँ : डालीगंज रेलवे क्रॉसिंग, लखनऊ।
10. पाण्डेय लक्ष्मीकान्त : शारीरिक शिक्षा की शिक्षण पद्धति, मैट्रोपोलिटन बुक कं.प्रा.लि., नई दिल्ली।
11. वैष्णव राजेन्द्र प्रसाद : शारीरिक शिक्षा का संगठन व विधियाँ : श्रीयांश पब्लिकेशन्स, जयपुर।
12. श्रीवास्तव ए.के. : शारीरिक शिक्षा और खेल में संगठन व पर्यवेक्षण, दिल्ली।
13. अजमेर सिंह और अन्य : शारीरिक शिक्षा स्वास्थ्य एवं खेलों की आधुनिक पाठ्यपुस्तक (बी.ए. पार्ट I, II, III) : कल्याणी पब्लिकेशन, लुधियाना।
14. सिद्धाना अशोक कुमार : शारीरिक शिक्षा सिद्धांत, मनोविज्ञान एवं इतिहास : श्रीयांश पब्लिकेशन्स, जयपुर।

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Practical **Max. Marks 80 Min. Pass Marks 28**

The practical examination shall be conducted by a panel of examiners.

A candidate shall be required to show his/her familiarity with the Rules & Techniques) and give performance/demonstration in the following :

1. Athletics (Compulsory) 40 Marks

   Triple Jump, Pole Vault, Javelin, Hammer and Walking.

2. Any one game of candidates choice from the following :

   (a) Cricket (b) Hockey (c) Kho-kho (d) Yoga 40 Marks

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27. INDIAN HERITAGE IN RURAL HANDICRAFTS

Scheme	Max. Marks	Min. Pass Marks
1. Theory : One Paper 3 hrs.	60	22
2. Practical	80	28
3. Submission	60	22
Total	200	72

1. Study of tools used in the early period made of:
   (a) Stone (b) Copper & Bronze (c) Iron & Steel
2. Machines and power tools-their uses, constructional particulars, operational processes and method maintenance, safety measures to be observed while operating them.
3. Special jigs and props for minimising manual labour and to increase productivity in manufacturing rural handicrafts.
4. Classification of raw materials method of identifying defects. Preservation and seasoning auxiliary methods of using different tools-safety precaution to be taken. Simple exercises involving cutting, fixing, fitting, drilling, forging, planning, polishing, etc.

Paper II (Practical) **5 Hrs. Duration**

Max. Marks : 80 **Min. Pass Marks : 28**

a) Wood work: Preparation of tools preparation of wood, marking and practice in different joints, making small objects like toys, paper weight and solid geometric forms.

b) Paper machine work : Preparation of toys dolls pots and decorative items.

Submission Works

Max. Marks : 60 **Min. Pass Marks : 22**

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Note (1) : Submission work will be submitted to the head of the department of Rural Handicrafts of the college 15 days before the commencement of examination. The marks in the submission will be awarded by the subject teacher (internal). However the external examiner shall be empowered to review the work of submission in case there is a drastic difference between the marks of the examination and submission.

(2) Candidates should pass in theory as well as in practical paper separately.

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COMPUTER APPLICATION (VOCATIONAL COURSE) FOR

B.A./B.Com/B.Sc. Part II

Paper-I

Paper Name : Operating System

Unit I

Concepts: Operating System & its need, Objectives of Operating System, Functions of Operating System, Types of OS: Simple Batch Systems, Multi-programmed Batch System, Time Sharing Systems, Parallel System, Distributed Systems and Real-Time Systems, Booting Process of OS, Operating System Structure.

Unit II

Process Management: Process Concept, Process States, Process Scheduling.
CPU Scheduling Algorithms: Basic Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multiple Feedback Queue, Multiple- Processor Scheduling.

Unit III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

Unit IV

Memory Management: Background, Why use memory management in OS, Logical versus Physical Address Space, Swapping, Contiguous Allocation (Fragmentation), Paging, Segmentation, Basic concept of Virtual Memory and Demand paging.
Introduction to File System : File Concepts(Operations and Attributes), Directory Structure, File System Structure

Unit V

Introduction of different Operating System(Linux, Unix, Windows Server), Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Input and Output, Inter Process Communication, network Structure, Security.

Recommended reference books:

1. A. Silbersachatz and P.Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.
2. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.
3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.
4. Peterson Richard, " The Complete Reference Linux " Tata McGraw Hill.
5. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6. Achyut S. Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.
7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001

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Paper-II

Paper Name : Database Management System

Unit I

Data, Data Processing, Merits and demerits of file organisation. Database Overview, Purpose of the Database system, File systems Vs. Database Systems, View of Data: Data Abstraction, Instances, Schema, Data Models: Overview of Network, Hierarchical, and Relational Model, Database Architecture and Administrators, Codd's Rules.

Unit II

ER Model: Basic Terminology, Entity, Entity sets, attributes and keys, Relation and Relationship sets, Entity-Relationship Diagram, Weak and Strong entity types, Features of E-R Model, Specialization, Generalization Aggregation, Creating table from ER diagram.

Unit III

Basic Concept of functional dependencies, loss less decomposition and dependency preservation. Normalization and its types: 1NF, 2NF, 3NF and BCNF. Introduction to transactions, Transaction States.

Unit IV

Query Languages: DDL, DML, DCL, Introduction to SQL, Data Types, Basic SQL commands like Create, Alter, Drop, Truncate, Insert, Update, Delete etc.

Unit V

Transaction management and Concurrency control, Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),database recovery management.

Recommended Books:

1. Korth H.F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill,2010
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4th Edn: BPB,2009
4. Navathe S.B. Elmasri R,; Fundamentals of Database Systems, 5th Edn, Pearson 2011.
5. Ramakrishan and Gharke, Database Management Systems, 3rd Ed, TMHI, 2007.
6. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

Paper-III

Paper Name : DBMS Lab
Content : Lab practical's based on paper II.

28. COMPUTER APPLICATION
(Common for B.A./B.Com./B.Sc.)

		Science	Com./Arts
Paper I	Data Base Management System	50	65
Paper II	Structured Programming and Computer Graphics	50	65
Practical	Programming Laboratory	50	70
	On-the-Job training (4 weeks)		

The duration of these papers will be 3 hours.

Paper I : Data Base Management System

Categorization of DBMS Systems. Network. Hierarchical and relational databases. Application of DBMS systems.

Relational data bases management system. Why to use them and where. Data Description Language. Data Manipulation Language and Data Control Language.

Introduction to DBASE, DBASE commands. Development of an application under DBASE using forms, screens and PRG. files.

Security considerations in database management systems. Performance improvement in databases.

Relational databases - advanced concepts. Introduction to ORACLE/INGRES or a similar RDBMS on a multiuser environment. Structured query language. Form design on a advanced RDBMS. Report generator, Query by example and Report by form. Accessing RDBMS using programming languages

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System management. User management Security considerations Practical.

Design of a database for a business application. Design of data entry forms and report layouts for this database. Creation of programs to access and manipulate database.

Development of a business application in RDBMS.

Paper-II : Structured Programming and Computer Graphics

Introduction. Need of structured programming. Methods of documentation. Methods of analyzing a program requirements. Data flow diagrams. Entity relationship. Flow charts.

Various categories of programming language (3GL, 4GL, etc.), introduction to C and COBOL. Program development in C using structured programming concepts.

Why Graphics: Various types of graphics programs. Drafting packages. DTP packages. Microsoft Windows. Various documentation cum DTP packages e.g. Wordperfect, Microsoft Word etc.

Introduction to a Pagemaker/Ventura or a similar package. Preparation of documents using DTP package. Formatting. Various fonts and characters set. Various type of printers used in DTP. Introduction to commercial DTP system available in market. Indian language fonts. Creation of Indian language fonts.

Practical

Development of a business application using C.

Preparation of a document and publishing it using a DTP System. Creation of fonts.

Managing a Microsoft Window session. Creating groups and program items under Window. Turning Windows for a computer system.

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SYLLABUS

B.A. Part-III

Examination - 2025

B.A. Part-II Examination

(Under 10+2+3 Pattern)

R.11 (2)

The number of papers and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of Examination on against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/ paper, wherever prescribed, separately classification of successful candidates shall be as follows :

First Division 60% Second Division 48%	}	of the aggregate marks obtained at the Part I, II, & III Examination, taken together

All the rest will be declared to have passed the Examination if they obtain the minimum pass marks in each subjects, viz. 36%No division shall be awarded at the Part-I and Part-II examination.

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CONTENTS

Optional Subjects (Any three of the following subjects to the restriction as mentioned in O. 203-I

1.	English Literature	4-5
2.	Hindi Sahitya	6-8
3.	Urdu	9-10
4.	Persian	11-13
5.	Sanskrit	14-19
6.	Philosophy	20-22
7.	History	23-29
8.	Political Science	30-33
9.	Indian Music	34-39
10.	Public Administration	40-45
11.	Drawing & Painting	46-47
12.	Sociology	48-50
13.	Home Science	51-67
14.	Textile Craft	68-69
15.	Garment Production & Export Management	70-73
16.	Investigative Bio-Technology	74-77
17.	Mathematics	78-81
18.	Economics	82-86
19.	Geography	87-90
20.	Statistics	91-94
21.	Applied Statistics	95-96
22.	Psychology	97-99
23.	Rajasthani	100-101
24.	Sheep & Wool	102-103
25.	Live Stock and Dairying	104-106
26.	Anthropology	107-108
27.	Dramatics	109-110
28.	Physical Education	111-115
29.	Indian Heritage in Rural Handicrafts	116-120
30.	Computer Application	121-122

N.B. : 1. Candidates must Pass separately in each of the paper theory and Practical (wherever prescribed)

2. Common papers in the subjects of Statistics, Mathematics, Economics, Geography and Psychology will be set both in the Faculties of Social Science and Science. The allocation of marks will however be different as mentioned in the booklet of syllabus.

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1. ENGLISH LITERATURE

BA Part III

The Syllabus aims at achieving the following objectives :

1. Interpretation and appreciation of selected texts from the genres of poetry, drama, prose and fiction.
2. Strengthening skills of note making, summarizing and dialogue writing.
3. Understanding texts with specific reference to genres, forms and literary terms.

Paper I: Poetry and Drama

Maximum Marks: 100

Duration: 3 hrs **Min. Pass Marks: 36**

Question No. 1: References to Context from unit A, B & C.

Candidate will be required to explain **four (4)** passages of Reference to Context out of **Eight (8)** of five marks each, with a total of **20 Marks.**

Question No. 2 will also be compulsory. The student will be required to attempt 5 questions out of 10, to be answered in about 5 lines each. Each question will carry 4 marks to a total of **20 marks.**

The other 3 questions will be essay-type questions of **20 marks** each, one from each section with internal choice.

SECTION A

The following poems from *String of Gold* part III edited by Jasbir Jain (Macmillan) :

Tennyson	:	Ulysses
R. Browning	:	My Last Duchess
M. Arnold	:	Dover Beach
G.M. Hopkins	:	The Sea and the Skylark
W.B. Yeats	:	A Prayer for my Daughter
T.S. Eliot	:	Preludes

SECTION B

The following poems from *Texts and Their Worlds* Edited by Anna Kurian. Foundation Books, 2005.

Kalidas, Bhavabhuti, Bhartrahari	:	Is Poetry Always Worthy when its Old?
Syed Amanuddin	:	Don't Call Me Indo-Anglian
R. Parthasarathy	:	From Homecoming
Agyeya	:	Hiroshima

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M. Gopalkrishna Adiga	:	Do Something, Brother
Eunice D Souza	:	Women in Dutch Painting
O.N.V. Kurup	:	Earthen Pots
A. Jayaprabha	:	Stares
Daya Pawar	:	Oh Great Poet
Sitakant Mahapatra	:	The Election

SECTION C

Grish Karnad	:	*Tughlaq*
Eugene O'Neill		*The Hairy Ape*

Paper II: Prose and Fiction

Maximum Marks: 100

Duration: 3 hrs **Min. Pass Marks: 36**

Candidate will be required to answer **five (5)** Essay type Questions of **20 marks** each, choosing at least one question from each section, out of **10** essay type questions.

SECTION A

The following short stories from *Texts and Their Worlds* edited by Anna Kurian.

Foundation Books, 2005 :

Munshi Premchand	:	The Shroud
Intizar Hussain		*A Chronicle of the Peacocks*
Ismat Chugtai	:	Roots
V.M. Basheer	:	Birthday
Shashi Deshpande	:	My Beloved Charioteer
Ambai	:	A Kitchen in the Corner of House

SECTION B

R.K. Narayan	:	*The Guide*
Charlotte Bronte	:	*Jane Eyre*

SECTION C

1. A Short Passage of about 10 simple sentences to be translated from Hindi to English.
2. Editing a short text (Grammaticality, Logicality, Cohesion, Coherence)
3. Critical Analysis of a Prose Piece.
4. Writing a News Report.

Recommended Reading :

Vandana R. Singh. *The Written Word* (O.U.P.)
K.M. Shrivastava: *News Reporting and Editing*. Sterling Publication

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Amitav Ghose	:	*The Hungry Tide*
Aldous Huxley	:	*Brave New World*

SA

SECTION C

1. A Short Passage of about 10 simple sentences to be translated from Hindi to English.
2. Editing a short text (Grammaticality, Logicality, Cohesion, Coherence)
3. Critical Analysis of a Prose Piece.
4. Writing a News Report.

Recommended Reading:

Short Stories *from texts and their worlds* edited by Anna Kurian Foundation Books, 2005

Indian Literature: An Introduction (Pearson)

Vandana R. Singh. *The Written Word* (O.U.P.)

K.M. Shrivastava: *News Reporting and Editing*, Sterling Publication

Dr. Babasahebh Ambedkar: Writings and Speeches, Vol 1, 2014

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5A

बी.ए. ~~(प्रतिवर्ष)~~ तृतीय वर्ष – हिन्दी साहित्य

प्रथम प्रश्न पत्र

आधुनिक काव्य

पूर्णांक 100 उत्तीर्णांक 36

खण्ड – 'अ'

1. **मैथिलीशरण गुप्त**
   साकेत – नवम सर्ग
   1. वेदने तू भी भली बनी ..... पाऊं प्राण धनी
   2. निरखी सखी ये खंजन आये ..... अश्रु सूखा कर लाये
   3. विरह संग अभिसार भी ..... और एक संसार भी
   4. दोनों और प्रेम पलता है ..... मुझे यही खलता है।
   5. आ आ मेरी निंदिया गूंगी..... मैं न्यौछावर हूँ जी
   6. कहती मैं, चातकि फिर बोल ..... उर के कल–कल्लोल।
   7. सखि निरखि नदी की धार ..... आगे नखीं सहागै

   यशोधरा
   1. सखि, वे मुझसे कहकर जाते
   2. अब कठोर हो वज्रादपि ओ कुसुमादपि सुकुमारी
   3. हे मन आज परीक्षा तेरी

2. **जयशंकर प्रसाद**
   कामायनी – चिन्ता सर्ग

3. सूर्यकांत त्रिपाठी निराला
   1. तुलसीदास – प्रथम पांच छंद
   2. दिवसावसान का समय

4. **अज्ञेय**
   1. नदी के द्वीप
   2. आज थमा हिय हारिलमेरा
   3. जो पुल बनाएंगे

5. **धूमिल**
   1. अकाल दर्शन
   2. रोटी और संसद

6. **नागार्जुन**
   1. बादल को घिरते देखा है।
   2. अकाल और उसके बाद

7. **माखनलाल चतुर्वेदी**
   1. पुष्प की अभिलाषा
   2. कैदी और कोकिला

8. **मुक्तिबोध** – ब्रह्मराक्षस

खण्ड – 'ब' खण्डकाव्य

संशय की एक रात – नरेश मेहता

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खण्ड – 'स'

आधुनिक हिन्दी कविता की प्रमुख प्रवृतियाँ – राष्ट्रीय काव्यधारा, छायावाद, प्रगतिवाद, प्रयोगवाद और नई कविता

अंक विभाजन

खण्ड – 'अ' व 'ब' से चार व्याख्याएं (एक कवि से केवल एक व्याख्या) (खण्ड ब से एक व्याख्या अनिवार्य) (विकल्प देय) 4 X 10 = 40 अंक

खण्ड अ व ब से तीन आलोचनात्मक प्रश्न (खण्ड ब से एक प्रश्न अनिवार्य) (विकल्प देय) 3X15=45 अंक

खण्ड – 'स' निर्धारित पाठ्यवस्तु से संबंधित एक प्रश्न (विकल्प देय) 15 अंक

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बी.ए. पास/~~ऑनर्स~~ तृतीय वर्ष हिन्दी साहित्य
द्वितीय प्रश्न पत्र – भाषा, काव्यशास्त्र एवं निबन्ध

पूर्णांक 100 उत्तीर्णांक 36

खण्ड – 'अ' भाषा

1. हिन्दी भाषा का उद्‌भव और विकास
2. देवनागरी लिपि – महत्व, वैज्ञानिकता तथा सुधार
3. राजभाषा के रूप में हिन्दी की स्थिति, समस्याएं तथा समाधान

खण्ड – 'ब' काव्य शास्त्र

1. अलंकार	–	परिभाषा और महत्व अनुप्रास, यमक, श्लेष, उपमा, रूपक, उत्प्रेक्षा, विभावना, अपन्हुति
2. छंद	–	परिभाषा और महत्व दोहा, चौपाई, छप्पय, रोला, मालिनी, शिखरणी, द्रुतविलम्बित, हरिगीतिका
3. रस	–	परिभाषा, रस के अवयव, रस सिद्धान्त और रस के प्रकार
4. गुण	–	माधुर्य, ओज, प्रसाद
5. शब्द शक्ति	–	अभिधा, लक्षणा, व्यंजना

खण्ड – 'स' निबंध

1. सरदार पूर्ण सिंह	–	आचरण की सभ्यता
2. रामचन्द्र शुक्ल	–	लोभ और प्रीति
3. हजारी प्रसाद द्विवेदी	–	भारतीय साहित्य की प्राणशक्ति
4. नंद दुलारे वाजपेयी	–	साहित्य और सामाजिक जीवन
5. रामविलास शर्मा	–	तुलसी के सामंत विरोधी मूल्य
6. विद्यानिवास मिश्र	–	तुम चंदन हम पानी
7. कुबेरनाथ राय	–	उत्तरा फाल्गुनी के आस–पास

अंक विभाजन

खण्ड – अ

निर्धारित पाठ्यवस्तु पर दो प्रश्न (विकल्प देय) 10 x 2 = 20 अंक

खण्ड – ब

एक प्रश्न रस और अलंकार से संबंधित (विकल्प देय) 10 x 1 = 10 अंक

एक प्रश्न – छंद, गुण, शब्द शक्ति से संबंधित (विकल्प देय) 10 x 1 = 10 अंक

खण्ड – स

कुल चार व्याख्याएं – एक निबंध से केवल एक – (विकल्प देय) $7\frac{1}{2}$ x 4 = 30 अंक

दो आलोचनात्मक प्रश्न – एक निबंध से एक प्रश्न (विकल्प देय) 15 x 2 = 30 अंक

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3. URDU

B.A. Part-III

Paper-I (Jadeed Asnafe Adab)

M.M. : 100 3 Hrs. Min. Pass Marks 36

1. Jadeed Nazam
2. Azad Nazam
3. Moarra Nazam
4. Nasri Nazam
5. Perody
6. Report Taaz Nigari
7. Khaka
8. Inshaiya
9. Khutoot Nigari
10. Savaneh Nigari

Division of Marks :

Unit I	Ten short answer type question.	20
Unit II	Question on Nazam Nigari.	20
Unit III	Question on Perody & Report Taaz Nigari.	20
Unit IV	Question on Khaka & Inshaiya	20
Unit V	Question on Khutoot Nigari & Savaneh Nigari	20
		Total 100

Note: Attempt at least one question from each unit. All the short answer type question of unit I are compulsory.

Books Recommended :

1. Jadeed Urdu Nazm Aur Europi Asrat-By Hamidi Kashmiri
2. Urdu Khake Nigari-By Dr. Sabira Sayeed
3. Urdu Inshaiya- By Dr. Mohd. Hasnain
4. Nai Nazm Ka Safar-By Dr. K. Azmi
5. Urdu Inshayye-By Anwar Sadeed
6. Adab Ka Mutaliya-By Dr. Athar Parveez

Paper-II

(History, Essay and Translation)

M.M. : 100 3 Hrs. Duration Min. Pass Marks 36

1. Urdu Adab Ka Aaghaz -o-Irtiqa up to 1957.
2. Fort William College Ki Adabi Khidmat.
3. Sir Syed Tehreek
4. Dabistan-e-Delhi
5. Dabistan-e-Lucknow

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Books Prescribed for translation from Persian to Urdu :

1. Gulha-e-Farsi Published- By Kitabistan, 30 Chak Road, Allahabad.

Division of Marks :

Unit I	Ten Short Answer type question.	20
Unit II	Essay on a literary topic.	20
Unit III	Translation from English, Hindi & Persian into Urdu	20
Unit IV	Urdu Adab Ka Aghaz-o-Irtiqa Dabistan-e-Delhi & Dabistan-e-Lucknow.	20
Unit V	Question on Sir syed Tehreek, Fort William College.	20
		Total 100

Note: Attempt at least one question from each unit. All the short answer type questions of unit I are compulsory.

Books Recommended:

1. Dacani Adab Ki Taeekh by Dr. Zor
2. Urdu Adab Ki Ek Sadi-by Dr. Syed Abdullah
3. Delhi Ka Dabistane Shairi-by Noorul Hasn Hashmi
4. Luknow Ka Dabistane Shairi-by Abdulla Siddiqi
5. Sir Sayed Aur Aligarh Tehreek-by Khaleeq Nizami
6. Fort William College Ki Adabi Khidmat-by Ubeda Begum

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4. PERSIAN

BA Part III

Paper-I : Prose & Poetry

Books prescribed :

1. Nisab-e-Jadeed Farsi Published by Jayyed Press Delhi.

   The following prose section is prescribed :
   Intekab Marzaban Namah - Marzaban Rustam Bin Sharveen

   (i) Dastan Barzeegar Bamar
   (ii) Dastan Ahoo-wa-Moosh-wa-Uqab
   (iii) Dastan Mard Tamaba-Nokhra Nokhara
   (iv) Dastan Ahangar-b-Mard Musafir
   (v) Dastan Bazargan-Ba-Dost Dana
   (vi) Dastan Dehqan-Ba-Pisr-e-Khud

2. Nisab-e-Farsi (Brae-B-A-Sal-e-Suwwum) published by Aligarh Muslim University, Aligarh.

   (i) Tareek-e-Tabri-Derzikr Khaber Padshahi Behrum Gour
   (ii) Chahar Maqala-Nisami Uruzi
   (iii) Chahar Maqla- Firdausi

The following poetry sections are prescribed :

1. Nisab-e-Farsi (Brae-B.A.Sal Suwwum)
   (i) Shahnama Firdausi Bazgasht-n-Ba-Jang-e-Asfandyar
   (ii) Gazliyat
   Farrukhi Yazdi
   Fidae-Sauz-e-Dil
   Pazman
   Maham-Shakista-Khatir
   (iii) Manzoomat-
   Parveen Etasami
   (a) Saped-o-Siyah (b) Asaish-e-Buzargan
2. Nisabe-Jadeed-Farsi published by Jayyed Press, Delhi.
   (i) Rubaiyat-e-Umarkhayyam (21 to 30)
   (ii) Intekabe Masnavi-e-Manavi Jalaluddin Rumi

Raj/Tai

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Hikayat Ashique Shudan .....

Unit-1	(A)Ten short answer type questions based on full paper.	10
	(B) Translation of two prose passages out of three into Urdu	20
Unit-2	Translation of two Poetry Passages out of three into Urdu	20
Unit-3	General Question on Prose Writer	15
Unit-4	General Question on Poetry Writer.	15
Unit-5	Summary of prescribed lessons.	20
	Total	100

Note: Unit-I Both A and B questions are compulsory.

Paper-II : History of Persian Literature & Translation

M.M. : 100 3 hrs. Min. Pass Marks. 36

Books Prescribed :

1. Tarikh-e-Adabiyate-Iran By Raza Zada Shafaq (Urdu Edition/Translated)
2. Tarikh-e-Adabiyate-Iran By Raza Zada Shafaq (Persian Edition)
3. Bar Rasi Adabiyate Imruz-e-Iran By Dr. Mohd. Istallami Published By Mussar-e-Intesharat-e- Amir Kabir, Tehran 2536
4. Shair-ul-Ajm Part I, II, III, IV, V By Shibli Nomani
5. Modern Persian Prose Literature By H. Khan Shad Published By Cambridge University, Press, 1966

Division of Marks :

Questions Based Upon the following Topics :

Unit-1	(A)Ten short answer type questions based on full paper.	10
	(B) Khan Period	20
	(i) Tarikh-e-Jahankusha	
	(ii)Jama-ul-Tarikh	
	(iii)Tarikh-e-Wassaf	
	(iv) Tarikh-e-Gazidah	
Unit-2	Critical Study of the following Writers & Poets of the 14th Century	20
	(i) Rumi	
	(ii)Sadi	
	(iii)Iraqui	
	(iv)Khawaja Nasiruddin Tusi	

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Unit-3	The Timurid Period (i) Hafiz & his contemporaries (ii) Critical Study of Obez Zakaniasa Satarist (iii) Development of Persian Prose Literature During the 15th Century (iv) Jami and His Works The Safawi Period (i)Historical & Political Importance of the Safawi Dynasty (ii)Study of the Poetry of Mohatsham Kashani The Qajar Period (iii) A Detailed Critical Study of Mirza Habeeb Qaani	20
Unit-4	Short Notes on the following Important Histories, Memories & Bigraphics of Qachar Periods (i) Nasikh-u-Tawarikh (ii)Tarikh Muntazim Nasri (iii) Riyazul Arfeen Manmaussafa (iv) Nama-e-Danishwaran	20
Unit-5	Translation of Five Urdu Sentences into Persian	10
	Total	100

Note: Unit-I Both A and B questions are compulsory.

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5. SANSKRIT

BA Part III 2020

सामान्य निर्देश –

1. प्रत्येक परीक्षा में दो–दो प्रश्नपत्र होंगे।
2. प्रत्येक प्रश्नपत्र में न्यूनतम उत्तीर्णांक 36 तथा पूर्णांक 100 होंगे और समय 3 घण्टे का होगा।
3. परीक्षा का माध्यम हिन्दी/अंग्रेजी होगा, परन्तु प्रश्नपत्र केवल हिन्दी में बनाया जायेगा। परीक्षार्थी को छूट होगी कि वह हिन्दी,संस्कृत अथवा अंग्रेजी में किसी एक भाषा में उत्तर दे सके । यदि परीक्षक ने किसी प्रश्न विशेष के लिए भाषा का निर्देश कर दिया है तो उस प्रश्न का उत्तर उसी भाषा में देना अनिवार्य होगा।
4. संस्कृत केवल देवनागरी लिपि में ही लिखा जाना अपेक्षित है।
5. निर्धारित ग्रन्थ में से अनुवाद, व्याख्या, सरलार्थ एवं समालोचनात्मक प्रश्न पूछे जावेंगे।
6. प्रत्येक प्रश्नपत्र में 10 प्रतिशत अंक संस्कृत भाषा में उत्तर के लिये निर्धारित हैं।
7. प्रत्येक प्रश्नपत्र में दो भाग होंगे, जिसमें प्रथम 'अ' भाग लघूत्तरात्मक प्रश्नों का होगा। 'ब' भाग में निबन्धात्मक प्रश्न होंगे। 'अ' भाग में कुल 15 प्रश्न होंगे, जिनका पूर्णांक 30 होगा।

प्रथम प्रश्न–पत्र : भारतीय दर्शन एवं व्याकरण

1. **श्रीमद्भगवद्गीता** – (2,3,4 अध्याय) 30 अंक
2. **तर्कसंग्रह** 30 अंक
3. तिङन्त–लघुसिद्धान्तकौमुदी के आधार पर 'भू', एवं एध् धातु की लट् लोट्, लृट्, लङ् एवं विधिलिङ् इन पांच लकारों में एवं समस्त गणों की प्रथम धातुओं की लट् लकार में रूपसिद्धि एवं सूत्रों की सोदाहरण व्याख्या 40 अंक

कुल योग 100 अंक

अंक– विभाजन

क्र.सं.	पाठ्यवस्तु	'अ' भाग प्रश्न संख्या	अंक	'ब' भाग प्रश्न संख्या	अंक	अंको का योग
1.	श्रीमद्भगवद्गीता	लघूत्तरात्मक 02	04	02	26	04+26=30
2.	तर्कसंग्रह	लघूत्तरात्मक 03	06	02	24	06+24=30
3.	व्याकरण तिङन्त	लघूत्तरात्मक 10	20	02	20	20+20=40
कुल योग		15	30	06	70	100

प्रश्नपत्र निर्माता के लिए निर्देश

1.	श्रीमद्भगवद् गीता	'अ' भाग	2 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	04 अंक

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		'ब' भाग	4 श्लोकों में से 2 की सप्रसंग व्याख्या (एक व्याख्या संस्कृत में) अपेक्षित है।	20 अंक
			2 प्रश्नों में से एक प्रश्न प्रष्टव्य है।	06 अंक
2	तर्कसंग्रह	'अ' भाग	3 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	06 अंक
		'ब' भाग	4 में से 2 की व्याख्या (एक व्याख्या संस्कृत में) अपेक्षित है।	18 अंक
			2 प्रश्नों में से एक प्रश्न प्रष्टव्य है।	06 अंक
3	व्याकरण तिङन्त	'अ' भाग	10 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	20 अंक
		'ब' भाग	10 सूत्र पूछकर किन्हीं 5 की सोदाहरण व्याख्या अपेक्षित है। प्रति व्याख्या 2 अंक निर्धारित।	10 अंक
			10 शब्द सिद्धि पूछकर किन्हीं 5 शब्दों की सूत्र निर्देशपूर्वक सिद्धि। प्रत्येक सिद्धि हेतु 2 अंक	10 अंक
	कुल अंक योग			100 अंक

सहायक पुस्तकें

(क) तर्कसंग्रह – अथल्यं एंव कोडास, पूना
तर्कसंग्रह – चौखम्बा प्रकाशन, वाराणसी
तर्कसंग्रह– डॉ. रामसिंह चौहान, अलंकार प्रकाशन, जयपुर

(ख) गीता
भगवद्गीता– गीताप्रेस, गोरखपुर
भगवद्गीता, विनोद पुस्तक मंदिर, आगरा
गीता रहस्य–तिलक
भगवद्गीता 2,3,4 अध्याय, डॉ. शिवसागर त्रिपाठी
श्रीमद्भगवद्गीता (2,3,4 अध्याय)– व्या. डॉ. राजेन्द्रप्रसाद शर्मा, जगदीश संस्कृत पुस्तकालय, जयपुर

(ग) व्याकरण

1. लघुसिद्धान्त कौमुदी–तिङन्त प्रकरण–डॉ. पुष्कर दत्त शर्मा, अजमेरा बुक कम्पनी, जयपुर
2. लघुसिद्धान्त कौमुदी–पं. श्री हरेकान्त मिश्र, भारतीय विद्या प्रकाशन, दिल्ली
3. पाणिनीय व्याकरण का अनुशीलन आर एस भट्टाचार्य, इंडोलोजिकल बुक हाउस, बनारस
4. लघुसिद्धान्त कौमुदी–हिन्दी व्याख्या, डॉ. अर्कनाथ चौधरी, आयुर्वेद हिन्दी संस्कृत पुस्तक भंडार, जयपुर
5. लघुसिद्धान्त कौमुदी– भीमसेन शास्त्री
6. लघुसिद्धान्त कौमुदी– महेशसिंह कुशवाह, चौखम्बा संस्कृत प्रतिष्ठान दिल्ली।
7. लघुसिद्धान्तकौमुदी–तिङन्त प्रकरण, डॉ.सुभाष वेदालंकार, अलंकार प्रकाशन, जयपुर
8. तर्कसंग्रह– व्याख्याकार डॉ. दयानन्द भार्गव, मोतीलाल बनारसीदास, नई दिल्ली

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द्वितीय प्रश्नपत्र– काव्य, धर्मशास्त्र, एवं निबन्ध

समय : 3घण्टे अंक–100

द्वितीय प्रश्न पत्र के दो भाग होंगे, जिसमें 'अ' भाग बहुविकल्पीय (वस्तुनिष्ठ) एवं लघूत्तर प्रश्नों का होगा। 'ब' भाग में निबन्धात्मक प्रश्न होंगे। 'अ' भाग में कुल 15 प्रश्न होंगे, जिनका पूर्णांक 30 अंकों का होगा। इनके समाधान हेतु एक घण्टा की अवधि निर्धारित की गई है। 'ब' भाग का पूर्णांक 70 अंकों का होगा, जिसके लिये शेष दो घण्टे की अवधि निर्धारित है।

पाठ्यक्रम

1. रघुवंशम् – छठा सर्ग (इंदुमति स्वयंवर) 20 अंक
2. महाभारत (व्यास) –उद्योग पर्व, विदुरनीति (34–35 अध्याय) 20 अंक
3. रामायण (वाल्मीकि) बालकाण्ड, प्रथम सर्ग 20 अंक
4. इन्द्रविजय, नामधेय प्रकरण, पं. मधुसूदन ओझा 20 अंक
5. निबंधरचना –संस्कृत में 20 अंक

कुल योग 100अंक

अंक– विभाजन

क्र.सं.	नाम पुस्तक	लघूत्तरात्मक प्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	अंको का योग
1.	रघुवंशम् छठा सर्ग (इन्दुमति स्वयंवर)	लघूत्तरात्मक 04	08	02	12	8+12=20
2.	महाभारत (विदुरनीति)	लघूत्तरात्मक 04	08	02	12	8+12=20
3.	रामायण (बालकाण्ड–प्रथमसर्ग)	लघूत्तरात्मक 04	08	02	12	8+12=20
4.	इन्द्रविजय	लघूत्तरात्मक 03	06	02	14	6+14=20
5.	निबन्ध रचना संस्कृत में			01	20	20
कुल योग		15	30	09	70	100

प्रश्नपत्र निर्माता के लिए निर्देश

1.	रघुवंश छठा सर्ग (इन्दुमति स्वयंवर)	'अ' भाग	4 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	08 अंक
		'ब' भाग	2 श्लोकों में से 1 की सप्रसंग व्याख्या	06 अंक
			2 प्रश्नों में से एक प्रश्न प्रष्टव्य है।	06 अंक
2	महाभारत विदुर नीति	'अ' भाग	4 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	08 अंक
		'ब' भाग	2 श्लोक पूछकर उनमें से किसी 1 की सप्रसंग व्याख्या	06 अंक
			2 श्लोक पूछकर उनमें से किसी 1 का उत्तर अपेक्षित।	06 अंक

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3	रामायण	'अ' भाग	4 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	08 अंक
		'ब' भाग	2 श्लोक पूछकर उनमें से किसी 1 की सप्रसंग व्याख्या	06 अंक
			2 प्रश्न पूछकर उनमें से किसी 1 का उत्तर अपेक्षित।	06 अंक
4	इन्द्रविजय	'अ' भाग	03 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक	06 अंक
		'ब' भाग	2 श्लोक पूछकर उनमें से किसी 1 की सप्रसंग व्याख्या	06 अंक
			2 प्रश्न पूछकर उनमें से किसी 1 का उत्तर अपेक्षित।	08 अंक
5	निबन्ध	'ब' भाग	4 विषय देकर उनमें से किसी 1 विषय पर संस्कृत में निबन्ध लेखन	20
कुल अंक योग				100 अंक

सहायक पुस्तकें–

रघुवंशम् –

1. 1.रघुवंश –कालिदास, चौखम्बा संस्कृत प्रतिष्ठान, दिल्ली।

महाभारत –विदुर नीति

1. विदुरनीति– डॉ. कृष्णकान्त शुक्ल, साहित्य भंडार, मेरठ।
2. विदुरनीति– श्री रेवतीरमण शास्त्री, यूनिक टेड़र्स जयपुर।

रामायण

1. रामायण–वाल्मीकिकृत – गीताप्रेस, गोरखपुर।
2. रामायण–वाल्मीकिकृत – के. सी. पख, निर्णयसागर प्रेस, मुम्बई।
3. रामायणकालीन भारत– व्यास एवं पाण्डेय, आत्माराम एंड संस, दिल्ली
4. लेक्चर्स ऑन रामायण– मद्रास साहित्य अकादमी, मद्रास।

इन्द्रविजय

1. इन्द्रविजय–व्याख्याकार पं. रामप्रपन्न शर्मा, प्रकाशन जगदीश संस्कृत पुस्तकालय, जयपुर
2. इन्द्रविजय–डॉ. श्रीकृष्ण ओझा, राजप्रकाशन मंदिर, चौड़ा रास्ता, जयपुर

निबन्ध रचना

1. प्रबन्ध रत्नाकर, श्री आर सी शुक्ल
2. प्रस्ताव तरंगिनी–श्रीवासुदेव शास्त्री
3. संस्कृत निबन्धरत्नाकर–शिवप्रसाद भारद्वाज
4. संस्कृत निबन्धकलिका डॉ. रामजी उपाध्याय
5. संस्कृत निबन्धादर्श डॉ. राममूर्ति शर्मा
6. संस्कृत निबन्ध एवं व्याकरण – पं. चण्डीप्रसाद
7. निबन्ध–चन्द्रिका–कृष्णदेव उपाध्याय, चौखम्बा संस्कृत प्रतिष्ठान, दिल्ली
8. निबन्ध–निवेश–रामअवध शास्त्री, चौखम्बा विद्याभवन, वाराणसी
9. निबन्ध शतकम्, कपिलदेव द्विवेदी, चौखम्बा विद्याभवन, वाराणसी
10. निबंधमंजरी, डॉ. राममूर्ति आचार्य आगरा प्रकाशन, दिल्ली
11. निबन्ध आदर्श, म.म. श्री गिरिधर शर्मा चतुर्वेदी, चौखम्बा संस्कृत प्रतिष्ठान, दिल्ली

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12. संस्कृत निबन्ध रचना, डॉ. श्रीकृष्ण ओझा, राज प्रकाशन मंदिर, जयपुर
13. संस्कृत निबंध पारिजात, डॉ. सुभाष वेदालंकार, अलंकार प्रकाशन
14. संस्कृत निबन्ध, डॉ. नन्दकिशोर गौतम एवं श्रीकृष्ण बिहारी भारतीय

अथवा

द्वितीय प्रश्नपत्र 'ब' – भारतीय ज्योतिष, तिथि निर्णय एवं पंचांग परिचय

समय : 3घण्टे अंक–100

इस प्रश्न पत्र के दो भाग होंगे, जिसमें 'अ' भाग बहुविकल्पीय (वस्तुनिष्ठ) एवं लघूत्तर प्रश्नों का होगा। 'ब' भाग में निबन्धात्मक प्रश्न होंगे। 'अ' भाग में कुल 15 प्रश्न होंगे, जिनका पूर्णांक 30 अंकों का होगा। इनके समाधान हेतु एक घण्टा की अवधि निर्धारित की गई है। 'ब' भाग का पूर्णांक 70 अंकों का होगा, जिसके लिये शेष दो घण्टे की अवधि निर्धारित है। 10 अंक संस्कृत भाषा के माध्यम से उत्तर देने के लिए निश्चित है।

पाठ्यक्रम

1– भारतीय ज्योतिष के प्रारम्भिक सिद्धान्तों का परिज्ञान — 70 अंक
(क) शीघ्रबोध (काशीनाथ दैवज्ञ) – प्रथम प्रकरण (लतापातादि दस दोष रहित) — 30 अंक
(ख) फलित प्रबोधिनी (विनोद शास्त्री) — 40 अंक

2– तिथि–निर्णय के सामान्य सिद्धान्त, प्रमुख व्रतपर्व तथा पंचांग का सामान्य परिचय – 30 अंक
काल के छः भेद, वर्ष के पांच भेद, अयन, ऋतु, मास, पक्ष, तिथि, क्षय, वृद्धि संक्रान्ति निर्णय, दानादि, अधिकमास–क्षयमास में वर्ज्यावर्ज्य, मलमास, कर्म के भेद एवं निणर्य, प्रदोषव्रत, जन्माष्टमी, गणेशचतुर्थी, रामनवमी, नवरात्र स्थापना, महालय (श्राद्ध), दीपावली,

होलिका आदि का सामान्य ज्ञान अपेक्षित है। पंचांग परिचय में तिथि, वार, नक्षत्र, वार, योग, करण का ज्ञान तथा पंचांग की सहायता से गुण मिलान, विवाह मुहूर्त निर्णय, गृहारम्भ, ग्रहप्रवेश आदि जानने की रीति का ज्ञान अपेक्षित है।

अंक–विभाजन

क्र. सं.	नाम पुस्तक	लघूत्तरात्मक प्रश्न	अंक	निबन्धात्मक प्रश्न संख्या	अंक	कुल अंक
1	(क) शीघ्रबोध	05 (लघु.)	10	02	21	10+20 =30
	(ख) फलित प्रबोधिनी	04 (लघु.)	08	02	28	08+32 =40
2	तिथि–निर्णय व पंचांग परिचय	06 (लघु.)	12	02	21	12+18 =30
		15	30	06	70	100

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प्रश्नपत्र निर्माता के लिए निर्देश–

1.	भारतीय ज्योतिष (क) शीघ्रबोध	5 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक।	10 अंक
		4 निबन्धात्मक प्रश्न पूछकर 2 प्रश्नों के उत्तर अभीष्ट – प्रति प्रश्न 10 अंक निर्धारित	20 अंक
	(ख)फलित ज्योतिष	4 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक।	08 अंक
		4 निबन्धात्मक प्रश्न पूछकर 2 प्रश्नों के उत्तर अभीष्ट – प्रति प्रश्न 16 अंक निर्धारित	32 अंक
2.	तिथि–निर्णय व पंचांग परिचय	6 लघूत्तरात्मक प्रश्न प्रति प्रश्न 2 अंक।	12 अंक
		4 निबन्धात्मक प्रश्न पूछकर 2 प्रश्न का उत्तर अभीष्ट। (पंचाँग परिचय संस्कृत में)	18 अंक

सहायक पुस्तकें –

1. शीघ्रबोध – पं. काशीनाथ देवज्ञ, चौखम्भा प्रकाशन, वाराणसी
2. फलित प्रबोधिनी–डॉ. विनोद शास्त्री, राजस्थान ज्योतिष परिषद् एवं शोध संस्थान, जयपुर
3. तिथि–निर्णय के प्रमुख सिद्धान्त एवं विशिष्ट तिथि पर्व निर्णय प्रकाशक–राजस्थान ज्योतिष परिषद् एवं शोध संस्थान, त्रिपोलिया, जयपुर
4. पंचांग का सामान्य परिचय, पं. शिवचरण शास्त्री एवं विकास शर्मा, प्रकाशक– राजस्थान ज्योतिष परिषद् एवं शोध संस्थान, त्रिपोलिया, जयपुर
5. विभिन्न प्रकाशित पंचागों की सहायता भी ग्राह्य है, जिसमें जयपुर पंचांग पं. दामोदर शर्मा कृत ग्राह्य है।

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6. PHILOSOPHY

B.A. Part III –

Scheme :

Two Papers	Min. Pass Marks 72	Max. Marks 200
Paper I	3 hrs. duration	Max. Marks 100
Paper II	3 hrs. duration	Max. Marks 100

General Instructions :

(1) The candidates shall opt for any two of the five electives. There shall be two question papers: Paper I and Paper II, corresponding to the electives opted by the candidate.

(2) Both the question papers will be in two parts: Part I & Part II

(3) Part I of the question paper will be of 40 marks in total. This part will consist of twenty compulsory short questions, with 2 marks each. The word limit for these questions shall be upto 50 words. These questions will cover the entire units and there will be no unit wise division of the questions asked in this part.

(4) Part II of the question paper will be of 60 marks and students will required to write detailed answer in the answer sheet only. If syllabus (course contents) of a paper is divided into two units i.e. Unit A and Unit B, then in this part of the question paper six questions will be asked in total: three questions from each unit. Student will be asked to attempt three questions in total and at least one question from each unit. Each question will be of 20 marks. If syllabus (course contents) of a paper is divided into three Units i.e. Unit A, B & C then in the Part II of the question paper, which consist of Essay type questions, six questions will be asked in total: two questions from each Unit. Students will be required to attempt three questions in total and one question from each Unit. The ideal word limit for these questions is 500-600 words.

Paper I: Philosophy of Religion

Unit A:

1. Philosophy of religion: nature and concern, the concept of Dharma.
2. Religion without God, atheism, theism, deism, pantheism.
3. Reason, faith and revelation.
4. Religion and morality.

Unit B:

1. Attributes of God: omniscience, omnipotence, omnipresence, eternity, goodness.
2. Problem of evil.
3. Proofs for the existence of God: Indian and Western.

Unit C:

1. Prayer and bhakti.
2. Immortality of the soul, transmigration and the doctrine of karma.
3. Religious experience: Mysticism.
4. Religious pluralism and the problem of absolute truth.

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6. PHILOSOPHY

B.A. Part III –

Scheme :

Two Papers	Min. Pass Marks 72	Max. Marks 200
Paper I	3 hrs. duration	Max. Marks 100
Paper II	3 hrs. duration	Max. Marks 100

General Instructions :

(1) The candidates shall opt for any two of the five electives. There shall be two question papers: Paper I and Paper II, corresponding to the electives opted by the candidate.

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Paper I: Philosophy of Religion

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3. Religious experience: Mysticism.
4. Religious pluralism and the problem of absolute truth.

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Suggested Readings :

John Hick : *Philosophy of Religion* (Hindi Translation available).
John Hick(Ed) : *Classical and Contemporary Readings in Philosophy of Religion*
Harendra Prasad Sinha : *धर्मदर्शन की रूपरेखा,* मोतीलाल बनारसीदास, नई दिल्ली
Yaqub Masih : *Religious Philosophy* (Hindi edition available)
H.N. Mishra : *धर्मदर्शन का परिचय*
V.P. Verma : *धर्मदर्शन की मूल समस्यायें*
L.N. Sharma : *धर्मदर्शन*

Paper II: Samkhya Yoga

Unit A:

1. Isvarkrsna's *Samkhya Karika* with Vaschaspati Mishra's commentary *Samkhya Tattva Kaumudi.*

Unit B:

1. Patanjali Yoga Sutra, Pada. 1
2. Pada 2
3. Pada 3 (sutras 1 to 3 only)

Books Prescribed:

Isvarkrsna, Samkhya Karika with Vaschaspati Mishra's Commentary Samkhya Tattva Kaumudi (Hindi translation available). Translation into English by Ganga Nath Jha, revised edition by M.M. Patkar, Oriental Series, Pune
Patanjali Yoga Sutra Pradeep, Geeta press,Gorakhapur, U.P. (Hindi translation available) English Trans. by Prasad Ram Chaukhambha, Varan

Paper III: Plato

Prescribed Reading : **The Republic, Plato**

Suggested Readings :

Jowett B. : *The Republic*, Oxford.
Nettleship R.L. : *Lectures on the Republic* of Plato, McMillan.
Dr. Zakir Hussain : *रियासत*
R.S. Bhatnagar : *नागरिकी* (रिपब्लिक का हिन्दी अनुवाद)

Paper IV: Logic (Indian)

Unit: A

1. Theories of inference in Nyaya: definition- constituents- process and types of anumana, Parramarsa, Vyapti, Types of Vyapti & Vyaptigrahopaya, Major Hetvabhasa.

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Unit: B

1. Theories of inference in Buddhism: definition- constituents and types of anumana, Vyapti & types of Vyapti
2. Theories of inference in Jainism: definition- constituents and types of anumana, Vyapti.

Suggested Readings :

Annambhatta	:	*Tarkasangraha*
Dharmakirti	:	*Nyayabindu.*
Yasovijaya	:	*Jaina Tarka Bhasa.*
S.S. Barlingay	:	*A Modern Introduction to Indian Logic.*
B.K. Matilal	:	*Logic, Language and Reality.*
S.K. Maitra	:	*Fundamental Questions of Indian Metaphysics & Logic.*
F.Th. Stchebatsky	:	*Buddhist Logic, Vols. I & II.*
C. Bhattacharyya	:	*Elements of Indian Logic & Epistemology.*
S. Chatterjee	:	*Nyaya Theory of Knowledge.*
R. Prasad	:	*Buddhist Logic.*
K.N. Tiwari	:	*Bhartiya Tarkshastra*, MLBD, New Delhi

Paper V: Socio- Political Philosophy

Section-A

1. Nature of Socio- political Philosophy
2. Social and Political Ideals : Equality, Justice, Liberty.
3. Democracy : Conceptual forms, Major theories and challenges
4. Political Ideologies : Fascism, Capitalism, Marxism and Socialism

Section-B

5. Humanism ; Secularism ; Multiculturalism.
6. Scientific Temper and Development.
7. Feminism : Major streams, Woman Empowerment
8. Caste Discrimination: Gandhi and Ambedkar

Suggested Readings :

R.N. Kaul	:	A Hand book of Social Philospohy
O.P. Gauba	:	Social and Political Philosophy (Pub. Mayur Paperbacks)
O.P. Gauba	:	An Introduction Social Political Philosophy
हृदय नारायण मिश्र	:	समाज दर्शन सैद्धांतिक एवं समस्यात्मक विवेचन
शिवभानु सिंह	:	समाज दर्शन का सर्वेक्षण
के.के. पाठक	:	समाज एवं राजनीतिक दर्शन (राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर)
डॉ. बी एन. सिंह तथा प्रो. उदय शंकर	:	समाज दर्शन एवं राजनीतिक दर्शन (आशा प्रकाशन, इलाहाबाद)

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S. HISTORY

The scheme of examination will be as follows:

Scheme:

Maximum Marks 200		Minimum Pass Marks 72
Paper I	3 hrs. Duration	Marks 100
Paper II	3 hrs. Duration	Marks 100

Note: There shall be two papers in all in the subject of History, and each paper shall be of three hours duration and of 100 marks.

Each paper shall consist of two parts. Part I shall carry 40 marks and shall consist of two compulsory questions. The first compulsory question will be of 20 marks, comprising of 10 very short answer type questions of two marks each. The answer to each question should not exceed 20 words.

The second compulsory question will be of 20 marks. It will comprise of 10 short answer type questions of 04 marks each, the candidate will be required to answer any 05 questions. The answer to each question should not exceed 50 words.

The second part of the question paper shall be divided into three sections comprising of 06 essay type questions, containing 02 questions from each section, of 20 marks each. Candidate will be required to answer 03 questions, selecting one question from each section. This part of the question paper shall be of 60 marks.

परीक्षा योजना

अधिकतम अंक 200		न्यूनतम उत्तीर्णांक 72
प्रथम प्रश्नपत्र	समय 3 घंटे	अंक 100
द्वितीय प्रश्नपत्र	समय 3 घंटे	अंक 100

नोट : इतिहास विषय के कुल दो प्रश्नपत्र होंगे, प्रत्येक प्रश्नपत्र तीन घंटे की अवधि का एवं 100 अंकों का होगा।

प्रत्येक प्रश्नपत्र के दो भाग होंगे। प्रथम भाग 40 अको का होगा एवं इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंकों के प्रथम अनिवार्य प्रश्न में, दो–दो अंक के 10 अनिवार्य अतिलघुउत्तरात्मक प्रश्न होंगे। प्रत्येक उत्तर की शब्द सीमा 20 शब्द।

20 अंकों के द्वितीय अनिवार्य प्रश्न में, चार–चार अंकों के 10 लघुउत्तरात्मक प्रश्न होंगे जिनमें से 05 प्रश्न करने होंगे। प्रत्येक उत्तर की शब्द सीमा 50 शब्द।

प्रश्नपत्र के द्वितीय भाग मे, पाठ्यक्रम के तीन खण्डो में से, प्रत्येक खण्ड से दो–दो प्रश्नों का चयन करते हुए, कुल 06 निबन्धात्मक प्रश्न होंगे। प्रत्येक प्रश्न 20 अंको का होगा। परीक्षार्थियों को प्रत्येक खण्ड मे से कम से कम एक प्रश्न का चयन करते हुए कुल 03 प्रश्न हल करने होंगे। प्रश्नपत्र का यह भाग 60 अंको का होगा।

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PAPER I : HISTORY OF MODERN INDIA (1761 - 1971 A. D)

Section – A

India in the mid-eighteenth century. Maratha confederacy, its strength and weakness – clash with the British and decline of the Marathas. Expansion and consolidation of the British rule – Bengal, Mysore, Awadh, Sind and Punjab – Subsidiary Alliance and Doctrine of Lapse. Establishment of Parliamentary control over East India Company – Regulating Act and Pitt's India Act. Land revenue settlements : permanent, ryotwari and mahalwari. Popular resistance to British rule : outbreak of 1857 – causes, nature and results.

Section – B

British policy after 1858 – development of British Paramountcy. Nature of colonial economy – commercialization of agriculture, decline of cottage industries, drain of wealth and India's poverty. Indian Renaissance, its nature and scope – Socio-religious reform movements – Brahma Samaj, Arya Samaj, Ramkrishna Mission. Indian Freedom Struggle –the first phase : Emergence of Indian Nationalism, Formation of the Indian National Congress – Moderates and Extremists - Gokhale and Tilak. Economic nationalism, Swadeshi Movement. Home Rule Movement. Beginning of Muslim communalism and the Muslim League.

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Section – C

Nationalism under Gandhi's leadership : Gandhi's ideology and methods - Non-cooperation, Civil Disobedience and Quit India Movements. Other strands in the National Movement : Revolutionaries, the Left (Socialists and Communists), Subhash Chandra Bose and the Indian National Army. Peasants', Workers' and Depressed Classes' Movements. Women in the National Movement. The Government of India Acts of 1909, 1919 and 1935. Communal politics and the Partition of India. Pogress and profile of Independent India (1947-1971) : Integration of States. Agrarian reforms, the concept of planned economy and industrialization. Foreign policy of independent India (1947-1971) – non-alignment and Panchsheel.

प्रथम प्रश्नपत्र : आधुनिक भारत का इतिहास (1761–1971 ईस्वी)

खण्ड – क

अठारहवीं शताब्दी के मध्य में भारत। मराठा परिसंघ, इसकी शक्ति एवं दुर्बलता – अंग्रेजों से संघर्ष एवं मराठों का पतन। ब्रिटिश शासन का विस्तार एवं सुदृढ़ीकरण – बंगाल, मैसूर, अवध, सिन्ध एवं पंजाब – सहायक संधियां एवं विलय का सिद्धांत। ईस्ट इंडिया कम्पनी पर संसदीय नियंत्रण की स्थापना – रेग्यूलेटिंग एक्ट एवं पिट्स इंडिया एक्ट। भू–राजस्व बन्दोबस्त : स्थायी, रय्यतवाड़ी एवं महलवाड़ी। ब्रिटिश शासन के प्रति जन प्रतिरोध : 1857 का विप्लव – कारण, प्रकृति एवं परिणाम।

खण्ड – ख

1858 के बाद ब्रिटिश नीति – ब्रिटिश सर्वोपरिता का विकास। औपनिवेशक अर्थव्यवस्था का स्वरूप – कृषि का व्यावसायीकरण, कुटीर उद्योगों का पतन, धन का निष्कासन एवं भारत की निर्धनता। भारतीय पुनर्जागरण : इसकी प्रकृति एवं क्षेत्र – सामाजिक–धार्मिक सुधार आंदोलन – ब्रह्म समाज, आर्य समाज, रामकृष्ण मिशन। भारत का स्वाधीनता संग्राम – प्रथम चरण : भारतीय राष्ट्रवाद का उदय, भारतीय राष्ट्रीय कांग्रेस की स्थापना – नरमपंथी एवं उग्रपंथी – गोखले एवं तिलक। आर्थिक राष्ट्रवाद, स्वदेशी आंदोलन। होम रूल आंदोलन। मुस्लिम सांप्रदायिकता का उदय एवं मुस्लिम लीग।

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खण्ड – ग

गांधी के नेतृत्व में राष्ट्रवाद : गांधी की विचारधारा एवं पद्धतियाँ – असहयोग, सविनय अवज्ञा एवं भारत छोड़ो आंदोलन। राष्ट्रीय आंदोलन की अन्य धाराएं : क्रांतिकारी, वामपंथी (समाजवादी एवं साम्यवादी), सुभाष चंद्र बोस एवं इंडियन नेशनल आर्मी। कृषकों, मजदूरों एवं दलित वर्गों के आंदोलन। राष्ट्रीय आंदोलन में महिलाएं। वर्ष 1909, 1919 एवं 1935 के भारत सरकार अधिनियम। साम्प्रदायिक राजनीति एवं भारत का विभाजन। स्वतंत्र भारत (1947–1971) की प्रगति एवं परिदृश्य : राज्यों का एकीकरण, कृषिपरक सुधार, नियोजित अर्थव्यवस्था की अवधारणा एवं औद्योगिकीकरण। स्वतंत्र भारत की विदेश नीति (1947–1971) – गुट निरपेक्षता एवं पंचशील।

Books Recommended (अनुशंसित पुस्तकें) :

Bisheshwar Prasad	:	*Bondage and Freedom, Vol. I and Vol. II*
C. A. Bayly	:	*Indian Society and the Making of the British Empire*, Cambridge University Press, 1987.
Sumit Sarkar	:	*Modern India, 1885-1947*, Delhi, 1995 (also in Hindi)
Bipan Chandra	:	*Nationalism and Colonialism in Modern India*, Delhi, 1981
A. R. Desai	:	*Peasant Struggles in India*, Delhi, 1979
Kenneth Jones	:	*Social and Religious Reform Movement in Modern India*, New Cambridge History, 1989
Ravindra Kumar (ed.)	:	*Social History of Modern India*, Delhi, 1983
Anil Seal	:	*Emergence of Indian Nationalism*, Cambridge University Press, 1971
Ranjit Guha & Gayatri C. Spivak (ed.)	:	*Selected Subaltern Studies*, Delhi, 1988
J. Krishnamurti (ed.)	:	*Women in Colonial India*, Oxford University Press, 1989
एस. एस. जैन	:	*आधुनिक भारत का इतिहास*
सुमित सरकार	:	*आधुनिक भारत : 1885- 1947* (अनुवाद)
जगन्नाथ प्रसाद मिश्र	:	*आधुनिक भारत का इतिहास*, उत्तरप्रदेश हिन्दी संस्थान, लखनऊ
बिपिन चन्द्र एवं अन्य	:	*भारत का स्वतंत्रता संग्राम*, दिल्ली, 1998
	:	*आजादी के बाद का भारत (1947 2000)*, दिल्ली, 2004
आर.एल. शुक्ल (सं.)	:	*आधुनिक भारत का इतिहास*, हिन्दी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविद्यालय, दिल्ली

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PAPER II : HISTORY OF MODERN WORLD (1500 - 2000 A.D)

Section - A

Renaissance and the beginning of the modern era. Reformation and Counter-Reformation. Economic changes - Feudalism to Capitalism. The American Revolution – causes, nature and consequences. The French Revolution – causes, main events, and impact. Evaluation of Napoleon Bonaparte. Industrial Revolution – causes, processes and impact.

Section – B

Rise of Nationalism in the 19th century. National unification of Germany and Italy. Age of conservatism and Revolutions of 1830 and 1848 in Europe. Growth of Imperialism and Colonialism – exploitation of New World with special reference to countries of Asia and Africa. Eastern question and its complexities for Europe. Nature of European Imperialism in China. Revolution of 1911 in China – principles of Sun-yat-sen. Modernisation of Japan in the 19th century. First World War – causes and consequences. League of Nations.

Section – C

The Russian Revolution of 1917. The Great Economic Depression and Recovery. Fascism in Italy and Nazism in Germany. Second World War. United Nations Organisation – objectives, achievements, limitations. The Chinese Revolution of 1949. Cold War. Emergence of Third World and Non-Alignment. Arab World (Egypt), South-East Asia (Vietnam), Africa – Apartheid to Democracy. Soviet Disintegration and the Unipolar World. Globalisation and its impact.

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द्वितीय प्रश्नपत्र : आधुनिक विश्व का इतिहास (1500–2000 ईस्वी)

खण्ड – क

पुनर्जागरण एवं आधुनिक युग का प्रारंभ। धर्मसुधार आंदोलन एवं प्रति–धर्मसुधार आंदोलन। आर्थिक परिवर्तन – सामंतवाद से पूंजीवाद। अमेरिका की क्रांति – कारण, प्रकृति एवं परिणाम। फ्रांस की क्रांति – कारण, मुख्य घटनाएं एवं प्रभाव। नेपोलियन बोनापार्ट का मूल्यांकन। औद्योगिक क्रांति – कारण, प्रक्रियाएँ एवं प्रभाव।

खण्ड – ख

19वीं शताब्दी में राष्ट्रवाद का उदय। जर्मनी एवं इटली का राष्ट्रीय एकीकरण। रूढ़िवादिता का युग एवं यूरोप में 1830 एवं 1848 की क्रांतियाँ। साम्राज्यवाद एवं उपनिवेशवाद का विकास – नव विश्व का शोषण, एशिया एवं अफ्रीका के देशों के विशेष संदर्भ में। पूर्वी समस्या एवं यूरोप के लिए उसकी जटिलताएँ। चीन में यूरोपीय साम्राज्यवाद की प्रकृति। चीन में 1911 की क्रांति – सन यात सेन के सिद्धांत। 19वीं शताब्दी में जापान का आधुनिकीकरण। प्रथम विश्व युद्ध – कारण एवं परिणाम। राष्ट्रसंघ।

खण्ड – ग

1917 की रूसी क्रांति। आर्थिक मंदी एवं समाधान। इटली में फासीवाद एवं जर्मनी में नाजीवाद। द्वितीय विश्व–युद्ध। संयुक्त राष्ट्र संघ – उद्देश्य, उपलब्धियाँ, सीमाएं। 1949 की चीनी क्रांति। शीत–युद्ध। तृतीय विश्व का अभ्युदय एवं गुट–निरपेक्षता। अरब विश्व (मिस्र), दक्षिण–पूर्व एशिया (हिंगतनाग), अफ्रीका – रंगभेद से लोकतंत्र की ओर। सोवियत विघटन एवं एकध्रुवीय विश्व। भूमण्डलीकरण एवं उसका प्रभाव।

Books Recommended (अनुशंसित पुस्तकें):

A. G. Dickens	:	*The Age of Humanism and Reformation*, New Jersey, 1972
Christopher Hill	:	*From Reformation to Industrial Revolution*, Penguin, 1970
H. B. Parks	:	*The United States of America – A History*, Indian Reprint, Calcutta, 1976
Georges Lefebvre	:	*Coming of the French Revolution*, Princeton, 1989
C. D. Hazen	:	*Modern Europe to 1945*, Indian Reprint, Delhi, 1977
David Thompson	:	*Europe since Napoleon*, Penguin, 1966
George Vernadsky	:	*A History of Russia*, 1961
Harold M. Vinacke	:	*A History of the Far East in Modern Times*, Indian Reprint, Ludhiana

A. J. P. Taylor — *The Origins of the Second World War*

H. A. Davies : *Outline History of the World*, 1968

J. E. Swain : *A History of World Civilisation*, Indian Reprint, New Delhi, 1994

Louis L. Synder : *The Making of Modern Man*, Princeton, 1967

बनारसी प्रसाद सक्सेना : *अमेरिका का इतिहास*, पटना, 1972

सी.डी. हेजन : *आधुनिक यूरोप का इतिहास* (अनुवाद), आगरा

देवेन्द्र सिंह चौहान : *यूरोप का इतिहास (1815–1919)*, भोपाल, 1995

जॉर्ज वर्नादस्की : *रूस का इतिहास* (अनुवाद), भोपाल, 1971

हेराल्ड एम. विनाके : *पूर्व एशिया का आधुनिक इतिहास* (अनुवाद), लखनऊ, 1982

एस.पी. पांथरी : *पूर्व एशिया का संक्षिप्त इतिहास, खण्ड I (19वीं शताब्दी) एवं खण्ड II (20 वीं शताब्दी)*, लखनऊ, 1973 एवं 1974

के.के. कौल : *पश्चिमी एशिया का आधुनिक इतिहास* : 1808–1973, लखनऊ, 1977

पार्थसारथि गुप्ता : *यूरोप का इतिहास*, हिन्दी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविद्यालय, दिल्ली

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8. Political Science

B.A. Part III

प्रश्न–पत्रों की रूपरेखा

राजनीति विज्ञान के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टे की अवधि का होगा तथा प्रश्न–पत्र के अधिकतम 100 अंक होंगे।

प्रत्येक प्रश्न–पत्र के तीन खण्ड होंगे। प्रथम खण्ड 20 अंको का होगा। इस खण्ड में दो अंकों के 10 अनिवार्य प्रश्न होंगे। जिनमें से प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20–25 शब्दों में देना होगा।

द्वितीय खण्ड 20 अंकों का होगा। इस खण्ड में 05 अंकों के 04 अनिवार्य प्रश्न होंगे, जिनमें से प्रत्येक का उत्तर 150 शब्दों में अपेक्षित होगा।

तृतीय खण्ड 60 अंकों का होगा। इस खण्ड में तीन भाग होंगे। जिनमें प्रत्येक में 20 अंको के दो निबंधात्मक प्रश्न होंगे। परीक्षार्थी से प्रत्येक खण्ड में से एक प्रश्न का उत्तर अपेक्षित होगा। प्रत्येक खण्ड से एक प्रश्न का चयन करते हुए कुल 03 प्रश्नों का उत्तर अपेक्षित होगा।

Scheme of Question Papers

There shall be two papers of political Science. Each question paper shall be of three hours duration and of 100 marks.

Each Question Paper shall consist of three Parts. Part I shall carry 20 marks and shall consist of 10 compulsory questions of 2 marks each to be answered in 20-25 words each.

Part II shall carry 20 marks and shall consist of 4 compulsory questions of 5 marks each to be answered in 150 words each.

Part III of the question paper shall carry 60 marks. This part shall be divided into 3 sections each comprising of 2 essay-type questions of 20 marks each. Candidates will be required to attempt one question from each section (3 questions in all, one from each section)

प्रथम प्रश्न–पत्रः प्रतिनिधि पश्चिमी राजनीतिक विचारक

खण्ड 'क'

प्लेटो, अरस्तू व एक्वीनास।

खण्ड 'ख'

मेकियावली, हॉब्स, लॉक व रूसो।

खण्ड 'ग'

बेन्थम, जे. एस मिल, मार्क्स एवं हैराल्ड जे. लास्की।

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अनुशंसित पुस्तके :–

जॉर्ज एच.सेबाइन : ए हिस्ट्री ऑफ पोलिटिकल थ्योरी (हिन्दी व अंग्रेजी)
सी एल वेपर : पोलिटिकल थॉट
जे.पी.सूद : वेस्टर्न पोलिटिकल थॉट
फॉस्टर : मास्टर्स ऑफ पोलिटिकल थॉट
डनिंग : हिस्ट्री ऑफ पोलिटिकल थॉट
पी.डी शर्मा : राजनीतिक विचारक
पुखराज जैन : कतिपय प्रमुख राजनीतिक विचारक
डनिंग : ए हिस्ट्री ऑफ पोलिटिकल थ्योरीज
एफ. डब्लू. कोकर : रीसेन्ट पोलिटिकल थॉट

Paper I : Representative Western Political Thinkers

Section-A

Plato, Aristotle and Aquinas.

Section-B

Machiavelli, Hobbes, Locke, and Rousseau.

Section-C

Bentham, J.S. Mill, Karl Marx and Harold J. Laski.

Books recommended :

A. Hacker : Political Theory
G.H. Sabine : History of Political Theory
C.L. Wayper : Political Thought
Foster : Master of Political Thought Vol. I
Jones : Master of Political Thought Vol. II
Lancaster : Master of Political Thought Vol. III
Chaddha : Pramukh Rajnitik Vicharak (Adarsh Prakashan)
P.D. Sharma : Pratinidhi Rajnitik Vicharak
Pukh Raj Jain : Katipay Pramukh Rajnitik Vicharak

द्वितीय प्रश्न– पत्रः द्वितीय विश्वयुद्धोत्तर अन्तर्राष्ट्रीय संबंध एवं भारतीय विदेश नीति

खण्ड 'क'

द्वितीय विश्वयुद्धोत्तर अन्तर्राष्ट्रीय प्रवृतियाँ, शीत युद्ध, एवं इसके विभिन्न चरण, संयुक्त राष्ट्र संघः संगठन, कार्यप्रणाली एंव भूमिका, संयुक्त राज्य अमेरिका व तृतीय विश्व, साम्यवादी खेमे का विघटन, यूरोप का पुनर्गठन।

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खण्ड 'ख'

भारत की विदेश नीतिः निर्धारक तत्त्व, भारत एवं संयुक्त राष्ट्र, गुट निरपेक्ष आंदोलन एवं वर्तमान में प्रासंगिकता, पूर्व की और देखो नीति, भारत के पडौसी देश एवं प्रमुख शक्तियों (अमेरिका, रूस, चीन) के साथ सम्बन्ध, समसामयिक बहुध्रुवीय विश्व में भारत।

खण्ड 'ग'

अन्तर्राष्ट्रीय राजनीति में सम–सामयिक प्रवृतियाँ व मुद्दे, पश्चिमी एशिया की राजनीति, नवीन विश्व अर्थव्यवस्था, क्षेत्रीय सहयोग संगठनः आसियान (दक्षिण–पूर्वी एशियाई राष्ट्र संगठन) एवं सार्क (दक्षिण एशियाई क्षेत्रीय सहयोग संगठन)ब्रिक्स, इब्सा, संयुक्त राष्ट्र में सुधार की मांग एवं संयुक्त राष्ट्र में भारत की स्थायी सदस्यता, समसामयिक बैश्विक मुद्देः मानव अधिकार, पर्यावरणीय मुद्दे, लैंगिक न्याय, आंतकवाद, परमाणु प्रसार।

अनुशंसित पुस्तके :

ब्लेक एण्ड थॉमसन : फारेन पॉलिसी

जॉरडन कॉनेल स्मिथ : पेन्टर्स परसेप्शन ऑव दी डवलपिंग सिंस 1982।

डैनियन एस.पप : सोवियत परसेप्शन ऑव दी डवलपिंग वर्ल्ड इन 1980।

डॉ मथुरालाल शर्मा : अन्तर्राष्ट्रीय सम्बन्ध 1945 से अब तक।

महेन्द्र कुमार : अन्तर्राष्ट्रीय राजनीति के सैद्धांतिक पक्ष (हिन्दी व अग्रेंजी)

पी.के.चड्डा : अन्तर्राष्ट्रीय सम्बन्ध (आदर्श प्रकाशन, चौडा रास्ता जयपुर)

बाबूलाल फाडिया : अन्तर्राष्ट्रीय सम्बन्ध

पुखराज जैन : अन्तर्राष्ट्रीय सम्बन्ध

दीनानाथ वर्मा : अन्तर्राष्ट्रीय सम्बन्ध

एस.एम. धर : इंटरनेशनल पॉलिटिक्स सिंस 1949

हरिदत्त वेदालंकार : इंटरनेशनल पॉलिटिक्स

Paper II : International Relations since World War –II and Indian Foreign Policy

Section-A

Post War International Development: Cold War & its different Phases, U.N.O : Organization, Working and role, U.S.A and Third World, Collapse of Communist Block, Reorganisation of Europe.

Section-B

Indian Foreign Policy : Determinants of Foreign Policy, India and UN, NAM and its relevance in Contemporary World, India's Look East Policy, India's relations with neighbourhood & with major powers (U.S.A., Russia and China), India in Contemporary multi-polar world.

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Section-C

Contemporary Trends and Issues in International Politics, Politics of West Asia, New International Economic Order, Associations of Regional Co-operation in Asia: ASEAN, SAARC, BRICS, IBSA, Demand for reform in UN & India for permanent seat of UN, Contemporary Global Issues : Human Rights, Environmental Issues, Gender Justice, Terrorism, Nuclear Proliferation.

Books recommended:

Black & Thomas Foreign Policy

Jorden Connel Smith : Patterns of the post World War 1982

S.M. Dhar: International Problem & World Politics since 1949

Denil S. Papp : Soviet Perception of the Developing world in 1980

Haridutt Vedleanker : International Politics

Dr. Mathuralal Sharma : International Relation (since 1945)

Dinanath Verma : Antar Rashtriya Sambandha

Mahendra Kumar : Theoretical Aspects of International Politics

P.K Chaddha : Antar Rashtriya Sambandh (Adarsh Prakashan Choura Rasta, Jaipur)

Palmer and Perkins : International Relation

Hans Morgenthau : Politics among Nation

Babulal Fadiya : Antar Rashtriya Sambandh

Pukhraj Jain : Antar Rashtriya Sambandh

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B.A. PART -III
INDIAN MUSIC (VOCAL)

B.A. PART -III

Paper - I	**3 hrs.duration**	**Max.Marks 40**	**Min. Marks 15**
Paper – II	**3 hrs. duration**	**Max.Marks 40**	**Min. Marks 15**
Practical	**1 hr. per candidate**	**Max. Marks120**	**Min. Marks 43**

Teaching Hours

Practical

6 Hours Per Week

Theory

Paper -I	2 Hours Per Week
Paper -II	2 Hours Per Week

Total Teaching Hours for practical – 06, Theory-04 Hours Per Week

Note :The paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

- Candidates have to pass separately in each of the paper Theory and Practical wherever prescribed.

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Important

B.A. Part -III Examination
(under 10+2+3 Pattern)

The number of papers and maximum marks for each paper altogether with the minimum marks required for passing are shown in the Scheme of Examination on against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of this subject/ paper, wherever prescribed, separately. Gradation of successful candidate shall be as follows:

First division	60%	of the aggregate marks obtained in Pt.I., Pt-II and Pt. III Examinations taken together.
Second division	48%	

Rest of the candidates will be declared as passed. Minimum pass percentage is 36% No division shall be awarded at the Pt. I and Pt. II Examination.

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Theory:-

Paper I

Principles of Indian Music (Vocal)
Common with Instrumental

Section –A

Paper: I **3 hrs. duration**
Max. Marks-40 Min. Marks-15

(1) Brief study of Rag and Ras.
(2) Comparative study of different Gharanas of Khayal and Sitar
(3) Music & Religion.

Section –B

(1) Life sketches and contribution of the following musicians- Ustad Bismillah Khan, Ali Akbar Khan, Pt. Ravi Shankar, Abdul Kareem Khan, Bhimsen Joshi, KishoriAmonkar, Bade Gulam Ali Khan and Amjad Ali Khan.
(2) Folk instruments of Rajasthan.
(3) Forms of Hindustani Music.
(4) Forms of Karnataka Music

Section –C

(1) Notation writing of different compositions in prescribed Ragas.
(2) Writing of Alaps and Todas in different Ragas.
(3) Recognition of Ragas from given notes.
(4) Writing of Thekason hand palm with different layakaries such asDugun, Tigun, Chaugun and Chhagun in the following Talas- Tilawada, Dhamar, Trital, Jhaptal, Ektal, Chautal, Punjabi, Sooltal, Jhoomra, Adachautal, Tivra, Deepchandi.

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Theory:-

Paper – II
History of Indian Music (Vocal)
Common with Instrumental

Paper: II **3 hrs. Duration**

Max. Marks-40 Min. Marks-15

Note : The paper will contain five questions, having three questions in each section. Candidates are required to attempt five questions in all selecting atleast one question from each section.

Section –A

(1) Origin of Music.
(2) Study of the works of Bharat,Matang, Sharangdev, VishnuDigamberPaluskar and Vishnu Narayan Bhatkhande.
(3) Types of western Scales Diatonic, Chromatic, Equally tempered.

Section –B

(1) General ideas of the forms of Vedic music.
(2) General ideas of Giti and Vani.
(3) Impact of Folk music on classical music Vice-versa.

Section –C

(1) General ideas of Rabindra Sangeet.
(2) General idea of Harmony and melody.
(3) Essay on General music interest.

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Practical (Vocal)

There shall be one practical paper (conducted by two different Examiners : External and Internal)

(Non-collegiate candidates will have to attend a practical course of forty eight hours at university allotted centres)

Presentation of Ragas & Viva-voce

Duration of Exam.: 1 hourper candidate

Max. Marks-120 Min. Marks-43

Critical and Comparative study of Ragas & Tala according to syllabus.

Detailed Course:

1. To sing given musical piece of notes to recognize the ragas.
2. Knowledge of comparative description of Ragas prescribed in syllabus.
3. To know verbly the "Bol" with Dugun, Tigun and chaugun on hand palm to recognize the following talas when played on tabla-Dhamar, Tilwara, Ektal,Chautal, Rupak, Punjabi, Sooltal, Jhumra, Adachautal, Tivra and Deepchandi.
4. Tosing Aroh, Avroh, Pakad and Swar-Vistar of the following ragas- Todi, Puriya-Dhanashree, Jaunpuri, DarbariKanhada, Bihag, Multani, Kafi, Adana, Marwa, Puriya, Kamod and Chhayanat.
5. With the accompaniment of Tabla to sing VilambitKhyaland DrutKhyal with sufficient varieties of Tanas in the following Ragas in the following Four ragas: (i) Todi (ii) Bihag (iii) Jaunpuri (iv) Darbari-Kanhada.
6. To the accompaniment of Tabla to sing DrutKhyalwith Tanas in any six ragas of the following-

(i) Kamod (ii) Multani (iii) Kafi (iv) Adana (v) Marwa
(vi) Puriya (vii) Chhayanat (viii) Puriya dhanashri.

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7. With the accompaniment of Tabla to sing one Dhruvpad and One Dhamar in any two Ragas and to play two compositions composed in other than Trital with Todas in anyragasfrom clause six bus not selected under clause fifth.
8. To sing a Bhajanin any Ragas from syllabus.

→ ***Educational Trip***

Books Recommended :

(1) Kramik Pustak Malika parts 2,3 and 4 Pt.V.N. Bhatkhande.
(2) Tan Malika parts 2 & 3 by Raja Bhaiya Poochwale,
(3) Tan Sangrah by S.N. Ratanjankar.
(4) Sitar Marg by S.Bandopadhyaya.
(5) Sitar Shiksha by B.N. Bhatt.
(6) Sitar Parts 1 to 3 by B.N. Bhimpure.
(7) Rag Vigyan by N.V. Patwardhan.
(8) A Short survey of the Music of the Northern India by Pt. V.N. Bhatkhande.
(9) संगीत के जीवन पृष्ठ by S.Rai.
(10) Vadya Shastra by Shri Harish Chandra Srivastava.
(11) Hamare Sangeet Ratnaby Sangeet Karyalaya, Hathras.
(12) Sangeet Visharad by Basant.
(13) Sangeet Kaumudi by V.Nigam.
(14) Hindustani Music-its physics and Aesthetics by G.S. Ranade.
(15) Origin of Ragas – Bandopadhyaya.
(16) Bhartiya Sangeet ka Itihas-Umesh Joshi.
(17) The Music of India by H.A. Popely.
(18) Hindustani Sangeet Paddhati 1 to 4 by Pt. Bhatkhande
(19) Pranav Bharti by Omkar Nath Thakur.
(20) Karanataka Music-Ramchandran.
(21) South Indian Music by Sambamurti.
(22) Sangeet Mani Part-I,II- Maharani Sharma
(23) SangeetSwarit- Ramakantdivedi

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16 - Public Administration

Scheme :	Max. Marks	Mini. Marks	Time
Two Papers			
Paper-I	100	36	3 Hours
Paper-II	100	36	3 Hours

Note : Each paper shall consist of two parts.

Part-I would consist of 10 compulsory short answer questions of 4 marks each to be answered in 50 words. Total Marks : 40

Part-II divided in three sections : each section contains 2 descriptive type questions of 20 marks each. The candidates are required to attempt three questions selecting one question from each section. Total Marks : 60

Paper - I : Comparative Administrative Systems

Section - A

Meaning, Nature, Scope and Significance of Comparative Public Administration

Structural Functional, Ecological and Developmental Approaches to the Study of Comparative Administration.

Salient Features and Evaluation of [illegible]

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Section - B

Parliamentary System in UK, Presidential System in USA and Presidentialist System in France. Salient Features of Administrative Systems of UK, USA, France and Nepal with particular Reference to Central Administration and Nature and Role of Civil Service

Section - C

British Home Office, Cabinet Secretariat in Great Britain, Independent Regulatory Commission in USA. The Office of Governor in the USA . Freuch Council of State, Swedish Ombudsman, British Treasury

Core Readings :

1 Ferrel Heady - Public Administration : A Comparative Perspective.
2. Ogg & Zink : Modern Foreign Government.
3 V.D Mahajan - Modern Select Governments
4 Vishnu Bhagwan and Vidya Bhushan - World Constitutions.
5 रवीन्द्र शर्मा : तुलनात्मक प्रशासनिक व्यवस्थाएँ
6 सी.बी गेना - तुलनात्मक राजनीति
7 Gavin Drewry and Tony Butcher - The Civil Service Today
8 U S Government Manual.
9 S.R. Maheshwari : Higher Civil Service in France
10 एस. फडिया : विश्व के प्रमुख संविधान।
11. सुरेन्द्र कटारिया : तुलनात्मक प्रशासनिक व्यवस्थाएँ

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प्रश्न-पत्र I : तुलनात्मक प्रशासनिक व्यवस्थाएँ

भाग-अ

तुलनात्मक लोक प्रशासन का अर्थ, प्रकृति, क्षेत्र व महत्त्व, तुलनात्मक लोक प्रशासन, अध्ययन के उपागम : संरचनात्मक-प्रकार्यात्मक, पारिस्थितिकीय, विकासात्मक उपागम। चीन, फ्रांस, संयुक्त राज्य अमेरिका तथा ग्रेट ब्रिटेन के संविधानों के प्रमुख लक्षण।

भाग-ब

ग्रेट ब्रिटेन में संसदीय व्यवस्था, संयुक्त राज्य अमेरिका में अध्यक्षीय व्यवस्था, फांस में अध्यक्षीय व्यवस्था।

ग्रेट ब्रिटेन, संयुक्त राज्य अमेरिका, फ्रांस व नेपाल की प्रशासनिक व्यवस्थाओं की प्रमुख विशेषताएँ, केन्द्रीय प्रशासन तथा लोक सेवाओं की प्रकृति एवं भूमिका के विशेष संदर्भ में।

भाग-स

ब्रिटिश गृह विभाग, ग्रेट ब्रिटेन में मंत्रिमण्डल सचिवालय, संयुक्त राज्य अमेरिका में स्वतंत्र नियामकीय आयोग, संयुक्त राज्य अमेरिका में गवर्नर का पद, फ्रांस में राज-परिषद्, स्वीडन का ओम्बुड्समैन, ब्रिटिश राजकोष।

Core Readings :

1 Ferrel Heady : Public Administration A Comparative Perspective.
2. Ogg & Zink : Modern Foreign Government.
3 V.D. Mahajan : Modern Select Governments.
4 Vishnu Bhagwan and Vidya Bhushan : World Constitutions.
5. रवीन्द्र शर्मा : तुलनात्मक प्रशासनिक व्यवस्थाएँ
6. सी.बी गेना : तुलनात्मक राजनीति
7. Gavin Drewry and Tony Butcher : The Civil Service Today.
8 U.S. Government Manual.
9. S.R. Maheshwari : Higher Civil Service in France.
10. बी.एल. फडिया : विश्व के प्रमुख संविधान।
11. सुरेन्द्र कठारिया : तुलनात्मक प्रशासनिक व्यवस्थाएँ

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Paper-II : Local Administration

Scheme	Min. Pass Marks 72	Max. Marks . 200
Paper-I	3 hrs. Duration	100 Marks
Paper-II	3 hrs. Duration	100 Marks

Section - A

Meaning, Nature, and Significance of Local-self Government in Modern State, Evolution of Local-self Government during the Ancient, Medieval and Modern India

The Organisational Structure of Urban, Local-self Government in India, Composition, Functions Powers and Role of various kinds of Local-bodies. Local Administration of the Metropolitan Cities, Municipal Corporations and their Problems of Autonomy and Accountability.

Section - B

Theory and Practice of Democratic Decentralisation in India with special reference to 73rd Constitution Amendment, Panchayati Raj Institution, Zila Parisad, Panchayat Samiti, Gram Panchayats and Gram Sabha : their Organisation and Functions. Personnel Administration for Rural & Urban Governments. Problem of Recruitment, Classification, Promotion. Training and Service Condition of Local Officials.

Section - C

Financial Administration of Local Bodies in India. Strengthening of Local Resources.

State Control over Local Bodies, Urban and Rural Mechanism of control over Local Bodies at State Level The Role of Directorate

Raj Laws

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of Local Bodies and Gramin Vikas & Panchayati Raj Department

Books Recommended :

1. R. Argel : Municipal Government in India
2. S.R. Maheswari Local Government in India.
3. M.V. Mathur : Panchayati Raj in Rajasthan.
4. R L. Khanna Municipal Government and Administration in India.
5. S.K. Bhogle : Local Government in India.
6. डॉ. एच.सी. शर्मा : भारत में स्थानीय प्रशासन।

Subsidiary Readings :

1. S.C. Jain : Community Development and Panchayati Raj
2. Govt. of Rajasthan : Sadiq Ali Report, 1964.
3. Govt. of Rajasthan : Rajasthan Municipalities Act, 1964
4. Rajasthan Panchayat Raj Act, 1994.
5. Govt. of India : Diwakar Committee Report, 1963.
6. Balwant Rai Mehta : Committee Report, 1957

Journals :

1. Nagarlok, Delhi
2. Journal of Local Self Government, Bombay.
3. Kurukshetra.

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प्रश्न-पत्र II : स्थानीय प्रशासन

भाग-अ

आधुनिक राज्य में स्थानीय स्वशासन का अर्थ, प्रकृति तथा महत्त्व। प्राचीन, मध्यकाल तथा आधुनिक भारत में स्थानीय स्वशासन का विकास, भारत में नगरीय स्थानीय स्वशासन का संगठनात्मक ढांचा, विभिन्न प्रकार के स्थानीय निकायों के कार्य, शक्तियां तथा भूमिका। महानगरों का स्थानीय प्रशासन : नगर निगम तथा उनकी स्वायत्तता एवं जवाब देयता की समस्याएँ।

भाग-ब

भारत में लोकतांत्रिक विकेन्द्रीकरण का सिद्धान्त तथा व्यवहार, 73वें संविधान संशोधन के विशेष संदर्भ में पंचायती राज्य संस्थाएँ : जिला परिषद् पंचायत समिति, ग्राम पंचायत तथा ग्राम सभा का संगठन तथा कार्य।

ग्रामीण तथा नगरीय सरकारों में सेवीवर्गीय प्रशासन, स्थानीय निकायों में भर्ती, वर्गीकरण, पदोन्नति, प्रशिक्षण तथा सेवा शर्तों की समस्याएँ।

भाग-स

भारत में स्थानीय निकायों का वित्तीय प्रशासन, स्थानीय संसाधनों का सुदृढ़ीकरण। स्थानीय निकायों पर राज्य-नियंत्रण, राज्य स्तर पर स्थानीय निकायों (ग्रामीण व नगरीय) पर नियंत्रण की प्रणाली, स्थानीय निकाय, निदेशालय तथा ग्रामीण विकास एवं पंचायती राज विभाग की भूमिका।

अनुशंसित पुस्तकें :

1. आर.आर. अंरगल : म्यूनिसिपल गवर्नमेन्ट इन इण्डिया
2. एस.आर. माहेश्वरी : भारत में स्थानीय प्रशासन
3. एम.बी. पाथुर : पंचायती राज इन राजस्थान
4. आर एल. खन्ना : म्यूनिसिपल गवर्नमेन्ट एण्ड एडमिनिस्ट्रेशन इन इण्डिया
5. एस.के भोगले : लोकल गवर्नमेंट इन इण्डिया
6. डॉ एच.सी. शर्मा : भारत में स्थानीय प्रशासन

सहायक पठन सामग्री :

1. एस.सी जैन : कम्यूनिटी डवलपमेंट एण्ड पंचायती राज
2. गवर्नमेंट ऑफ राजस्थान : सादिक अली रिपोर्ट, 1964
3. गवर्नमेंट ऑफ राजस्थान : राजस्थान म्यूनिसिपलिटिज एक्ट, 1959 संशोधित
4. दिवाकर कमेटी रिपोर्ट, 1963
5. राजस्थान सरकार : राजस्थान पंचायती राज अधिनियम, 1994
6. बलवन्त राय मेहता कमेटी रिपोर्ट, 1957
7. सादिक अली कमेटी रिपोर्ट, 1964

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B.A. Part – III
DRAWING & PAINTING

SCHEME :

Theory Paper I	Duration	M.M.	Min. Pass Marks
Post Independence Artists of India	3 hrs.	60	21
Paper II-Practical Paper I			
Study from Life	5 hrs.	60	22
Paper III-Practical Paper II			
Pictorial Composition	5 hrs.	60	22
Submission of Practical Works		20	07
	Total	**200**	**72**

Paper I : Post Independence Artists of India

Note : The paper consist of three parts :-
Part –I: Carries 10 marks and consist of 10 short type questions of 1 mark each.
Part –II: Carries 20 marks and consist of 4 compulsory questions of 5 marks each to be answered in 100 words each.
Part –III: Carries 30 marks divided into three sections 3 questions of 10 marks each with internal choice. Candidates are required to attempt three questions selecting one question from each section. Each answer should be limited in 700-800 words.

Section – A

M.F. Hussian, S.H. Raza, F.N. Souza, K.H. Ara, N.S. Bendre, K.K. Hebbar, Tayab Mehta, Satish Gujral, K.G. Subramanyam, J. Swaminathan, Ram Kumar, Vikas Bhattacharya, Vivan Sundram

Section – B

Indian Sculptors – D.P. Roy Choudhary, Shankhoo Choudhary, Ram Kinkar Baij, Dhanraj Bhagat, Somnath Hore, Mrinalini Mukherjee, Himmat Shah.

Section – C

Rajasthani Painters and Sculptors - Ram Gopal Vijayvargiya, Kripal Singh Shekhawat, P.N. Choyal, Ram Jaiswal, Usha Rani Hooja, Bhoor Singh Shekhawat.

Books Recommended:

1. Art of India (Feeling and Form) - Ajit Mukarjee
2. आधुनिक चित्रकला की पृष्ठभूमि – जी.के. अग्रवाल
3. भारतीय चित्रकला के आधार स्तम्भ – प्रेमचन्द गोस्वामी
4. भारत की समकालीन कला – प्राणनाथ मागो, नेशनल बुक ट्रस्ट इण्डिया, नई दिल्ली, 2006
5. आधुनिक कला कोश – विनोद भारद्वाज, वाणी प्रकाशन, नई दिल्ली, 2006
6. आधुनिक चित्रकला का इतिहास – आर.वी. सांखलकर, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।
7. समकालीन कला – अशोक
8. कला विलास – आर.ए. अग्रवाल, डी.एस.ए. बुक्स इंटरनेशनल, मेरठ, 2015

Paper- II (Practical Paper –I) : Study from Life

Medium – Pencil/Charcoal/Soft Pencil — Size ½ Imperial
Duration : 5 hrs. — Max. Marks : 60
Study from life (full figure) showing broad masses of light and shade, clearly bringing out the modelling of the figure and drapery.

Books Recommended :

1. Anatomy and Drawing by Victor Perard, Publisher J.V. Navlakhi, Bombay.
2. Human figure by Vanderpol, Publisher J.V. Navlakhi, Bomb...

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Note : Life Model will sit in front of the candidate for five hours with a rest of 10 minutes when required by the model. Option to arrange a female model should also be given if the Centre Superintendent can arrange one or Life model male could wear a turban or cap. Strictness about the quality of model should be avoided. Emphasis will be given on correct drawing.

Paper- III (Practical Paper –II) : Pictorial Composition

Pictorial Composition based on human figures, should be rendered with emphasis on stylization, colour scheme and textures etc.

Medium – Acrylic, Tempera, Oil, Pastel etc. Size ½ Imperial
Duration : 5 hrs. Max. Marks : 60

Composition should be based on any subject related to life. Its important events and the world around us. Styles of composition could be stylised, traditional or modern. Subjects from life (indoor and outdoor) like workers, travellers, farmers and group meetings, festivals etc.

Submission of Practical work : Max. Marks : 20
Min. Pass Marks : 7

(a) Five plates from Life.
(b) Five Plates form Composition.
(c) A Sketch book of not less than 50 sketches

Instruction for submission :

Note : Submission work will be submitted to the Head of the Department of Drawing and Painting of the College fifteen days before the commencement of examination. The marks in the submission will be awarded by the subject teacher (internal). However, the external examiner shall be empowered to review the work of the submission in case there is a drastic difference between the marks of the examination and submission. Submission work will be retained till the declaration of the result and returned to the Candidate from the Department thereafter. If no claim is made within two months of the declaration of the result, the submission will be destroyed.

Note:

(a) Candidate should pass in theory as well as in practical paper separately.
(b) There should be minimum 12 hours for the regular study including two hours for sketching.
(c) Minimum three demonstrations should be arranged by the subject expert during the session for each practical paper.
(d) The Department should also arrange for an Educational tour to Ancient Art centres like Ajanta, Ellora, Elephanta, Khujraho, Mahabalipuram etc. once a year.
(e) Practical examination will be conducted at the centres and the practical work will be examined by external examiner. The examiner will examine the answer books in consultation with and internal examiner who is the subject teacher of the Department of Drawing and Painting. University may centralize the practical examinations at few well equipped Departments to hold examination economically.

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12. SOCIOLOGY

B.A. Part III –

Scheme :

Min. Pass Marks 72		Max. Marks 200
Paper-I	3 hrs. duration	Marks 100
Paper-II	3 hrs. duration	Marks 100

नोट : समाजशास्त्र के दो प्रश्न–पत्र होंगे। प्रत्येक प्रश्न–पत्र 3 घण्टों में विभाजित होगा। प्रत्येक प्रश्न–पत्र के दो भाग होंगे। प्रथम भाग 40 अंको का होगा। इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंको के एक प्रश्न में, एक–एक अंक के 20 लघु प्रश्न होंगे तथा प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20 शब्दों में देना होगा। दूसरे अनिवार्य प्रश्न के अंतर्गत दो–दो अंको के 10 प्रश्न होंगे। प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 40 शब्दों में देना होगा। निर्धारित शब्द सीमा से अधिक शब्दों में उत्तर देने पर अंक काटे जा सकेंगे। प्रश्न–पत्र के लिए निर्धारित कुल 3 घण्टों की अवधि में से अधिकतम 1 घंटे की अवधि प्रश्न–पत्र के इस भाग के लिए निर्धारित होगी।

प्रश्न–पत्र के इस प्रथम भाग के दोनों प्रश्न, 3 घण्टों में विभाजित पाठ्यक्रम के तीनों खण्डों से संबंधित होंगे। अर्थात् प्रश्न–पत्र के इस भाग में पूरे पाठ्यक्रम से संबंधित प्रश्न होंगे।

प्रश्न–पत्र के द्वितीय भाग में, पाठ्यक्रम के तीनों खण्डों में से प्रत्येक में से दो–दो निबन्धात्मक प्रकृति के प्रश्न होंगे। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए, कुल 3 प्रश्न हल करने होंगे। प्रत्येक प्रश्न 20 अंकों का होगा। प्रश्न–पत्र का यह भाग 60 अंको का होगा।

Note: There shall be two papers in all, and each paper shall be of three hours duration and of 100 marks. Each paper shall consist of two parts. Part I shall carry 40 marks. There shall be 2 questions in Part-I, first question will consist of 20 short questions of 1 mark each, carrying a word limit of 20 works. The second question will consist of 10 questions of 2 marks each, carrying a word limit of 40 words. Marks may be deducted if the word limit is exceeded. This part of the question paper will be given maximum one hour duration and shall relate to all the three sections covering thereby the entire course.

Part-II of the question paper shall be divided into three sections comprising 6 essay type questions of 20 marks each. Candidates will be required to attempt 3 questions selecting one question from each section. This part of the question paper shall be of 60 marks.

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Paper I: Sociological Thought

Max Marks: 100

Unit I: Classical Sociological Tradition

- Karl Marx: Dialectical Materialism, Class struggle
- Emile Durkheim: Mechanical and Organic Solidarity, Social Fact
- Max Weber: Social Action, Types of Authority

Unit II: Contemporary Sociological Tradition

- Jurgen Habermas: Legitimation Crisis, Communicative Action
- Antonio. Gramsci: Hegemony, Civil Society
- Anthony Giddens: Modernity, Structuration

Unit III: Indian Sociological Tradition

- M.N. Srinivas: Sanskritization, Dominant Caste
- D.P Mukherji: Diversity, Dialectics of Tradition
- A.R Desai: Nationalism, Path of Development

Essential Readings: *(in English) :*

1. Doshi, S.L. 2003: Modernity, Post Modernity and Neo-Sociological Thought, Jaipur: Rawat Publication.
2. Coser, Lewis A., 2008: Masters of Sociological Thought, Jaipur: Rawat Publication.
3. Nagla, B. K. 2013: Indian Sociological Thought, Jaipur: Rawat Publication.
4. Raymond Aron, 1967: Main Currents in Sociological Thought, (Vol. I & II), London: Pengui Books.

Essential Readings: *(in Hindi)*

1. दोषी, एस. एल., 2003: आधुनिकता अंतर–आधुनिकता एवं नव–समाजशास्त्रीय सिद्धान्त, जयपुर: रावत पब्लिकेशन्स
2. हुसैन, मुजतवा, 2010: समाजशास्त्रीय विचार, नई दिल्ली: ओरियंट ब्लैकस्वॉन
3. दोषी, एस. एल., 2007, आधुनिक समाजशास्त्रीय विचारक, जयपुर: रावत पब्लिकेशन्स
4. मुकर्जी, रवीन्द्रनाथ, 2003, सामाजिक विचारधारा, दिल्ली: विवेक प्रकाशन

Paper II: Introducing Sub Sociologies

Max Marks: 100

Unit I: Sociology of Urban Society

- Concepts: City and its Types, Urbanization, Urbanism, Migration
- Urban Sociology: Nature, Subject Matter, significance
- Issues: Slums, Health and Sanitation

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Unit II: Sociology of Development

- Concepts: Development & its Forms, Sustainable Development, Modernization
- Sociology of Development: Nature, Subject Matter, Significance
- Issues: Displacement-Rehabilitation, Development Inequalities: Education, Gender

Unit III: Sociology of Globalization

- Concepts: Globalization, Glocalization, Globalism
- Sociology of Globalization: Nature, Subject Matter, Significance
- Issues: Marginalization: Digital Divide, Economic Divide, Identity Crisis

Essential Readings: *(in English)*

1. Doshi, S.L. 2003: Modernity, Past Modernity and Neo-Sociological Theories, Jaipur: Rawat Publications.
2. Flanagan WG (2011): Urban Sociology, Maryland, Rowman & Littlefield
3. Kofman E. & Youngs G. (edt) (1996), Globalization: Theory & Practice, London, Pinter.
4. Singh, Sheobahal, 2010: Sociology of Development, Jaipur: Rawat Publications.
5. Singh, Yogendra (edited) 2014: Indian Sociology Vol. 2, New Delhi: Oxford University Press.
6. Singh, Yogendra, 2002: Culture Change in India, Jaipur: Rawat Publications.
7. Singh, Yogendra, 2005: Ideology & Theory in Indian Sociology, Jaipur: Rawat Publications.
8. Somayaji S. & Dasguptas, 2013: Sociology of Displacement: Policies and Practice, Jaipur: Rawat Publications.

Essential Readings: *(in Hindi)*

1. सिंह, शिव बहाल, 2010: विकास का समाजशास्त्र, जयपुरः रावत पब्लिकेशन्स।
2. भार्गव नरेश, 2014 : वैश्वीकरण : समाजशास्त्रीय परिपेक्ष्य, रावत पब्लिकेशन्स।
3. YMSOE-004, 2018, नगरीय समाजशास्त्र, गलीबाबा पब्लिशिंग हाउस प्राइवेट लिमिटेड़।

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13. HOME SCIENCE

B.A. Part III –

Examination Scheme :

- Each Theory paper will contain nine questions having three questions from each unit. Candidates are required to attempt five questions in all selecting at least one question from each unit. Each question will be of 10 marks.

BA Home Science Part III

Paper	Subjects	Duration of exam	Maximum marks	Minimum marks	No. of hrs/wk
Theory Paper V	Mother and Child Care	3hrs	50	18	4
Practical V	Mother and Child Care	3hrs	50	18	2
Theory Paper VI	Extension education and Communication	3hrs	50	18	4
Practical VI	Extension education and Communication*	3hrs	50	18	2
		Total	200	72	12

*In BA Part III, a **"Vocational Oriented Practical"** under Practical VI- Extension education and communicationhas been planned in the form of training, internship, demonstration to provide skills to students and enable them to take up a money earning vocation. One practical from each subject has been planned and given as an option to the institution/home science department. The practical which is opted can be based on the available infrastructure and local facilities.

The student has to opt for the practical selected by her institution.

Vocation Oriented Practical*

(in the form of training, internship, demonstration. **One practical** to be selected by the institution based on the available infrastructure and facilities)

One of the following six practicals to be selected by the institution.

- Family Event management
- Nutrition Education activities
- Food Preservation
- Knowledge & Skills based Training for Childhood Educators
- Dyeing & Printing
- Extension Activity Management

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B.A. PART-III

MOTHER AND CHILD CARE (THEORY PAPER V)

Maximum Marks: 50
Minimum marks: 18
Teaching workload: 3 hrs /week
Total teaching workload: 72hours/year

Learning Outcomes:-

The subject will give a basic understanding of menstruation and it's related issues.it will enable the student to understand the physiology of pregnancy and lactation; and the problems and it's management. They will learn about care of newborns and their management of the common ailments.

After studying this subject, they will be able to understand the reproductive cycle and its various related issues. It will facilitate them to understand and utilise the support given to women in reproductive cycle through various health schemes.

Objectives :

1. To understand importance of reproductive cycle
2. To understand the basic care of mother during pregnancy and lactation
3. To understand the problems /complications during pregnancy and their management.
4. To understand the basic care of newborns and infants.
5. To understand the Danger Sign and Common ailments of newborns and their management.

Contents	Hours
Unit – I	
Health of the Mother	
1. Menstruation & Fertility : • Normal Menstrual Cycle • Process of Reproduction	6
2. Pregnancy: • Sign & Symptoms • Use of Pregnancy Kits • Signs & Symptoms • Common Ailments • Abortions –causes & Care of Mother	8
3. Health & nutritional care during Pregnancy & lactation: • Antenatal Care: i. Registration of Pregnancy ii. Sign & Symptoms of Pregnancy iii. Use of Pregnancy Kits iv. Common ailments during pregnancy & their	18

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management: morning sickness, heartburn, indigestion, constipation, piles, leg cramps, sleeplessness, frequency of micturition, edema, varicose veins v. Antenatal Checkups & their importance vi. Danger signs during pregnancy & management. • Intra natal care: • Birth preparedness for safe delivery • Danger signs during delivery & management & when to refer • Post natal care: i. Complications during post partum period & their management ii. Post natal Checkups	
Unit II **Care of New Born**	
4. Use of Mother & Child protection card	6
5. Mother and Child Health Nutrition Programme • Janani Shishu Suraksha Yojana • Reproductive and Child Health	
6. Family Planning • Advantages & importance • Methods of family planning	6
7. Abortions-causes & care of mother	
8. New born: • Nutritional care of New Born(referring to Integrated Management of Neonatal Childhood illness). • Identification of Danger Sign and when to refer • Common ailments of newborns and their management-diarrhea, constipation, flatulence, vomiting, colic, malnutrition, napkin rash, umbilical infection, acute respiratory infections	20
Unit III	
9. Immunization & growth monitoring of infant and young child	4
10. Nutritional care of infant & young child (referring to Infant and Young child nutrition guidelines) • Infancy i. Importance of breastfeeding , early intitaion , colostrums	12

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ii. Exclusive breastfeeding – techniques of breastfeeding • Complementary feeding: i. Importance of complementary feeding ii. Time of introduction iii. Technique of complementary feeding iv. Points to be considered –FODU (Frequency, Adequacy, Density and Utilization. v. Homemade recipes, premixes, from family pot	16

References:

1. Sudha Narayanan & Anupama Narayana (2000). Mothercraft Research Publications. 89 Tripolia Bazar, Jaipur.ISBN 8185789-88-6
2. Park JE & Park K (1995). Essentials of Community health Nursing. M/s Banarsidas Bhanot

Publishers. 1167 Prem Nagar, Jabalpur. 482001. 2nd Edition. ISBN 81-90011871

3. Dr. Subhash C. Arya (2007). Infant & Child care for the Indian Mother. ISBN 8125914412
4. Shanti Ghosh (2004). Nutrition and Child care: A practical guide. Jaypee Publishers. Second Edition. ISBN: 9788180612077
5. First Aid to the injured. Authorised Manual of St. John Ambulance. 1 cross road, New Delhi 110001
6. Module 1-8 developed for Asha Sahyoginis.

MOTHER AND CHILD CARE(PRACTICAL V)

Maximum marks: 50

Minimum marks: 18

Teaching workload: 1 practical/ week (2 hours/ practical)

Total teaching workload: 24 practical/ batch

Learning Outcomes :-

The practical will teach students about basic menstruation hygiene and use of pregnancy kits. They will be aware about the care and management of pregnant and lactating mothers; and significance of Mother and Child protection card.

At the end of the course, they will be have basic knowledge about administering first aid in emergency situations. Students will be able to manage home nursing of patients with simple illnesses.

Objectives:-

1. To make the students aware and understand about use of pregnancy kits.

2. To teach them about preparation oh home based, appropriate complementary foods and premixes.

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3.To teach about home based management of common ailments of newborns.

4. To teach students about basic first aid and home nursing.

Content	Hours
1. Use of Pregnancy kits	1
• Safe Days	
• Menstrual Hygiene	
• Hygienic use & disposal of Sanitary pads	1
2. Breastfeeding – Techniques & Posture	
3. Preparation of Complementary foods	6
• Premixes	
• Guidelines for consistency for quality, preparing frequency, density & variety premixes.	
• Homemade recipes	
• Adaptation from family pot C	5
4. Use of Mother & Child Protection Card	
• Registration & personal details	
• Antenatal care	
• Danger signs of pregnancy	
• Diet during pregnancy	
• Planning of low cost nutritious recipe for pregnant mother	
• Internal care	
• Post antenatal care	
• Checkups planning of low cost nutrition's recipes for lactating mother	
• Danger signs of new born	
• New born care	
• Immunization	
• Growth monitoring – Demonstration of weighting & measurement of child	
• Guidelines for child care	
5. Management of Diarrhea	2
• Skin pinch test for identifying dehydration	
• Feeding schedule	
• Preparation of oral rehydration solution	2
6. Management of fever	
• Use of thermometer	
• When to refer	4
• How to bring down fever (home based care)	

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7. First aid & home nursing • First Aid during i. Burns & Scalds ii. Cuts & wounds (Tetanus Toxoid vaccine) iii. Sprains & fractures iv. Unconsciousness v. Electric shock vi. Animal bite – dog, monkey, snake (importance of vaccine) vii. Poisons viii. Heat stroke • Care in infectious disease i. Isolation ii. Prevention of infection through fomites iii. Ventilation & Disinfection iv. Baby weighing scale, ARIT inner & thermometer, first aid box. v. Materials to be provided – from nearest Aanganwadi /Subcentre	3

Examination scheme

Major problem – 15 marks

Planning and preparation of low cost recipe for any one

- Pregnant/ Lactating mother
- Supplementary foods/ premixes

Minor Problem – 10 marks

Use of pregnancy kit

Management of diarrhea ,care of infectious disease, use of Mother & child card,

Viva voce 5 marks

Internal -20 marks

EXTENSION EDUCATION AND COMMUNICATION (THEORY PAPER VI)

Maximum Marks: 50
Minimum marks: 18
Teaching workload: 4 hrs /week
Total teaching workload: 96

Learning Outcomes –

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The students will learn about followings-

- **Concept of education and its types, principle and objectives**
- **Role of development initiatives of government of India in the progress of country**
- **Concepts of communication , teaching methods and types**
- **International, National and local support structure contributing to the development of country.**

Objectives:

1. To make the students understand the concept of extension and its related aspects.
2. To understand the support of national and international agencies in extension.
3. To sensitize the students and help them to understand the process of communication and its importance in extension teaching.

Contents

Unit-I	**Hours**
Extension Education	
1. Concept and Meaning- Non Formal Education, Formal Education, Informal Education, Extension Education	3
2. History of Extension Education in India	3
3. Objectives and principles of Extension Education	4
4. Role and qualities of extension worker	2
5. Extension teaching methods- Personal , Group and mass approach	10
6. Basic knowledge of flagship development programmes of the Government of India in reference to objectives, target groups, activities, organizational structures and financial support	10
UNIT-II	
7. Communication	
• Concept, meaning and process of communication	4
• Elements and models of communication- Aristotle, Leagens, Roger's and shoemakers	5
• Functions and barriers of communications	4
8. Audio visual aids	
• Meaning and use of audio visual aids	2
• Cone of experience	1
	10
9. Classification of audio visual aids- Projected and non projected (visual, audio and audio visual aids)	6
10. Media	
• Basic concepts of traditional and modern methods of communication	4
• Relative advantages and limitations of traditional and modern methods of communication	

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UNIT III	
11. Support structure and functions – • Panchayati Raj – Concept, objectives, and structural organisation. Role of Panchayati Raj for Women empowerment	10
• Village organisations – village school, Yuva Mandal, Mahila Mandal, Cooperatives and KVK's	10
• Role of UNDP, UNICEF, NIRD, NIPCCD, CSWB	8

References:-

1. Dahama OP (1988). Education and communication for development. Oxford and 1 BH Publishing Co. Pvt. Ltd. New Delhi.
2. Supe SV (1997). An Introduction to Extension Education. Oxford BH publishing Co. Pvt. Ltd. New-Delhi.
3. Jain R (1993). Mass Media and Rural Development, Vol. III. Manak Publication Pvt. Ltd. New Delhi.
4. Pankajam G (2000). Extension – Third Dimension of Education. Gyan Publishing House. New-Delhi.
5. हरपालानी बी.डी. 1998 : गृह विज्ञान में प्रसार शिक्षा , स्टार पब्लिकेशन , आगरा
6. शॉ , सुगीता पुष्प और शॉ जामस शीला 2011 : प्रसार शिक्षा , श्री विनोद पुस्तक मन्दिर , आगरा–2

EXTENSION EDUCATION AND COMMUNICATION (PRACTICAL VI)
(Based on the institution's choice)

Vocation Oriented Practical* (in the form of training, internship, demonstration)

One practical to be selected by the institution based on the available infrastructure and facilities.

***One of the following six practicals to be selected by the institution**

- Family Event management
- Nutrition Education activities
- Food Preservation
- Knowledge & Skills based Training for Childhood Educators
- Dyeing & Printing
- Extension Activity Management

The student has to opt for the practical selected by her institution.

FAMILY EVENT MANAGEMENT

Maximum marks: 50

Minimum marks: 18

Teaching workload: 2 practical/ week (2 hours/ practical)

Total teaching workload: 24 practical/ batch

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Learning Outcomes

1.Students will be able to plan any event in the family .
2. Students will learn various aspects of event management .

Objectives

1. To develop a practical approach for planning on event.
2. To understand various aspects of event management

Contents :	**Hours**
Step of Event Management	
1. Making a paper plan	1
• Guest List • Making / Drafting / Finalizing/Invitation Card	1
• Infrastructure i.Tents ii.Furniture and Furnishing for areas : o Reception, o DJs / Music, o Games, o Food serving (Based on numbers of persons and types of events)	
i.Decoration (Theme etc.) ii.Planning of games iii.Transportation & communication iv.DJ's / Music v.Planning and Management of food o Welcome drink o Welcome Snacks o Main Course o Deserts o Mouth Fresheners vi.Return Gifts	3
2. Budget under different heads (Market survey can be done)	2
• Food	3
• Decoration	1
• Invitation	1
• Gifts	1
• Transportation and communication	1
• Games	2
• Infrastructure tents, furniture, furnishing, etc.	1
• DJ's / Music	1
• Time schedule for major activities	
• Implementation of various activities	1

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i. Finding out a leader and making groups	1
ii. Work distribution among group members	1
3. Controlling the event activities	2
4. Feedback /evaluation	
5. Variation in events in a family • Religious events • Entertainment and recreational events • Picnics, Other parties and events • College events : Fresher's day, Farewell, Annual function	1
6. Class rooms presentation	
Note: Students will participate in events of institution.	

Examination scheme

1. **Major** – 20 marks.
   Making a party plan for any specific party.
2. **Minor** – 10 marks.
   Planning budget for the party in the specific amount
3. **Internal** – 20 marks

NUTRITION EDUCATION ACTIVITIES

Maximum marks: 50

Minimum marks: 18

Teaching workload: 2 practical/ week (2 hours/ practical)

Total teaching workload: 24 practical/ batch

Learning Outcomes

The students shall learn about the process of nutrition education and its significance for community.

They shall be able to make a plan to impart nutrition education with the help of various kinds of teaching aids. The course will provide them basic skills for undertaking a nutrition education program in a community.

Objectives:-

1. To gain insight on the concept and importance of Nutrition Education.
2. To develop skills in organizing a Nutrition Education program.

Contents	**Hours**
Activities: **(A) Classroom/Lab activities :** 1. Introduction to Nutrition Education: Definition, importance related topics, approaches (Individual, group mass), methods, and Teaching aids.	2 1

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2. Identification and finalization of nearby village/community/women's group/ Auganwari center/college premises for Nutrition Education.	1
3. Divide the students in different groups – 5 students in each group. Assign one topic to each group.	2
4. Every group will prepare a Nutrition Education program plan based on the topic given.	3
5. Guidelines for Preparation of teaching aids. – Posters, Charts, Flash Cards, Demonstrations, Street Play, Puppetry. - Every group will prepare a minimum of 3 teaching aids. (Posters / chart/ demonstration/flash cards/role play etc.)	2
6. Prepare an activity calendar: venue, time, place, number of participants and implementation of each education programme.	1
7. Village Health & Nutrition day at the nearest Auganwari centre-Previsit for Planning, organising –VHND, Evaluation.	
(B) Implementation and evaluation of education program The students will implement every activity as per the activity calendar. (Division of classes will be based on number of groups formulated)	10
(C) File work • Discuss the various programs implemented. Every student should prepare a file which would include: Report of program plan & implementation and a way of teaching aids prepared.	2

Suggested Topics:

- Nutritional care during pregnancy.
- Nutritional care during lactation.
- Advantages of Breast feeding.
- Importance and timely introduction of complementary feeding.
- Formulation and preparation of fresh home-made and premix for an infant 6 months to 12 months.
- Formulation and preparation of fresh home-made and premix for 1 year to 3 years child.
- Formulation and preparation of energy – protein rich snack for 3-6 years old child
- Growth Monitoring – taking body weight and plotting on growth chart (weight – for – age)
- Nutrition counselling based on the results of growth chart.
- Preparation of Vitamin 'A'/ Beta- carotene rich food for a young child.

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• Preparation of iron rich food for an adolescent girl. • Promotion of consumption of iodized salt. • Immunization of safe water and house – hold methods of water purification. • Hand – washing promotion.	

Examination scheme:

1. **Major problem:** 20 marks
   Plan any nutrition education activity for community on any one of the given topics.
2. **Minor problem** 10 marks
   Preparation of any one teaching aid.
3. **Internal:** 20 marks

FOOD PRESERVATION

Maximum marks: 50
Minimum marks: 18
Teaching workload: 2 practical/ week (2 hours/ practical)
Total teaching workload: 24 practical/ batch

Learning Outcome

The students will learn skills for food preservation techniques. It will also teach them how to set up their own unit along with financial aspects. The course will enable the students to undertake food preservation as an enterprise.

Objectives:-

1. To enable the students to develop skills in food preservation.
2. To encourage the students to use these skills at small scale level.

Content	Hours
1. Theory of Preservation : Need, importance, principles of food spoilage, principle of food preservation, various methods of food preservation	2 1
2. Development of skills in preparation of : • Dried fruits and vegetables	2
i. Sun drying (Curry leaves, mint, methi, coriander, cauliflower, amla , kair-sangri, guar-fali, amchur, onion, peas, kachri, red chillis)	2
• Papad & Magodi	2
• Juices i. Aloe Vera ii. Squashes iii. Lemon iv. Orange v. Pineapple	3

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• Syrups i. Rose ii. Khas iii. Chandan iv. Jellies v. Karonda	3
• Jams i. Apple ii. Mixed fruit iii. Preserve (Murabba) iv. Carrot v. Amla vi. Ketchup sauce and chutney vii. Tomato Ketchup viii. Garlic Chutney ix. Tomato Chutney x. Imli Chutney	2 2 5
• Canning and bottling i. Green pea ii. Apple iii. Cauliflower iv. Frozen vegetables * Peas * Carrots * Cauliflower * Mango Pulp	
• Pastes & Purees i. Onion ii. Garlic iii. Ginger iv. Tomato Puree	
• Pickles i. Mango ii. Mix Vegetables iii. Kair iv. Lasoda v. Chilli vi. Lemon	
• Requirements to start a small scale unit i. Equipments ii. Finance * Loan options	

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	* Budgeting – calculation of selling price of the product * Book keeping	

Examination scheme:

1. **Major problem:** 20 marks
   Planning and preparation of any one preserved food.
2. **Minor problems:** 10 marks
   Calculation of selling price of a given product.
3. **Internal:** 20 marks

KNOWLEDGE AND SKILLS BASED TRAINING FOR CHILDHOOD EDUCATORS

Maximum marks: 50

Minimum marks: 18

Teaching workload: 2 practical/ week (2 hours/ practical)

Total teaching workload : 24 practical/ batch

Learning Outcomes

Early childhood years (birth to 8 years) are crucial for the development of children which is greatly influenced by early stimulation (birth to 3 years) and preschool education (3-8 years). This will cater to the needs of working parents/mothers who seek for safe custody of their children in crèches, preschool and day care centres. Early childhood educator plays a major role in shaping the development and laying strong foundation of young children. This practical will be useful for students to learn the skills and knowledge required to be an effective early childhood educator.

Objectives –

1. To develop communication skills in organising various developmental appropriate activities for young children.
2. To gain a clear insight of child's developmental milestone & needs.
3. To develop insight about administration, management and supervision of early childhood Education Centres i.e. Crèches, Preschools and day care centres.

Content	Hours
Pre-Requisites: Identifying nearby crèches, preschool and day care centres. • Preparation of activity calendar. • Developing skills and characteristics of an ideal preschool teacher using different teaching strategies – task analysis scaffolding, storytelling, do it signals, dramatization demo field trips songs environmental cues. • Participation with children in crèches, preschool and day care centres	(12 weeks) 2

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Course Content :	2
• Teaching strategies for early childhood care and education	2
• Characteristics and qualifications of an early childhood educator.	
• Developing communication skills in dealing with young children.	2
• Working in crèches, preschool and day care centres to develop administrative, managerial and supervisory skills in students.	2
• Administration, management and supervision of crèches, preschool and day care centres.	2
• Planning and implementing developmentally appropriate activities in crèches, preschool and day care centres.	

Examination scheme:

1. **Major Problem : 20 marks**
   Planning and preparation of ECE activities in preschools and day care centres.
   Evaluation of crèches, preschool and day care centres.
2. **Minor Problem : 10 marks**
   Preparation of teaching aids – story books, songs poems, models, toys, aids etc.
3. **Internal : 20 marks**

DYEING AND PRINTING

Maximum marks: 50
Minimum marks: 18
Teaching workload: 2 practical/ week (2 hours/ practical)
Total teaching workload: 24 practical/ batch

After doing the course the students will be able to be self employed as they will master the art of dyeing and printing. Rajasthan is a fertile place where enough infrastructure is available in this area so any related vocation can be started or else they can join as an expert in the area of dyeing and printing.

Contents	Hours
Make a scrap book with following	
1. Different types of motifs	4
• Floral – Natural and stylized	
• Human - Natural and stylized	
• Animal - Natural and stylized	
• Abstract	
• Geometrical	
2. Make samples of different methods of printing and dying	
• Tie & Dye techniques (10 samples with different techniques)	8
i. Marbling	

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ii. Pleating & binding iii. Knotting iv. Twisting and coiling v. Bandhej vi. Stitching (Shibori) vii. Pegging, etc Make any one Product – Table cloth with 6 napkins/Chunni / Saree/cushion & bolster set • Printing – i. Block printing (samples) o Butti block to create all over effect o Borders & corners Make any one Product – Table Mats/Table Napkins/Runners ii Screen printing (Samples) Make any one Product – Table mat / 'T' shirt /Cushion cover	8 4

Examination scheme :

1. **Major Problem** -20 Marks
   Make a design for a product by combining any two techniques e.g. tie and dye, block and screen.
2. **Minor** -10 Marks
   Make a sample of tie and dye using two colors and two techniques
3. **Internal Marks** -20 Marks

EXTENSION ACTIVITY MANAGEMENT

Maximum marks: 50
Minimum marks: 18
Teaching Workload: 2 practical/ week (2 hours/ practical)
Total teaching workload: 24 practical/ batch

Learning Outcome

Objectives:

1. To impart knowledge regarding process of extension activity management.
2. To develop the skills in organizing extension activity at the community level.

Practicals

1. 2.	Theoretical understanding of process of programme/extension activity management.	4

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	Organise followingextension activities from the area of home science : • Workshop/seminar • Fair • Exhibition • Rally could be taken up in rural/urban/slum community in a group on the basis of following steps-	
	• Identification of the activity - nature, duration, number of participants etc.	2
	• Plan of the activity – selection of venue, resource management (men, material/infrastructure, and money), and delegation of responsibility.	4
	• Scheduling of the activity	2
	• Publicity of the activity	2
	• Organising the activity	3
	• Overall supervision	3
	• Report writing	4

Examination scheme :

Total Marks: 50 marks

Major Problem: 15 Marks

Plan strategy to publicise the chosen extension activity and prepare any one aid out of them.

Minor Problem: 10 Marks

Prepare financial budget for the planned activity or prepare scheduling of activities according to allotted time.

Viva: 5 Marks

Internal: 20 Marks

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14. TEXTILE CRAFT

B.A. Part III –

SCHEME: BA/B.Com PART-III

		Duration	Max mark	Min mark
1. **Theory:**	Paper-I	3Hrs	30	
	Paper -II	3Hrs	30	22
2. **Practical:**	Paper -I	3Hrs	35	
	Paper-II	3Hrs	35	25
3. **Submission:**	Paper -I		35	
	Paper-II		35	25

Paper-I : Weaving Theory II

UNIT-I

1. Types of Spinning: Mechanical and Chemical
   Mechanical spinning process: picking, ginning, combing/carding, drawing etc. Types of chemical spinning-melt spinning, dry spinning and wet spinning.
2. Types of Yarns: Simple and Fancy
   Simple yarn: single and double/plied/folded yarn
3. Calculation of resultant count for folded yarn

UNIT-II

1. Manmade and Synthetic fibres
   Man-made fibres: Basic methods of producing rayon fibre, Different types of man-made fibres
   Synthetic fibres: Different types of synthetic/chemical fibre, method of their production, properties of polyester fibre, nylon fibre, glass fibre.
2. Silk and Wool
   Production, spinning, properties and uses of silk, different types of silk
   Classification of wool, wool spinning process, difference between woollen and worsted fabric
3. Concept of Mixing and Blending, Basic difference between mixing and blending. Concept of Staple and Filament fibre; difference between staple fibre and filament fibre

UNIT-III

1 Derivatives of Twill weave: Broken weave, Herringbone weave and Diamond weave

2 Towel weaves: Huckaback and Honeycomb; quality of yarn and weave selected for towels

3 Concept of shedding mechanism; Dobby and Jacquard shedding mechanism

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Paper-II: Dyeing Theory II

UNIT-I

1. Dye molecule; Concept and Importance of Chromophores and Auxochrome in a dye
2. Objectives of Fabric finishes; different mechanical and chemical fabric finishes; Determinants of finishes
3. Different types of natural and synthetic dyes.

UNIT-II

4. Method of direct printing: Screen printing; colour preparation and screen preparation
5. Discharge and Resist printing; different styles of discharge and resist printing
6. Factors affecting colour fastness: composition of fibre, chemical structure of dye, techniques of dyeing/printing, addition of other useful additives

UNIT-III

7. Importance of fabric finishes
8. Different types of chemical finishes- crease resistant finish, water proof finish, fire proof finish, moth proofing finish and absorbency finish.
9. Determinants of fabric finishes.

Practical (Paper-I)

1. Concept of yarn twist(S twist and Z twist) and plied yarn(single and double yarn)
2. Calculation of Ends and Picks per inch in given piece of fabric
3. Towel weaves preparation using paper strips

Practical (Paper-II)

1. Screen preparation (simple tracing method)
2. Table cover preparation by screen printing

Submission (paper-I)

1. Assessment of yarn and fabric samples 2. Assessment of weave samples

Submission (paper-II)

1. Assessment of samples 2. Any one article using screen printing

Practical Examination Scheme:

Major Problem: 20 Marks Minor Problem: 15 Marks

Reference books:

Booth, J.E. (1996) Principles of Textile Testing, 1st edition, CBS publishers & distributors PVT.Ltd. New delhi

Sahnai, V.A. (1980) Technology of Dyeing, Sevak publications. Mumbai

Sahnai, V.A. (1979) Technology of printing, Sevak publications. Mumbai

Sahnai, V.A. (1999) Technology of finishing, Sevak publications. Mumbai

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15. GARMENT PRODUCTION & EXPORT MANAGEMENT

B.A. Part III –

PAPER – 1 : APPAREL TECHNOLOGY

B.A./B.Com. – M.M 40 **B.Sc.- M.M. 50** **Hrs. – 3**

OBJECTIVES:

1. To create awareness on the basics of Fashion
2. To study the psychological effects of clothing on the individual in social situation.
3. To develop understanding of manufacturing technology of the garment Industry.
4. To understand the fundamental concepts of dyeing and printing.

SECTION-A : INTRODCUTION TO FASHION

1. Fashion terminology, sources of fashion, factors influencing fashion.
2. Fashion forecasting and fashion cycle.
3. India and international fashion designers (five each).
4. Sociological and psychological significance of clothing.

SECTION-B : MANUFACTURING TECHNOLOGY

5. Product development, design development, developing a sample garment.
6. Apparel production
   - I. Costing a garment
   - II. Purchasing pattern making
   - III. Production scheduling
   - IV. Spreading and cutting procedure
   - V. Contracting
   - VI. Garment assembly
7. Introduction to industrial machines-
   - I. cutting : round , straight and band
   - II. fusing: collars, facing
   - III. sewing: chain stitch, lock stitch, button hole, blind stitching
8. Use of components and trims –
   - (i) Performance and properties of components and trims.
   - (ii) labels and motifs
   - (iii) linings and interlinings
   - (iv) face, braids, elastics
   - (v) fasteners; loops
   - (vi) seam binding and tapes
   - (vii) shoulder pads, eyelets

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SECTION –C : DYEING AND PRINTING

Application of design:

7. i. Printing methods – block, screen, stencil, roller.
   ii. Styles of printing – direct, discharge and resist.
8. Dyeing – introduction to natural and synthetic dyes (acid, basic, sulphur, vat, reactive and direct dyes)
9. Stages of dyeing : Fiber, yarn and fabric

References:

1. Rouse Blizabeth, 1999, Understanding Fashion, Blackwell science.
2. Carr Harold and John pomerory, 1996. Fashion design and product development. Blackwell science.
3. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER- II : INTERNATIONAL MARKETING

B.A./ B.Com.- M.M. 40 **B.Sc. – M.M. 50** **Hrs. -3**

OBJECTIVES:

1. To study the importance of marketing to the global economy
2. To develop insight into the development of marketing strategies for international markets
3. To Identify business opportunities in an international business environment

SECTION –A

1. International Marketing: nature and scope of international marketing.
2. International marketing v/s domestic marketing.
3. Importance of international marketing.
4. Problems and challenges of international marketing.
5. Selection of agents.

SECTION – B

6. Identification of markets for readymade garments.
7. Market entry conditions.
8. Channels of distribution.
9. Direct and indirect export
10. Trade fair and Exhibitions.

SECTION – C

11. Pricing, role of price and non price factors, factors influencing pricing, price quotation, information needed for export pricing.
12. Role of trading and export houses.

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13. Institutional segments and packaging for exports: packing material, boxing and pressing department, machinery and equipments used in packaging department.
14. Quality control
15. Labeling and consumer protection meaning and its role.

References :

1. R. K. Kothari, B. S. Rathore, P. C. Jain (2009) International Marketing (2009) I[st] ed. Ramesh Book Depot, Jaipur, New Delhi
2. R. Kothari and P. C Jain (2009) International Management 1[st] ed. Ramesh Book Depot, Jaipur, New Delhi
3. M. J. Methew International Marketing (Procedures and practices) 1[st] ed. RBSA publishers, Jaipur

PRACTICAL – 1 : APPAREL PRODUCTION

B.A/B.Com.-M.M.60 **B.Sc.-M.M. 25** **Hrs.- 4**

OBJECTIVES :

1. To develop basic adult drafts of bodice, sleeve and collar.
2. To develop various patterns of textile techniques
3. Guidance for preparation of portfolio

CONTENT

1. Prepare an adult's bodice and sleeve block.
2. Sketching and designing of men/women garments (5 each)
3. To prepare with specific details of necklines and sari blouses. (20)
4. To identify patterns and its application for women designer dress on fashion figures:
5. Types of patterns include –
   - I. Structural
   - II. Geometrical
   - III. Stripes and plaids
   - IV. Floral
6. Design and prepare an adult dress for fashion shows.

Examination Scheme:

B.A.\B.Com. -Max Marks:-60
1.Major Problems :-30
2.Minor Problems:-20
Internal :-10

B.Sc:-Max Marks:-25
1.Major Problems :-10
2.Minor Problems:-10
Internal :-5

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PRACTICAL – II : DYEING AND PRINTING

B.A/B.Com.-M.M. 60 **B.Sc.- M.M. 25** **Hrs.- 4**

OBJECTIVES:

1. To learn the various types of skills in dyeing
2. To develop various textile printing techniques
3. Guidance of practical knowledge of export houses

Contents

1. Prepare and article of each: Tie and dye, stencil printing, block printing and batik
2. Field trips to Export houses and mass production centers.
3. Exhibition ;

References:

1. Bhargava, Ritu, 2005, fashion illustration and rendering, Jain Publications Pvt. Ltd. New Delhi.
2. Ireland, fashion designing drawing and presentation.
3. Prayag: Technology of textile printing.
4. Shenai: Technology of dyeing

Examination Scheme :

B.A.\B.COM:-Max Marks:-60

1.Major Problems :-30

2.Minor Problems:-20

Internal :-10

B.SC:-Max Marks:-25

1.Major Problems :-10

2.Minor Problems:-10

Internal :-5

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16. INVESTIGATIVE BIO-TECHNOLOGY

Scheme :

Paper—I Theory 3 Hrs. Duration 40 Mark

Paper—II Field Work and Practical Experience 40 Marks Min. Pass Marks 1

Practical 8 Hrs. Duration in two days. 120 Marks Min. Pass Marks 42

Paper—I Parasitology, Systomic Pathology & Laboratory Management

Section - A

PARASITOLOGY :

1. Identification and outline of life cycle relevant to laboratory diagnosis of the following:

(i) Giardia

(ii) E.H. & Other Intestinal amoebae

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(iii) Trichomonas (iv) Plasmadia
(v) Laisamania (vi) Tenia
(vii) Trichiaris (viii) Anchylostoma
(ix) Ascaris (x) Oxyris
(xi) Guinea Worm (xii) Filaria.

Section - B

ELEMENTARY TOXICOLOGY :

1. Introduction to Toxicology (history).
2. Classification of Poisons.
3. Fatal dose and fatal period of Chemical poisons.
4. Detection of Metallic Poisons.
5. Detection of Toxic anions.
6. Detection of Volatile Poisons.
7. Detection of Insecticides (Organo Phosphorus, Organo Chloro and Carbomates).
8. Detection of Plant Poisons (Alkalosidal and Clycosital)
9. Detection of Habit forming Toxic Drugs.
10. Screening Test for common poisons. (Literatrue and books on Toxicology).

Section - C

LABORATORY MANAGEMENT :

1. Design and lay out of the analytical laboratory.
2. Receipt of material and record-keeping.
3. Laboratory administration.
4. Prevention of laboratory accidents and laboratory infection.
5. Care of laboratory animals.
6. Collection and preservation of the material.
   — Water
   — Food ingredients
   — Prepared food
   — Milk and cold drinks
   — Fruit, Cane juice and the cream
   — Stool
   — Sewage
   — Blood and other materials connection with problems of health diseases and pollutants.
7. Transportation of these materials.
8. Presentation of the data including basic statistical methods.

Work for 60 days in any laboratory connected with Biochemical Microbiological, Serological, Hematological and Pathological analysis recognised by the University.

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Paper—II : Field Work and Practical Experience

Paper - I Theory	3 Hrs. Duration	40 Marks Min. Pass Marks 15
Paper-II Field work and Practical Experience	40 Marks 3 Hrs. Duration	Min. Pass Marks 15
Practical	120 Marks	Min. Pass Marks 42

8 Hrs. Duration in two days.

The students will be required to work for atleast 50 hours in any Laboratory connected with above. A project will be submitted during practical examination to be examined by a board of examiners for practical consisting of at least one external examiners.

PRACTICAL

(75×3 periods) Max. Marks 120 Min. Pass Marks 42

8 Hrs. Duration in two days.

Unit - I : Microbiology

1. Skin scripting and their digestion for demonstration.
2. Fungi and preparation of wet mounts of exulaes for rungal examination.
3. Preparation and stains used for identification of fungi.
4. Demonstration of bacteriology of water, milk and food.

Unit-II : Protozoology

1. Collection of steel of demonstration of Protozoa parasite.
2. Warm slide technique for trophozoties and wet mounts for Protozoa.
3. Demonstration of cysts of E.G.-M. coli, Giardia etc.
4. Staining and examination of Blood for M.P.
5. Demonstration of trichomonas in vaginal smears.

Unit-III : Helminthology

1. Demonstration of adults worm.
2. Examination of Blood for microfilaria.
3. Collection and preservation of stool for helminithic intestine.
4. Demonstration of various Helminthic ova.
5. Examination of water for cyclops.

Unit-IV : Biochemistry

1. Estimation of total and direct bilirubin for liver function test.
2. Chemical analysis for drinking water.

Unit-V : Serology

1. V.D.R.L Qualitative and quantitative.
2. Wasserman reaction (WR)
3. Rosawallter Test and Rehumatoid Factor (R.F.)
4. Cold Aggulutmation and Paul Bunnal Test.

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5. C.R.P. (C. reactive Proteins)
6. Pregnancy Test.

Unit-VI : Hematology

1. Revision of a staining of blood film and bonemarrow smears.
2. Blooding time, clotting time, Platelet count.
3. Prothombin Time (P.T.)

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17. MATHMATICS

B.A. Part III –

Teaching : 3 Hours per Week per Theory Paper.

Examination Scheme :

		Min.Pass Marks	Max. Marks
		Science – 54	150
		Arts – 72	200
		Duration	Max.Marks
Paper – I	Algebra	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Complex Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Mechanics	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates (20 Candidates in one batch).
4. Each candidate has to pass in Theory and Practical examinations separately.

Paper -I : Algebra

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53(Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE Question from each Unit. All questions carry equal marks.

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Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

Unit 2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 3: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.

Unit 4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Reference Books:

1. Joseph A. Gallian, Contemporary Abstract Algebra (4th Edition), Narosa Publishing House, New Delhi, 1999.(IX Edition 2010).
2. S Lang, Introduction to Linear Algebra (2nd edition), Springer, 2005.
3. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
4. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
5. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra 2nd Ed., Prentice-Hall Of India Pvt. Limited, 1971.

Paper – II: Complex Analysis

Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks: 40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection. Complex valued function – Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, Construction of an analytic function.

Unit 2: Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville' theorem.

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Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.
Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.
Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

Unit 5: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z)=\frac{1}{2}\left(z+\frac{1}{z}\right), z^2, e^z, \sin z, \cos z,$ and $\log z$.

Evaluation of a real definite integral by contour integration.

Analytic continuation. Power series method of analytic continuation.

Reference Books:

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw – Hill International Edition, 2009.
2. Joseph Bak and Donald J. Newman, Complex analysis (2nd Edition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

Paper – III: Mechanics

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 2: Motion in resisting medium– Resistance varies as velocity and square of velocity. Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle. Projectile.

Unit 3: Central orbits – p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia – M.I. of rods, Circular rings, Circular disks, Solid and Hollow spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Product of inertia.

Unit 4: Equilibrium of coplanar force, moments and friction.

Unit-5: Virtual work and Catenary.

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Reference Books :

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009.
2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
3. S.L. Loney - An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Kalyani Publishers, New Delhi.
4. J.L. Synge & B.A. Griffith - Principles of Mechanics, Tata McGraw-Hill, 1959.

Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination: **Duration: 2 Hours**

Scheme			**Science**	**Arts**
Max.Marks			30	40
Min.Pass Marks			11	15
Distribution of Marks:				
Two Practicals one from each group				
10 Marks each	=	20 Marks	(13 Marks each)	26
Practical Record	=	05 Marks		07
Viva-voce	=	05 Marks		07
Total Marks	=	30 Marks		40

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Practicals with Computer Programming in C Language.

Group A:

1. Solution of algebraic and transcendental equations by Bisection method, **Regula-falsi** method and Newton-Raphson method.
2. Solution of Initial value problems by Euler's method and Runga-Kutta(third and fourth order) method.

Group B:

1. Matrix operations: addition, subtraction, multiplication, Rank of a matrix, inverse of a matrix.
2. Solution of linear algebraic equations by Gauss elimination method, Matrix method, Gauss Jordan method.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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18. Economics

B.A. Part III –

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150
Paper-I	3 hours duration	Arts 100 Science75
Paper- II	3 hours duration	Arts 100 Science 75

Note:

1. There shall be two papers in each class. Each paper shall have 3 questions from every unit. In Addition to these nine questions (3 questions for each unit) there shall be one multiple choice\objective type/ short answer question in each of the two papers

   This question shall be compulsory.
2. The student shall be required to attempt five questions in all in each paper selecting atleast one question from each unit and one compulsory multiple choice/objective type/ short answer question
3. The multiple choice/ objective type\short answer questions shall consist of 20 questions in B.A. Examination and 15 questions in B. Sc. Examination of one mark each.

ECNOMICS

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No.1 consisting of very shot type –X (Ten) question. The candidate is required to answer each question in 20 words. Part –B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of part A and part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All question carry equal marks.

Paper 1: Introduction To International Trade, Development And Public Economics

Section – A

Features of International Trade, Gains from Trade.Trade Theories: Adam Smith, Recardo, Harberler, Mill and H O Theory (Elementary treatment). Free Trade and Protaction, foreign

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Exchange Market and Exchange Rate. Balance of Trade And Finance of payment: Definition And Structure, International Monetary Fund, WTO scope and Impact.

Section –B

Economic Growth and Development: Factors affecting Economic Growth, Measures of Development , Lewis Theory of Unlimited Supply of Labor, Balanced V/S Unbalanced Growth Model, Harrod Domer and Solow Models, Concept of Poverty and Inequality. International Bank for Reconstruction and Development, Asian Development bank.

Section – C

Nature and Scope of Public Finance.Role of Government in the Economy.Public Goods and Private Goods.Theory of Maximum Social Advantage, Optimal Budgeting. Public Revenue: Canons of Taxation, Impact, Incidence and Shifting of Taxation. Direct and Indirect Taxation, GST, Public Expenditure: Canons of Public Expenditure, Classification and Effects on Production and Distribution. Public Debt: Meaning Objectives and Burden Theories. Fiscal Policy: Meaning, Objectives and Anti-Inflationary Policy.

Books Recommended :

1. R.N Musgrave and P.B Musgrave. Public Finance in Theory & Practice, McGraw Hill Publication.
2. S. Ganguly, Public Finance, The World Press Pvt. Ltd.
3. H.L. Bhatia, Public Finance, Vikas Publishing House Pvt. Ltd.
4. John Callas and Philip Jones, Public Finance and Public Choics, Oxford University Press.
5. D. salvatore: International Economics.
6. K.C RanaAnd K.N Verma: Internatinal Economics. (Hindi/English Edition)
7. B.O. Souderton & G. Reed: International Economics.
8. Michael P. Todaro, Economic decelpment, Macmillan.
9. A.P Thirlwal, Growth and Development, Macmillan.
10. Debraj Ray, Development Econmics, Oxford University Press.
11. S.k. Misraand V.K Puri, Ecomimics of Devlopement and Planning Theory Himalya Publishing House.

Paper –II (a): Application of Mathematics in Economics

Section – A

Differential Calculus and integral Calculus: Application in Economics: Matrix and Determinants: Solution of Simultaneous Equations: Mixima and Minima: Convexity and Concavity.

Theory of Consumer Behaviour Nature of a Utility function: Properties of an Indifference Curve. Maximization of Utility. Demand Functions. Ordinary and Compensated Price and

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Income Elasticity, Elasticity Relation in demand Analysis, Slusky Equation in two Commodity Case, Elasticity Form and Important Results: Income and Leisure – Derivation of Labour Supply Function and its Properties.

Section –B

Theory of firm: Production Function- Properties of a Well Behaved and Homogenous Production Functions- Cobb- Douglas and CES Production Functions: Product Curves: Output Elasticity of Factor input; Properties of an Isoquant; Elasticity of Substitution of a Homogeneous Production Function –Linearly Homogeneous and Cobb-Douglas Production Functions : Optimization Behaviour of a Firm – Constrained Cost Minimization, Constrained Output Maximization and Profit Maximization; Input Demand Functions Properties and Derivation of Producer's Input Demand functions ; Cost Functions- Properties and Derivation of Short Run and Long Run Cost functions; Consumer's and Producer's Surplus.

Section-C

Linear Programming: Graphical and Simplex Method (Maximization Problem Only): Input Output Analysis: Concepts of Static, Dynamic, Closed and Open Input – Output Models, Hawkins-Simon Conditions of Viability, Determination of Gross Output, and Value Added in Open Input –Output Model; Theory of Games: Two-person Constant Sum Games, Zero-Sum Game, Maximin and Minimax, Dominant Strategies and Saddle Point Solution; First Order Difference Equation- Cobweb Model.

Note: Use of Non-programmable Calculator is permitted

Books Recommended :

1. J.M. Henderson and R.L. Quandt: Micro Economic Theory: A Mathematical Approach, McGraw- Hill London.
2. RGD Allen. Mathematical Economics, McMillan
3. B.C. Mehta: Mathematical Economics; Micro Economic Models, Sultan Chand & Sons, New Delhi.
4. Alpha C Chiang: Fundamental Methods of Mathematical Economics. McGraw-Hill, Kagakusha. Tokyo.

OR

Paper- II (b): Environmental Economics

Section –A

Environmental Economics: An Introduction; Review of Microeconomics and Welfare Economics; The Theory of Externalities: Pareto Optimality and Market Failure in the Presence of Externalities; Property Rights and the Coase Theorem; Sustainable Development: Concepts and Measurement.

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Section-B

Development and Environment: The Environment Kuznets Curve; Trade and Environment; Environmental Problems; Trans-boundary Environmental Problems: Global Warming and Climate Change; Methods of Environment Valuation: Hedonic Pricing, Contingent Valuation Method and Travel Cost Method.

Section-C

International Environmental Policy: Conventions and Treaties, UN Effort to Protect the Environment, Stockholm, Rio, Johansberg, Agenda 21, OECD Environmental Committee Report, Kyoto, Convention on Biodiversity, Paris Climatic Conventions; Environmental Governance in India; WTO and Environment.

Recommended Books:

1. Charles Kolstad, Intermediate Environmental Economics, Oxford University Press. 2nd Edition, 2010
2. Robert N. Stavins (ed.), Economics of the Environment: selected Readings, W.W.Norton, 5th edition, 2005.
3. Roger Perman, Yue Ma, James McGilvray and Michael Common, Natural Resource and Environmental Economics, Pearson Education/ Addison Wesley, 3rd edition, 2003.
4. Maureen L. Cropper and Wallace E. Oates, 1992, "Environmental Economics: A Survey", Journal of Economic Literature, Volume 30, pp. 675-740.

OR

Paper-II (C): Economy of Rajasthan

Section-A

Position of Rajasthan in Indian Economy: Population, Area, Agriculture, Industry and Infrastructure. Population: Size and Growth, District Wise Distribution of Rural and Urban Population, Demographic Features, Occupational Structure and Human Resource Development (Literacy, Health and Nutrition Indicators). Natural Resources Endowments: Land, Water, Livestock and Wild Life, Minerals and Mineral Policy of the State. State Domestic Product: trends and Composition. Agriculture: land Reforms, Land Utilization, Cropping Pattern, Production and Productivity, Agriculture Finance, Marketing and Insurance, Importance of Livestock and Animal Husbandry, Dairy Development Programmes, Famines and Droughts in Rajasthan.

Section-B

Infrastructure in the State (Irrigation, Power, Road), Industrial Development of the State (Agricultural and Mineral Based Industries, Small Scale and Cottage Industries, Export Based Units, Rajasthan Handicrafts). Growth Centresand Development of Industrial areas.

Raj/Jai

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Enterprises in Rajasthan. Role of Different Corporations in Industrial Development (RIICO, RFC & RAJSICO), Industrial Finance, Service Sector: Education, Health, Tourism Development in Rajasthan.

Section-C

Economic Planning and Development in Rajasthan. Constraints in The Economic Development of Rajasthan. Special Area Development Programmes in Rajasthan.Woman Empowerment and Child Development.Problems of Poverty and Unemployment in Rajasthan. PanchayatiRaj and Rural Development in Rajasthan. Budgetary Trends in Rajasthan. Centre State Financial Relations.

Books Recommended:

1. Economic Review, Directorate of Economics And Statistics, Department of Planning, Rajasthan Jaipur. (Hindi &English.)
2. Statistical Abstract Directorate Of Economics And Statistics. Department of Planning, Rajasthan Jaipur.
3. लक्ष्मीनारायण नाथूराम का राजस्थान की अर्थव्यवस्था, रमेश बुक डिपो, जयपुर।

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19. Geography

BA (RS) Pt III

Scheme of Examination

Faculty	Min. Pass Mars	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	World Regional Geography	Arts 75 Science 50
Paper II	Geography of India	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q.No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examinations.

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Paper I: World Regional Geography

Section A

Asia: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General. Regional Study of South-East and South-West Asia.

Europe: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General ; Regional Study of British Isles, France and Germany.

Section B

North and South America: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General; Regional Study of New England and Brazil.

Section C

Australia and New Zealand: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of Australia and New Zealand In General.

Recommended Readings:

Cole, J., 1996. A Geography of the World's Major Regions, Routledge, London.
Deblij, H.J., 1994, Geography : Regions and Concepts, John Wiley, New York.
Dickenson, J.P. et al, 1996. The Geography of the Third World, Routledge, London.
Gourou, P., 1980. The Tropical World, Longman, London.
Jackson, R.H. and Hudman, L.E., 1991. World Regional Geography : Issues for Today, John Wiley, New York.
Kolb, A., 1977. East Asia - Geography of a Cultural Region, Mathuen, London.
Minshull, G.N., 1984 Western Europe, Hoddard & Stoughton, New York.
Patterson, J.H., 1985. Geography of Canada and the United States, Oxford University Press.
Songquiao, Z., 1994. Geography of China, John Wiley, New York.
Ward, P.W. and Miller, A. 1989. World Reginal Geography : A Question of Place, John Wiley, New York.

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Paper II: Geography of India

Section A

India in the context of South and Southeast Asia, geological structure, physiographic divisions, climate: seasons, mechanism of Indian monsoon, major climatic regions; vegetation, major soils and regions; drainage system, water resources and irrigation projects; forests, mineral and power resources: their utilization policy and conservation strategies.

Section B

Agriculture:-typology, major crops, changing pattern of crops, agricultural growth during plan period and green revolution, livestock resources and their development, industrial growth and development; industrial localization with reference to iron and steel, cotton textile, cement and chemical industries, industrial regions; population growth, distribution, problems, policy implication, trends of urbanization and human resource development.

Section C

Regional disparities in economic development, planning and economic regions of India, multilevel planning, problems and prospects of linking of rivers, environmental issues in India, transport development: rail, road, air and waterways, foreign trade: challenges and prospects.

Recommended Readings:

Gautam, Alka, 2010: Geography of India, Rastogi Publications, Meerut.

Gopal Krishnan, R. 2001: Geography of India, Jawaher Publishers & Distributions, New Delhi, 2nd Edition

Khullar, D.R. 2006. India a comprehensive Geography; Kalyani Publishers, New Delhi

मान्देरिया, सी. 1999: आधुनिक भारत का वृहत भूगोल। साहित्य भवन पब्लिकेशन्स, आगरा।

Sdasyuk, G. and Sengupta, 1968: Economic Regionalisation of India, Census of India Publication, New Delhi.

Singh, G. 1998: A Geography of India, Atma Ram & Sons, Delhi, Sixth Edition.

Singh, R.L. (ed.) 1971: India: A Regional Geography, NGSI, Varanasi.

Spate, O.H.K. and Learmonth, A.T.A. 1967: India and Pakistan, Land, People and Economy, Methuen and Co., London.

Tirtha, R 2000: Geography of India, Rawat Publications, Jaipur 2nd Edition (India)

सिंघल, आर.सी. 2012 भारत का भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Practicals

Scheme of Examination

Min. Pass Marks: 18		Max. Marks: 50
	Bifurcation of Marks	Time
Written test	24	3 hrs
Field survey and viva voce	10+04	2½ hrs
Record and viva voce	08+04	

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N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks.

SYLLABUS

Section A

Definition, classification, uses and characteristic of map projection: (graphical constructions).
Conical projections:

1. with the one standard parallel
2. with two standard parallels
3. Bonne's
4. Polyconic

Cylindrical projections:

1. Equidistant
2. Equal Area
3. Mercator's, Universal Transverse Mercator (UTM)
4. Gall's Stereographic

Section B

Zenithal Projections: (Only Polar Case)

1. Equidistant
2. Equal Area
3. Gnomonic
4. Stereographic
5. Orthographic

Three dimensional diagrams: sphere, block pile, cube.

Section C

Plane table surveying: Equipments, procedure, traversing – open and closed traverse, methods- radial and intersection, concept of resectioning.
Height calculation using Indian pattern clinometer.

Recommended Readings:

चौहान, पी.आर. 2005: प्रायोगिक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
Raisz, E. 1962: General Cartography. John Wiley and Sons, New York. 5th edition.
Rampal, K.K. 1993: Mapping and Conflation: Methods and Techniques Concept Publishing Company, New Delhi (Reprint 2009)
Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York (Sixth Edition)
Singh, L.R. 2006: Practical Geography. Prayag Pustak Publisher, Allahabad U.P.
Singh, R.L. and Singh, RPB 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi (Reprint 2002)
शर्मा, जे.पी. 2010-11. प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन, मेरठ।

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20. Statistics

SYLLABUS
FOR
B.Sc./B.A. Pt-III

Subject: Statistics

Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Sample Survey	50 mark	65 marks
Paper II	Design of Experiment and Computational Techniques	50 mark	65 marks
Paper III	Practical based on Paper I,II	50 mark	70 marks
	Total	150	200

Note:

In each Theory Question Papers , 10 (ten) questions will be set having 2 having 2(Two) from each unit. Candidates have questions in all, taking not more than one from each unit.

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Subject: Statistics

Paper –I
(Sample Surveys)

(Alsó common with Subject- Applied Statistics)

Unit-I

Concepts of population and sample, need for sampling, census & Sample surveys. Advantages of sample survey over complete enumerations, Principle steps in a sample survey, Principles of sample survey, Sampling and non-sampling errors.

Unit-II

Probability and non-probability sampling: Methods of drawing a random sample from finite population, accuracy and precision of an estimator. Simple random sampling with and without replacement, probability of selecting any specified unit in the sample ,simple random sampling of attributes, size of simple random sample for a specified precision.

Unit-III

Stratified random sampling: Meaning and advantages of Stratified Random Sampling, Estimation of the population mean and its variance. Optimum and proportional allocation and their comparison with SRS & SRS WOR.

Unit-IV

Systematic Sampling: Meaning and sample selection procedures, advantage and disadvantages, variance of the estimated mean, Comparison of systematic with (i) SRSWOR and (ii) stratified random sampling. Cluster sampling (of equal size): Meaning, advantages and disadvantages, estimation of population mean.

Unit-V

Ratio Method of estimation (first approximation only): Meaning, bias of ratio estimators, variance, efficiency of ratio estimate with SRSWOR estimate. Regression method of estimation (first approximation): Meaning, Simple Regression Estimate, expected value and variance of simple regression estimate. Comparison with SRSWOR and ratio estimators.

REFERENCES:

Des Raj(2000) : Sample Survey Theory. Narosa Publishing House.
Murthy, M.N.(1967): Sampling Theory and Methods. Statistical Publishing Society, Calcutta.
Singh, Daroga and Chaudhary. F.S.(1989): Theory and Analysis of Sample Surveys Designs. Wiley Eastern Ltd.
Sukhatme et al .(1984): Sampling Theory of Surveys with Applications. Indian Society of Agricultural Statistics.
Joon A.M, Gupta M.K. Das Gupta B (1986) , Fundamentals of Statistics, Vol II World Press Kolkata
Gupta S.C., Kapoor V.K. : Fundamentals of Applied Statistics , Sultan Chand & Sons., New Delhi

ADDITIONAL REFERENCES:

Sampath S. (2000): Sampling Theory and Methods Narora Publishing House

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Subject: Statistics

Paper II

Design Of Experiments and Computational Techniques

(Also common with Subject- Applied Statistics)

Unit-I

Analysis of Variance: Linear model & its different types (only introduction), Analysis of Variance technique, ANOVA for one-way and two-way classified data (with one observation per cell & fixed effects model) ; Least Square Estimates of Sum of squares, Effects of violations of basic assumptions of ANOVA; Transformations, Crtitical Difference.

Unit-II

Design of Experiments: Need for design of experiments, fundamental principles of design of experiments, Uniformity Trials, Choice of size and shape of plots , Basic designs (with one observation per cell & fixed effects model)-Completely randomized design(CRD), Randomised block design(RBD)- Their advantages and disadvatntages & usage. Efficiency of RBD over CRD.

Unit-III

Latin square design (LSD)- Analysis; least square estimates; expectation of sum of squares; efficiency of LSD over CRD & RBD, Missing plot technique- Estimation of single missing value in RBD & LSD . Factorial experiments-2^2 , 2^3 experiments, illustrations ,main effects, interaction effects & their analysis,.

Unit-IV

Computer Application and Data-Processing: Basics of Computer: Operations of a computer, Different units of a computer system like central processing unit, memory unit, arithmetic and logical unit, input unit, output unit etc. ,Hardware including different types of input, output and peripheral devices, Software, system and application software, number systems, Operating systems, packages and utilities, Low and High level languages, Compilcr, Assembler, Memory– RAM, ROM, unit of computer memory (bits, bytes etc.).

Unit-V

Network – LAN, WAN, internet, intranet, basics of computer security, virus, antivirus, firewall, spyware, malware etc. Basics of Programming: Algorithm, Flowchart, Data, Information, Database, overview of different programming languages, frontend and backend of a project, variables, control structures, arrays and their usages, functions, modules, loops, conditional statements, exceptions, debugging and related concepts.

REFERENCES :

. Das M.N. & Giri N.C. (1986) .Design and Analysis of Experiments. Springer Verlag

'. Goon A.M, Gupta M.K. Das Gupta B (1986) ; Fundamentals of Statistics. Vol-II World Press Kolkata

. Gupta S.C., Kapoor V.K. : Fundamentals of Applied Statistics . Sultan Chand & Sons., New Delhi

. Nagpal D.P. :Computer Fundamentals . Wheeler Publishing. New Delhi

Norton Peter : Peter Norton's Introduction of Computers . Tata McGraw hills

Stallings: Operating Systems PHI

DDITIONAL REFERENCES

Kempthrone O. (1965) : The Design and Analysis of Experiments . Wiley Eastern

Cochran W.G. and Cox G.M. (1957) : Experimental Design . John Wiley and sons

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Subject: Statistics

Paper III
Practical Paper

(Also Common with Subject- Applied Statistics)

1. To draw a SRS with and without replacement to obtain an estimate of the population total along with the estimates of their variances., Comparing the efficiency of SRSWR with SRSWOR .Finding of confidence interval for the population mean.

2. To draw all the possible samples by SRS-technique and that to show that expected value of the sample mean equals the population mean to show expected value, $E(S^2) = S^2$ in SRSWOR.

3. Stratified sampling (i) estimate the sample sizes by (a) proportional allocation (b) Neyman optimum allocation (ii) estimate the mean to the population under the above scheme(iii) calculation of the sampling variance (iv) Comparison of efficiencies of the allocation scheme amongst themselves as well as with SRS.

4. Systematic sampling
5. Cluster sampling.
6. Ratio & Regression methods of estimation.
7. Analysis of one way classification (CRD).
8. Analysis o two way classification (RBD).
9. Analysis of LSD.
10. Efficiency of RBD over CRD.
11. Efficiency of LSD over CRD & RBD.
12. Analysis of 2^2 & 2^3 factorial design.
13. Construction of Flowcharts and Algorithms for Statistical Problems

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21. Applied Statistics

SYLLABUS
FOR
B.Sc./B.A. Pt-III –

Subject: Applied Statistics

Marks Scheme.

		Marks	
Paper	**Nomenclature**	**Science**	**Arts**
Paper I	Sample Survey	50 mark	65 marks
Paper II	Design of Experiment and Computational Techniques	50 mark	65 marks
Paper III	**Practical based on Paper I,II**	50 mark	70 marks
	Total	150	200

Note:

In each Theory Question Papers . 10 (ten) questions will be set having 2 having 2(Two) from each unit. Candidates have questions in all, taking not more than one from each unit

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Subject: Applied Statistics

Paper -I
(Sample Surveys)

(Course Contents are same as that of Subject- Statistics)

Paper II
Design Of Experiments and Comp. tational Techniques

(Course Contents are same as that of Subject- Statistics)

Paper III
Practical Paper

(Course Contents are same as that of Subject- Statistics)

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22. Psychology

B.A. Part III –

SCHEME OF EXAMINATION:

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr.18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Positive Psychology	3 Hrs.	75	50
II	Psychological Testing and Assessment	3 Hrs.	75	50
	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

For clarification the distribution of marks is tabulated as below:-

Arts			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (out of 7)	03	15
C	3 (with Internal Choice)	15	45
		Total marks	75
Science			
Section	No. of Question	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (with internal choice)	10	30
		Total Marks	50

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Use of simple calculator will be allowed for statistical portions of all papers.

Paper I -Positive Psychology

Section A

1. Introduction : Definition, Goals and Assumptions of Positive Psychology; Relationship with other Branches of Psychology
2. Happiness: Meaning; Hedonic and Eudaemonic Viewpoint; Positive and Negative Affect; Theoretical Viewpoints; Determinants and Sources; Authentic Happiness; Enhancement of Happiness and Wellbeing.
3. Positive Cognitive States and Processes: Self-Efficacy, Optimism, Hope, Mindfulness, Flow and Spirituality.

Section B

4. Virtues and Strengths of Character: Classification and Measures of Human Strengths, Gallup's Clifton Strength Finder; VIA Classification; Identifying Personal Strengths.
5. Resilience: Meaning and Sources; Developmental and Clinical Perspective; Successful Aging and Growth through Trauma.
6. Self-Regulation and Self-Control: Meaning and Theories; Planning for Self-Regulation Success; Self-Regulation Problems – Goal Conflict, Goal Difficulty and Goal Disengagement.

Section C

7. Mental Health and Well-Being: Subjective Well-Being and Life Satisfaction, Social Well-Being and Psychological Well-Being, Complete State Model.
8. Emotional Intelligence: Meaning, Components and Theories; Enhancement of Emotional Intelligence.
9. Pro-Social Behavior: Empathy, Altruism, Gratitude and Forgiveness.

Books Recommended:

- Snyder, C.R. & Lopez, S.J.(2007).*Positive Psychology*. New Delhi: Sage.
- Snyder, C.R. & Lopez, J.(2005). *Handbook of Positive Psychology*. New York: Oxford.
- Baumgardner, S. & Crothers, M. (2019). *Positive Psychology* . Noida: Pearson Education India.

Paper II - Psychological Testing and Assessment

Section-A

1. Psychological Testing and Assessment-: -Definition, Difference between Testing and Assessment , Tools of Psychological Assessment Interview, Case History Data, behavioral Observation, Computers as tools.
2. Psychological Test: Nature, Functionsand Uses of Psychological Test, Problem of test

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Administration, History of Psychological Testing, Characteristics of good Psychological test

3. Psychological Test Development:-Conceptualization, Test Construction, Item analysis.

Section-B

4. Reliability: Meaning, Types and Methods of Calculating Reliability.
5. Validity: Meaning, Types and Methods of Calculating Validity.
6. Norms: Meaning and Types of Norms.

Section-C

7. Types of Psychological Tests: Group and Individual, Verbal, Non-verbal and Performance Test, Self-Report Inventories, Projective Techniques, Ethical Consideration in Assessment
8. Application of Psychological Testing: Educational, Counseling and Guidance, Clinical and Organizational Setting.
9. Assessment of Personality- Big Five, 16 PF, MMPI, TAT and Rorschach. Test. Assessment of Intelligence- Binet, WAIS, SPM.

Books Recommended:

- Anastasi, A. (1997). *Psychological testing.* New York: MacMillan Co.
- Chadha, N.K. (2009). *Applied Psychometry.* New Delhi: Sage.
- K,aplan, R.M. & Saccuzzo, D.P. (2009). *Psychological Testing and Assessment.* New Delhi: Cengage Learning.
- Cohen, R.J, Swerdlik, M. & Struman, E.D. (2015). *Psychological Testing and Assessment.* New Delhi: McGraw Hill.
- अरुण कुमार सिंह (2002) : मनोविज्ञान में मापन एवं मूल्यांकन, नई दिल्ली मोतीलाल बनारसीदास।

Practical

1. Measurement of Subjective Wellbeing
2. Measurement of Forgiveness
3. Measurement of Emotional Intelligence
4. Measurement of Hope
5. Measurement of Resilience
6. Measurement of Intelligence (SPM)
7. Personality Assessment through HSPQ
8. Reaction Time
9. Mullar Lyer Illusion
10. Measurement of Level of Aspiration

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23. राजस्थानी

इसमें दो प्रश्न-पत्र होंगे :

प्रथम—प्राचीन राजस्थानी साहित्य एवं निबंध

द्वितीय—राजस्थानी भाषा तथा राजस्थानी साहित्य का इतिहास

परीक्षा योजना	न्यूनतम उत्तीर्णांक 72	पूर्णांक 200
प्रथम प्रश्न-पत्र	समय 3 घंटे	अंक 100
द्वितीय प्रश्न-पत्र	समय 3 घंटे	अंक 100

प्रथम पत्र : प्राचीन राजस्थानी साहित्य एवं निबंध :

(क) एक प्रश्न व्याख्या से संबंधित (कुल दो व्याख्याएँ)	2 × 16 = 32
(ख) दो प्रश्न-प्रत्येक पुस्तक पर एक-एक आलोचनात्मक प्रश्न	2 × 20 = 40
(ग) एक प्रश्न निबंध	1 × 28 = 28

निबंध अनिवार्यत : राजस्थानी भाषा में लिखना होगा।

यह राजस्थानी भाषा के किसी भी क्षेत्रीय रूप में लिखा जा सकता है।

पाठ्य पुस्तकें :

1. राजस्थानी साहित्य संग्रह, भाग प्रथम, सम्पादक-नरोत्तम दास स्वामी, राजस्थान प्राच्य विद्या प्रतिष्ठान, जोधपुर।
   (इस संग्रह में संकलित खींची गंगेव नीबावत री दोपहरौ को छोड़कर शेष अंक यथावत रहेंगे।)
2. ढोला मारू रा दूहा-संपादक-स्वामी, रामसिंह पारीक, नागरी प्रचारिणी सभा, वाराणसी।
   (इसमें से आरम्भ के 100 दोहे पाठ्यक्रम में रहेंगे)।

सहायक ग्रंथ :

1. प्राचीन काव्यों की रूप परम्परा, अगरचंद नाहटा, भारतीय विद्या मंदिर शोध प्रतिष्ठान, बीकानेर।
2. ढोला मारू रा दूहा—डॉ. शंभूसिंह मनोहर। स्टूडेन्ट्स बुक कम्पनी, चौड़ा रास्ता, जयपुर।

द्वितीय प्रश्न-पत्र : राजस्थानी भाषा तथा राजस्थानी साहित्य का इतिहास

परीक्षा योजना	न्यूनतम उत्तीर्णांक 72	पूर्णांक 200
प्रथम प्रश्न-पत्र	समय 3 घंटे	अंक 100
द्वितीय प्रश्न-पत्र	समय 3 घंटे	अंक 100

इसमें पाँच प्रश्न होंगे। 2 प्रश्न राजस्थानी भाषा में तथा 3 प्रश्न राजस्थानी साहित्य के इतिहास से संबंधित होंगे। प्रत्येक प्रश्न 20 अंक का होगा। 5x20=100

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(क) राजस्थानी भाषा से संबंधित राजस्थानी भाषा का उद्भव और विकास राजस्थानी की विशेषताएँ-राजस्थानी की विभिन्न बोलियाँ, उनकी विशेषताएँ, उनके क्षेत्र, डिंगल-पिंगल हिन्दी और राजस्थानी।

(ख) राजस्थानी साहित्य के इतिहास से संबंधित-काल विभाजन-आरम्भिक काल, मध्य काल तथा आधुनिक काल, इन कालों की प्रमुख प्रवृत्तियाँ, काव्य धाराएँ, गद्य विधाएँ, प्रमुख रचनाएँ और रचयिता। राजस्थानी लोक साहित्य का सामान्य परिचय।

सन्दर्भ ग्रंथ :

1. पुरानी राजस्थानी-डॉ. टैसीटरी, अनुवादक-डॉ. नामवरसिंह, नागरी प्रचारिणी सभा, वाराणसी।
2. राजस्थानी भाषा, डॉ. सुनीतिकुमार चटर्जी, साहित्य संस्थान, उदयपुर।
3. राजस्थान का भाषा सर्वेक्षण, जार्ज ग्रेयर्सन अनुवादक डॉ. आत्माराम जाजोदिया राजस्थानी भाषा प्रचार सभा बनीपार्क, जयपुर
4. राजस्थानी भाषा और साहित्य—डॉ. मोतीलाल मेनारिया, हिन्दी साहित्य सम्मेलन, प्रयाग।
5. राजस्थान का पिंगल साहित्य—डॉ. मोतीलाल मेनारिया, हितैषी पुस्तक भण्डार, उदयपुर।
6. आधुनिक राजस्थानी साहित्य प्रेरणा स्रोत और प्रवृत्तियाँ—डॉ. किरण नाहटा, चिन्मय प्रकाशन, चौड़ा रास्ता, जयपुर।
7. राजस्थान का लोक साहित्य, नानूराम संस्कर्ता, रूपायन संस्थान. बोरूंदा (जोधपुर)।

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24 SHEEP AND WOOL

(To be offered by the Collegiate student of Shri B.D. Todi College, Lacchmangarh (Sikar) only)

Scheme :

Min. Pass Marks : Theory 48

Min. Pass Mark : Practical : 24

Paper-I	3 Hrs. Duration	Max. Theory 132 Mark
Paper-II	3 Hrs. Duration	Max. Practical 68 Mark
Practical	4 Hrs. Duration	66 Mark
Syllabus :		66 Marks
		68 Marks

Paper—I: Wool Grading and Processing :

Classification of fleece-Bulk classification. Visual appraisal for apparel and carpet wools. Various types of Wool. Wool quality. length. fineness, colour, vegetable content yield.

Grading of Wool : Fine, medium, strong, coarse, white, light yellow, heavy yellow, burru, stained, black. Spinning counts for

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Various types of wools. Salient feathes of International grades. Agmark ISI specification. Wool utilisation, blending, scouring, carding combing, spinning, weaving, knitting, felting. Woollen and Worsted system. Elementary principles of dyeing and finishing.

Scheme

Min. Pass Marks : Theory 48 Max. Theory 132 Marks

Min. Pass Mark : Practical 24 Max. Practical 68 Marks

Paper-I	3 Hrs. Duration	66 Marks
Paper-II	3 Hrs. Duration	66 Marks
Practical	4 Hrs. Duration	68 Marks

Syllabus :

Paper-II : Marketing of Sheep and Sheep Products :

Common practice of sale-procurement of sheep and sheep products. Important Sheep products and their uses : Wool, mutton skin, bone, manure, milk etc.

Marketing of wool-regulated markets of wool particularly of Rajasthan, Wool Mandis-Krishi Upaj Mandi, Sheep and Wool Federation, regulations etc.

System of wool purchase of Rajasthan, Marketing systems adopted by Government of Rajasthan.

Wool handling, storage, packing, transportation etc.

Mutton marketing : Mutton Production, potential of Rajasthan and relative position in the country, Existing marketing system of mutton. Establishment of modern abbatores and their utility, common by-products of sheep slaughtered and their relative economic value. storage preservation of meat.

Market intelligence and pricing pattern and trends of sheep and sheep products.

Sheep and wool entrepreneurship : Financing agencies and resources mobilisation. Assistance from Banks, State Government, Co-operative etc.

Practicals	4 Hrs. Duration each	68 Marks
(Based on Paper I & II)		Min. Pass Marks 24

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25. LIVESTOCK & DAIRYING

(Pragya Mahavidyalaya, Bijai Nagar and Govt. College, Rajgarh)

Scheme :

Min. Pass Marks : Theory 48

Max. Theory 132 Marks

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Min. Pass Mark : Practical : 24		Max. Practical 68 Marks
Paper-I	3 Hrs. Duration	66 Marks
Paper-II	3 Hrs. Duration	66 Marks
Practical	4 Hrs. Duration	68 Marks

Paper—I : Livestock Products, By-Products and Their Uses

3 Hrs. Duration 66 Marks

1. Meat Slaughter houses, method of slaughtering meant hygiene, storage, preservation and marketing.
2. Skin—Method of skining, types of skin, its preservation, tanning, dyeing uses, various products of skin.
3. Horns, hoofs, Bonnes, intectives—collection, processing and uses.
4. Wool Shearing, grading, processing and uses.
5. Animal wastes—Gobar, blood, urine, their collection, storage, processing and utilization. Composts and mannures.
6. Gobar Gas : Construction and types of plant. Production, Utilization of gas.
7. Milk by-Products skim milk, ghee, butter milk and their uses, manufacture of elasein.

Paper—II : Dairy Economics

Scheme :

Min. Pass Marks : Theory 48		Max. Theory 132 Marks
Min. Pass Mark : Practical : 24		Max. Practical 68 Marks
Paper-I	3 Hrs. Duration	66 Marks
Paper-II	3 Hrs. Duration	66 Marks
Practical	4 Hrs. Duration	68 Marks
3 Hrs. Duration		66 Marks

1. Dairy Economics—Its definition meaning and scope, importance of the study of dairy economics in relation to India and Rajasthan.
2. Consumption of dairy products—demand and supply of milk and milk products in India and Rajasthan, Determination of price, price and income, elasticities of demand, cross elasticity.
3. Production of dairy products, principles of production and applied to milk and milk products, costs of production, law of diminishing returns, least cost combination, opportunity cost principles enterprize combinations, comparative advantage.

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4. Profit/Efficiency measures, measures on a dairy farm-Gross income, net income, return to factor of production as labour income, return to capital, return to management, etc. Efficiency measures for Labour, capital, Liverstock production index. Economics of dairy farm vis-a-vis, mized farms, Basic ideas of personnel management.
5. Marketing of dairy products—The nature and problems of marketing in dairy products and how they differ from farm products, marketing functions, marketing agencies & institute Live stock markets and cattle fair, marketing costs & margins.
6. Budgeting and planning on dairy farms.
7. Dairy Cooperatives—History, development, Organization and set up dairy cooperatives in India and abroad, role and types, problems and suggestions for improvement.
8. Role of credit and dairy finance—need, types and sources of credit availability on diary farms. Principles of dairy financing and repayment procedures.
9. Price policy and role of government in regulating pricing of dairy products. Role of Government in the establishment of dairy farm.

Practicals :

4 Hrs. Duration 68 Marks

1. Study of slaughtered cares of an animal—determination of proportions of edible and non-edible parts, bones and flash, dressed percentage.
2. Preservation of skin.
3. Shearing of sheep, grading of wool.
4. Preparation of decorative items from horns and hoofs.
5. Preparation of case in, its storage and disposal.
6. Study of Gobar Gas Plant, making of slvrty, changing the plant, removal of decomposed dung.
7. Determination of overall and wet average yields of animals.
8. Working out the requirements for starting a dairy with different number of animals.
9. Working out the cost of milk production under different conditions of management and production.
10. Preparation of credit proposal for starting a dairy farm with different number of animals.
11. Visit to dairy farms, lead banks and their financing institutions.

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26. ANTHROPOLOGY

BA Part III

Paper-I — Max Marks-100, Min Marks-36

Paper-II — Max Marks-100, Min Marks-36

Note- Each Paper will contain nine questions having three questions from each Unit. Candidates are required to attempt five questions in all selecting atleast one question from each Unit.

Paper-I Society and Culture in India

UNIT-I

Characteristics of Indian Culture: Purushartha, Varna Vyavastha, Ashram Vyavastha, Sanmskara. Marriage and Family in India: Continuity and Change.

UNIT-II

Concepts: Great Tradition and Little Tradition, Universalization and Parochialization, Sanskritization and Westernization. Social Stratification: Caste and Class.

UNIT-III

Special Sections of Indian Society and their Problems: Scheduled Castes, Scheduled Tribes, Women and Minorities. Nature of Indian diversity and problems of National Integration.

List of Books:.

Ahuja Ram, 1993, Indian Social System, Jaipur, Rawat Publications.

Marriott Mckim, 1955, Village India: Studies in Little-Community, Chicago University of Chicago Press.

Sharma K.L. 1997, Social Stratification in India, New-Delhi, Sage Publication.

Singh, Y., 1999, Modernization of Indian Tradition, Jaipur, Rawat Publications.

Srinivas M.N., 1966, Social Change in Modern India, California, Los Angeles,

आहुजा राम, 2000, भारतीय समाज, जयपुर, रावत पब्लिकेशन्स।

योगेन्द्र सिंह, 2006, भारतीय परम्परा का आधुनिकीकरण, रावत पब्लिकेशन्स, जयपुर, अनुवादकः अरविन्द कुमार अग्रवाल।

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Paper-II Peasant Society and Folk Culture

UNIT-I

Meaning of Rural, Characteristics of Indian rural communities. Concept and characteristics of Peasant and Peasant Society. Characteristics of Folk Society.

UNIT-II

Panchayati Raj: Structure and function of Panchayats, Impact of Panchayati Raj on Rural India. Change and development in rural society.

UNIT-III

Folklore: Definition and function. Classification of Folk literature. Folk Literature and its Social Content: Family, Women, Caste and Religion. Concept of Elite tradition.

List of Books:

Beteille Andre, 1974, The Concept of Peasant Society: Six Essays in Comparative Sociology, Oxford, Oxford University Press.

Desai A.R., 1969, Rural Sociology in India, Bombay, Popular Prakashan Private Limited.

Deva Indra, 1989, Folk Culture and Peasant Society in India, jaipur, Rawat Publications.

Dube S.C., 1955, Indian Village, London Routledge and Kegan Paul.

Islam Mazharul, 1985, Folk lore: the Pulse of the People, New-Delhi, Concept Publishing Company.

Redfield Robert, 1947, Peasant Society and Culture Chicago, University Chicago Press.

श्रीवास्तव, ए.आर.एन., 1999, भारतीय समाजः समाजशास्त्रीय विवेचन, के.के. पब्लिकेशन्स।

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B. A. Part – III (Drama) Examination 2022-23

Paper-I Western and Oriental Acting Theories (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

I. Study of acting styles in:
   a. Greek Theatre with reference to Sophoclese
   b. Elizabethan Theatre with reference to Shakespeare
   c. Renaissance Theatre with reference to Mollier
   d. Realistic Theatre
II. Selective study of Poetics
III. Study of Stanislavski and Method Acting
IV. Study of Acting in Epic Theatre of Brecht
V. Study of Oriental theatre with reference to Japanese Kabuki, Noh and Bunrako
VI. Study of following plays:
   a. Greek Plays
      1. Oedipus - Sophoclese
      2. Antigone - Sophoclese
   b. Elizabethan Plays
      1. Othello - Shakespeare
      2. Macbeth - Shakespeare
   c. Renaissance Plays
      1. Mock Doctor - Mollier
      2. Miser - Mollier
   d. Realistic Plays
      1. Doll's House - Ibsen
      2. Three sisters - Chekhov
   e. Epic Plays
      1. Three Penny Opera - Brecht
      2. Mother Courage - Brecht

Books Recommended:

1. History of Theatre – Oscar Brockett
2. Introduction to Theatre – Frank M Whiting
3. Natyakala ke Teen Sahastra Varsh – Sheldon Chenny (Tr. Sitaram Chaturvedi)
4. An Actor Prepare – Stanislavski (Tr. Vishwanath Mishra)
5. Arastoo Ka Kavyashastra – Dr. Nagendra
6. Japanese Theatre – F. Bowers
7. Brecht on Theatre – Tr. John Willett
8. All the plays prescribed in Ch. VI

Paper-II Scene Design (Theory)
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

a. Brief study of the development of Theatre Building.
b. Definition and study of basic principles of Scene Designing.
c. Study of conventions of Natyashalas of Natyashastra.
d. functions and different forms of Scenery.
e. Study of the process of the Scene Construction.

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Scene Design & Production

PRACTICAL PAPER –II
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

a. Cross section of Theatre building.
b. Rough sketches and Mechanical Drawing such as plan Elevations, Working Drawings, Cross Sections, Isometric, Orthographic and perspective Drawing
c. Model Making of a set

PRACTICAL PAPER- II
Duration – 3 Hours Max. Marks – 50 Min. Pass Marks - 18

d. Play Production by each students
e. Submission of workbook and assignments

Books Recommended:

1. Designing and printing for Theatre, Lynn Pecktel.
2. Sceneriography and Stage Technology, W.F. Bellman.
3. Scene Designing and Lighting, Parker and Smith.
4. Building a Character, K. Stanislavsky.
5. Creating a Role, K. Stanislavsky.
6. Hindi Abhinav Bharti, Vishweshar.
7. Brecht on theatre (Selected chapters), Tr. John willet.
8. A primer of Acting, C. Lowell Lees.

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28. PHYSICAL EDUCATION

There shall be two theory papers of 60 marks each, and a practical examination carrying 80 marks. A candidate must pass in theory and practical examination separately.

Paper-I

Health Education

Time : 3 Hours **Max. Marks 60** **Min. Pass M. 22**

Unit-I

Meaning of Health Education, its need and scope for college students; aims, objectives and principles of Health Education.

Unit-II

Concept of Health and Fitness; the importance of health to individual, family, community and the State; Meaning of Mental Health and its relation ship with Physical health.

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Unit-III

Balanced diet and nutrition, misconceptions about food, function of food in the body, essential body nutrients and other components of food, required diet for sportsman, adverse effects of tobacco, alcohal and intoxicating drugs.

Unit-IV

Need and importance of personal hygience, environmental hygine, food hygine, communicable disease and its posture-common postural defects, their causes and remedies.

Unit-V

Importance and general principles of safety education for preventing accidents in physical Education and sports. Common accidents in games and sports and its first aid treatments.

Books for Reference :

1. Lawrence, Thomas Gordan; Schriver, Alico : Powers; Douglas F. and Verhans Levia — Your Health and Safety Har Court, Brace & World, Inc. New York 1969
2. Bauer, W.U. (Editor) — Today's Health Guide Americal Medical Association Revised Edition, 1968.
3. Johns, Edward P. Suttan, Wilfred C., and Webster, Lloyd T. — Health for effective living No Graw Hill Book Company New York, 1970
4. Stack, Harbett, J. Duke Elkow Education for safe living, Englewood Cliffs, Now Jersey, Prentice Hall Inc. 1966.
5. Evans, A. William Everyday Safety, Chicago; Lyons and Carnathan, 1952.
6. Floria, A.A. & Stafford G.T. Safety Education; New York Mc Graw Hill Book Co. 1969.
7. Park J.E. Text Book of Preventive and Social Medicine Banarsidass Bhanat, 1980.
8. Ajmer Singh etc. : Basis of Physical Education, Health & Sports B.A. I : Kalyani Publication Ludhiana.
9. Ajmer Singh etc. Basis of Physical Education, Health & Sports (B.A. II) : Kalyani Publicatioo Ludhiana.
10. Ajmer Singh etc. Basis of Physical Education, Health & Sports (B.A. Pt III) : Kalyani Publication Ludhiana.

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11. Sharma & Granth Singh : Physical & Health Education : Asha Prakashan Greh, New Delhi.
12. Datta A.K. & Mazumdar L : Student teaching in Physical Education : Janvani Prakashan Pvt. Ltd., Delhi.
13. अजमेर सिंह और अन्य शारीरिक शिक्षा स्वास्थ्य एवं खेलों की आधुनिक पाठ्यपुस्तक (बी.ए. I) : कल्याणी पब्लिकेशन लुधियाना।
14. अजमेर सिंह और अन्य : शारीरिक शिक्षा-स्वास्थ्य एवं खेलों की आधुनिक पाठ्यक्रम (बी.ए. पार्ट I व III) : कल्याणी पब्लिकेशन लुधियाना।
15. मोहम्मद वाहिद और दीक्षित एन.के. : शारीरिक शिक्षा का इतिहास : डालीगंज रेलवे क्रासिंग लखनऊ।
16. मोहम्मद वाहिद और दीक्षित एन.के. : शारीरिक शिक्षा में शिक्षण विधि डालीगंज रेलवे क्रॉसिंग लखनऊ।
17. पाण्डेय लक्ष्मीकान्त : शारीरिक शिक्षा की शिक्षण पद्धति : मैट्रोपोलिटन बुक कं. प्रा. लि., नई दिल्ली।
18. सिंहल अशोक कुमार : शारीरिक शिक्षा सिद्धान्त, मनोविज्ञान एवं इतिहास : श्रीयांस पब्लिकेशन्स नवपुर।
19. भाटिया ए.एल. और बघेला हेत सिंह : शरीर रचना, क्रिया शास्त्र, स्वास्थ्य शिक्षा, सुरक्षा शिक्षा, प्राथमिक चिकित्सा और आहार : श्रीयांश पब्लिकेशन्स नवपुर।
20. कपलेश और संगीत : शारीरिक शिक्षा के सिद्धान्त व इतिहास : प्रकाश ब्रदर्स लुधियाना।
21. वैष्णव राजेन्द्र प्रसाद : शारीरिक शिक्षा का संगठन व विधियाँ : श्रीयांश पब्लिकेशन्स नवपुर।

Paper-II
Test and Measurement

Time : 3 Hours **Max. Marks 60** **Min. Pass M. 22**

Unit-I : Introduction

1. Meaning of tests, measurements & Evaluation, Need & Importance of Tests & Measurement in Physical Education.
2. Meaning of Statistics, Need & Importance of Statistics.
3. Frequency Tables-Meaning, Construction & Uses.

Unit-II : Fundamental of Statistics

1. Measures of Central Tendency- Meaning, uses and Calculation from Frequency Tables.
2. Graphical representation of Data-Meaning uses and Techniques.
3. Percentiles-Meaning, Uses and Calculations.

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Unit-III : Test Evaluation and Construction

1. Item to be included in Objective and Subjective tests.
2. Criteria of tests selection.
3. Administration of Testing programme.

Unit-IV : Measurement of Physical Fitness and Skill Performance

1. Fitness Tests : Apeard, JCR Test, Candian Fitness test.
2. Sports skill Tests : Johnson Basket ball Ability Test, MC Donald Soccer Test, Dribble and Goal Shooting Test in Hockey.

Unit-V

Dimenciors and Markin of Playfields Football, Volleyball, Basketball, Cricket, Hockey and Badminton.

Books Recommended :

1. Clarke H.H. Application of Measure to Health and Physical Education, Englewood Cliffs, N.J. Precentice Hall Inc.
2. Larson I.A. and Yacom, R.D: Measurement and Evaluation in Physical. Health and Recreation Education, St. Louis : C.V. Moslay Company 1957.
3. Mathew, Donald K. Measurement in Physical Education, London; W.B. Saunders Company 1973.
4. Neilson N.P. : An Elementary Course in statistice Test and Measurement in Physical Education. National Test Polo Athletic 1960.
5. Ajmer Singh etc. : Basis of Physical Education, Health & Sports, B.A. I : Kalyani Publication Ludiana.
6. Ajmer Singh etc. Basis of Physical Education, Health & Sports (B.A. II) : Kalyani Publicaiton Ludhiana.
7. Ajmer Singh etc. Basis of Physical Education, Health & Sports (B.A Pt.III) : Kalyani Publication Ludhiana.
8. Sharma & Granth Singh : Physical & Health Education : Asha Prakashan Greh, New Delhi.
9. Datta A.K. & Mazumdar I. : Student teching in Physical Education : Janvani Prakashan Pvt. Ltd., Delhi.
10. अजमेर सिंह और अन्य शारीरिक शिक्षा स्वास्थ्य एवं खेलों की आधुनिक पाठ्यपुस्तक (बी.ए. I) कल्याणी पब्लिकेशन लुधियाना।
11. अजमेर सिंह और अन्य शारीरिक शिक्षा स्वास्थ्य एवं खेलों की आधुनिक पाठ्यपुस्तक (बी.ए III) कल्याणी पब्लिकेशन लुधियाना।

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12. मोहम्मद वाहिद और दीक्षित एन.के. : शारीरिक शिक्षा का इतिहास : डालीगंज रेलवे क्रासिंग लखनऊ।
13. मोहम्मद वाहिद और दीक्षित एन.के. : शारीरिक शिक्षा में शिक्षण विधि : डालीगंज रेलवे क्रासिंग लखनऊ।
14. पाण्डेय लक्ष्मीकान्त : शारीरिक शिक्षा की शिक्षण पद्धति : मैट्रोपोलिटन बुक कं. प्रा. लि., नई दिल्ली
15. सिंहमा अशोक कुमार : शारीरिक शिक्षा सिद्धान्त, मनोविज्ञान एवं इतिहास : श्रीयांश पब्लिकेशन्स जयपुर
16. पाटिया ए.एल. और बघेला हेत सिंह : शरीर रचना, क्रिया शास्त्र, स्वास्थ्य शिक्षा, सुरक्षा शिक्षा, प्राथमिक चिकित्सा और आहार : श्रीयांश पब्लिकेशन्स जयपुर
17. कमलेश और संगीता : शारीरिक शिक्षा के सिद्धान्त व इतिहास : प्रकाश ब्रदर्स लुधियाना।
18. वैष्णव रामेन्द्र प्रसाद : शारीरिक शिक्षा का संगठन व विधियाँ : श्रीयांश पब्लिकेशन्स जयपुर।

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29. INDIAN HERITAGE IN RURAL HANDICRAFTS

B.A. Part III

Scheme	Max.Marks	Min. Pass Marks
1. Practical Paper I 5 Hrs. Duration	70	25
2. Practical Paper II 5 Hrs. Duration	70	25
3. Submission	60	22
	220	72

Syllabus

Paper I practical 5 Hrs. Duration	Max. Marks	Min. Pass Marks
	70	25

a) Clay modelling (sculpture)
b) Ceramics and pottery

Paper II practical 5 Hrs. Duration	Max. Marks	Min. Pass Marks
	70	25

Wood work

a) Fabrication of toys, sculptures
b) Furniture

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Submission work : Max. Marks 60 Min. Pass Marks 22

Note (1) : Submission work will be submitted to the head of the departments of Rural Handicrafts of the college 15 days before the commencements of examination. The marks in the submission will be Awarded by the subject teacher (Internal). However the external examiner shall be empowered to review the work of submission in case there is drastic difference between the marks of the examination and submission.

B.A. Part-III

Paper-I Scientific Principles of Sports Training & Coaching

Duration : 3 Hrs. Total Periods : 104 Max. Marks:100

Note: The paper will contain ten questions having atleast two questions from each Unit. Candidates are required to attempt five questions in all taking atleast one question from each unit.

Unit-I

I. Sports Training
- (a) Definition of the terms.
  - (i) Conditioning
  - (ii) Training
  - (iii) Coaching
- (b) Definition, aim and characteristics of Sports Training.
- (c) Principles of Sports Training.

II. Training and Load
- (a) Important features of training load.
  - (i) Intensity
  - (ii) Density
  - (iii) Duration
  - (iv) Prequency.
- (b) Principles of Training load
- (c) Over lad
  - (i) Causes
  - (ii) Symptoms

Unit 2

Motor Components
(i) Strength
- (a) Types of strength
- (b) Characteristics of Strength
- (c) Factors determining Strength

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(ii) Endurance
  (a) Form of Endurance
  (b) Importance of Endurance
  (c) Characteristics of Endurance
  (d) Types of Endurance
(iii) Speed
  (a) Form of Speed
  (b) Factors of determining speed
(iv) Flexibility
  (a) Importance
  (b) Meaning
  (c) Types
  (d) Factors determining flexibility.
(v) Coordinative abilities
  (a) Characteristics
  (b) Importance
  (c) Types
  (d) Classification

Unit 3

(a) Technique tactic & Planning
  (i) Meaning
  (ii) Definition of skill
  (iii) Techniques and Technical training
  (iv) Characteristics of Techniques
  (v) Aims of Techniques
  (vi) Methods of Technique Training
  (vii) Causes and Correction of Faults
(b) Tactics
  (i) Meaning
  (ii) Principles of Tactical Preparation
  (iii) Training Process
(c) Planning: Principle of planning, type of planning
(d) Physical fitness & their effect

Unit 4

Scientific principles: equilibrium, force, motion lever, Laws of motion and their application in different sports games.

Unit 5

Psycho-Sociological aspects of Sports Training.

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(a) Competition
  (i) Functions of Competition
  (ii) Competition Frequency
  (iii) Preparation for Competition
    (Psychological preparation)
(b) Role of Motivation in Sports.
(c) Leadership in Sports Book
(d) Group behaviour in Sports Book
(e) Audience and Sports Performance

Reference Books (Third year)

1. Cratty S. Perceptual and Motor Development in infants and children. Prentice Hall, 1979.
2. Dick F.T. Sports Training Principles Lepus, London, 1980.
3. Jonson, C.B. Fisher, A.G. Scientific Basis of Athletic conditioning Lea and Febiger, Philadelphia, 1972.
4. Matveyew, L.P. Fundamentals of Sports Training. (Translation from Russian) Mr. Publisher, Moscow, 1981.
5. Pyke, Frank, S.Towards Better Coaching, Australian Government Publishing Service Canberra, 1980.
6. Singh, H. Sports Training, General Theory and Methods, N.I.S. Patiala, 1984.
7. Willmore, U.M. Athletic training and Physical Ed. Fitness Allyn and becon. Inc. Sydney, 1977.
8. D. Harre, Principles of Training.
9. Singh, Hardayal, Science of Sports Training for D.V.S. Publications.
10. Davis R.J. Ball C.R. Rosecu J.V., Roscoe D.A. Physical Education and the Study of Sports Wolfe publishing Ltd.

Paper-II Duration 4 Hrs. Max. Marks : 100

Practicals: Mandatory Change

1. Specialization game, one which the student had opted for last two year as major game. Test will be conducted in its skill. Rules and regulation and officiating.
   Note: Specialization skill test consist of the following for the various games.
   A. (i) Hockey - Harbans Singh Hockey Test.
      (ii) Basketball - Johnson Basketball ability test.

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(iii) Volleyball - Bandy Volleyball test.
(iv) Badminton - Lockart and MC -Pherson Badminton test.
(v) Soccer - Mc Donald Soccer test.

B. Specialization Record book

VII. Any one has to be opted:

(A) Secondary game
  (a) Secondary game
    (i) Basketball
    (ii) Volleyball
    (iii) Handball
    (iv) Hockey
    (v) Cricket
    (vi) Foothall
  (b) Track and field (Heptathalon)
    (i) High jump
    (ii) Shotput
    (iii) 200 mt.
    (iv) Long jump
    (v) Javelin
    (vi) 800 mt.

(B) Racket game - Badminton
(C) Yoga Asanas

The scheme of Examination B.A. Part-I, II and III in Physical Education subject laid down as per University other optional subjects.

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COMPUTER APPLICATION (VOCATIONAL COURSE) FOR

B.A./B.Com/B.Sc. Part III

Paper-I

Paper Name : Web Authoring tools

Unit I

Data communication, Components of Data Communication System, Transmission Media- Coaxial, UTP, Optical-Fibber, Wireless, Transmission Mode- Simplex, Half Duplex, Full Duplex, Introduction to networking, LAN, MAN, WAN, network topologies.

Unit II

Evolution of Internet, Basic internet terms (Client, Server, MODEM, Web page, Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & Offline etc), Internet applications (Remote login, VoIP, Video Conferencing, Audio-Video streaming, Chatting etc). E-Mail, Advantages, working, Anatomy of an e-mail Message, basic of sending and receiving, E-mail Protocol.

Unit III

Introduction to World Wide Web: History, Working of Web Browsers, Its functions, Search engine category, Concept of Hyper Text Transfer Protocol (HTTP), Web Servers, Internet Explorer, Component of Web Publishing, Site and Domain Name, Overview of Intranet and its applications. Introduction to Advanced Technologies: Big Data, Cloud Computing, Internet of Things, Artificial Intelligence(Introduction only).

Unit IV

HTML, Designed Tools, HTML Editors, Issue in Web Site Creations and Maintenance, FTP S/W for Upload Website, Elements of HTML & Syntax, Building HTML Documents, Use of Font Size and Attributes, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, Use of Frames and Forms in Web Pages.

Unit V

Basic of Cyber Security and Cyber Crime: Computer Ethics and Application Programs, Cyber Law, Introduction to IT laws &Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, Legal System of Information Technology, Mail Bombs, Bug Exploits. Software Piracy, Firewall, Threats, Hacking and Cracking (basic concepts only for these topics).

Recommended Books:

1. The Colete eference: HTML & XHTML; Thomas A. Powel, 4th Edn.
2. Mastering HTML 4.0 by Deborah S.Ray an Eric J. Ray From BPB
3. Mastering Java Script, BPB publication.
4. Internet and web technology by Raj Kamal, TMH Publication 2. Steven Holzner,
5. The Complete Reference Java Scripts,, Tata McGraw – Hill,3rd Edn.
6. Java Script, Don Gosselin,Vikas publications

Raj Jain

Paper-II

Paper Name : Software Engineering & E-Commerce

Unit I

Introduction to software engineering: What is software engineering, software engineering principles, Software characteristics, applications. Software Development life-cycle, Models: Waterfall model, Incremental model, spiral model, Prototyping Model.

Unit II

Software requirements: Functional- non-functional requirements, User requirement, System requirements, Software requirements documentation, Software Requirement engineering process, Feasibility studies, Requirements elicitation and analysis, software prototyping, Software Reliability, Software Reusability. Software design: Basics of software design, Software Design Techniques, Data design, Data Flow Diagram.

Unit III

A strategic approach to software testing, test strategies for convention software, Black-box and white box testing, validation and system testing, and debugging; System implementation, maintenance and documentation;

Unit IV

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Security Threats of E-Commerce, E-Commerce models.

Unit V

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash. Introduction to e-banking and support services.

Recommended Books:

1. Pressman, Roger (2001) Software Engineering; A Practitioner's Approach, 8th ed. M Graw-Hill,2014.
2. Girdhari Singh, Shalinipuri; Software Engineering;2022 Edn.Genius Publications
3. Jalote, Pankaj (7) An integrated Approach to Software Engineering 2nd Ed.
4. Simon Bennett, Steve McRobb and Ray Farmer, " Object-Oriented Systems Analysis and Design Using UML" 4th Edition,McGraw Hill Education, 2010
5. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition 2012.
6. Ian Daniel, "E-Commerce get it Right", Neuro Digital Publication, 2011.
7. Lexis Leon; Enterprise Resource Planning;TMH

Paper-III

Paper Name : Web Authoring Tools Lab
Content : Lab practical's based on paper I.

Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.
Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.
Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

Unit 5: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z)=\frac{1}{2}\left(z+\frac{1}{z}\right), z^2, e^z, \sin z, \cos z,$ and $\log z$.

Evaluation of a real definite integral by contour integration.

Analytic continuation. Power series method of analytic continuation.

Reference Books:

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw – Hill International Edition, 2009.
2. Joseph Bak and Donald J. Newman, Complex analysis (2nd Edition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

Paper – III: Mechanics

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 2: Motion in resisting medium– Resistance varies as velocity and square of velocity. Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle. Projectile.

Unit 3: Central orbits – p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia – M.I. of rods, Circular rings, Circular disks, Solid and Hollow spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Product of inertia.

Unit 4: Equilibrium of coplanar force, moments and friction.

Unit-5: Virtual work and Catenary.

Raj Jain

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GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Bachelor of Commerce (B. Com.)

Duration – 3 Years

GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will develop good knowledge of commerce, accounts, finance, and business so they can do well in higher studies and future jobs.

PEO2: Students will learn to think clearly, solve problems, and make smart decisions to handle business and money matters.

PEO3 Students will understand the importance of honesty, ethics, and responsibility in their personal and professional life.

PEO4: Students will clearly understand their chosen subjects, useful topics, which will help them in higher studies or getting jobs.

PEO5: Students will learn practical skills through projects, case studies, and field activities. This will help them apply concepts from books to real business and workplace situations.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will understand commerce, accounting, economics, and management, which will help them in higher education and work life.

PO2: Students will develop the ability to solve challenges and decide wisely in business and finance.

PO3: Students will learn hands-on skills by doing lab work, field visits, and solving problems, so they can use book knowledge in real-life situations.

PO4: Students will improve communication and presentation skills to express business ideas clearly

PO5: Students will develop confidence for lifelong learning and adapt to new business and technology trends.

PSO1: Students will study different types of accounting like financial, cost, and management accounts and apply them in business and finance.

PSO2: Students will be prepared for careers in accounting, banking, finance, taxation, and corporate sectors.

PSO3: Students will learn how to apply commerce and management skills in managing or starting a business.

PSO4: Students will understand the importance of business ethics, social responsibility, and sustainable practices.

PSO5: Students will learn management concepts and use them in areas like marketing, business, and organizational behaviour to improve business activities.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

UNIVERSITY OF RAJASTHAN

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SYLLABUS

B.Com. Part –I

Examination 2025

CONTENTS

S. No. Name of the Subject and Paper

SYLLABUS

Compulsory Subject (Four)

1. General Hindi 4
2. General English (Communication Skills in English) 6
3. Environmental Studies 8
4. Elementary computer Applications 12
5. Elementary Hindi 14
   (in lieu of General Hindi for Non-Hindi speaking students only)

Core Subjects

1. Accountancy and Business Statistics 15
2. Business Administration 17
3. Economic Administration and Financial Management 21
4. Book-Keeping and Accountancy 23
   (For non-commerce students only)

Additional Subjects

1. Textile Craft 24
2. Garments Production and Export Management 26
3. Investigative Biotechnology 30

Add-on Subjects

1. Computer Applications 33
2. Tax Procedure and Practice 35
3. Principles and Practice of Insurance 39
4. Office Management and Secretarial Practice 42
5. Advertising Sales Promotion and Sales Management 46
6. Tourism and Travel Management 49
7. Foreign Trade : Practices and Procedures 53
8. Tourism 56
9. Principles and Practice of Banking and Insurance 58
10. Foreign Trade Procedure 61

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B.Com. (Pass Course)

Scheme of Examination

1) The number of papers and the maximum marks for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of a subject/paper, wherever prescribed, separately; classification of successful candidates shall be as follows:

First Division	60%	of the aggregate marks prescribed at (a) Part I Examination, (b) Part II Examination, (c) Part III Examination taken together
Second Division	48%	

All the rest will be declared to have passed the examination if they obtain the minimum pass mark in each subject viz. 36%. No division shall be awarded at the Part I and the Part II Examination.

2) There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

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/ बी.कॉम. /

सामान्य हिन्दी

3 Hrs duration

पूर्णांक 100 न्यूनतम उत्तीर्णांक 36

न्यूनतम 36 से कम अंक लाने पर छात्रों को उत्तीर्ण नहीं किया जायेगा। इस प्रश्न–पत्र में प्राप्त अंकों को श्रेणी निर्धारण हेतु नहीं जोड़ा जायेगा।

अंक विभाजन – प्रश्न पत्र में दो भाग होंगे – 1. साहित्य खण्ड एवं 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे – गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित है।

50 अंक

क	दो व्याख्या पद्य से (प्रत्येक में विकल्प देना है)	5 x 2 =	10 अंक
ख	दो व्याख्या गद्य से (प्रत्येक में विकल्प देना है)	5 x 2 =	10 अंक
ग	आलोचनात्मक प्रश्न पद्य से (विकल्प देना है)	$7\frac{1}{2}$ x 2 =	15 अंक
घ	आलोचनात्मक प्रश्न गद्य से (विकल्प देना है)	$7\frac{1}{2}$ x 2 =	15 अंक

साहित्य खण्ड – 'क' :– गद्य–पद्य की निर्धारित रचनाएँ

गद्य भाग –

1	कहानी	–	प्रेमचन्द – बडे भाई साहब विजयदान देथा – सिकंदर और कौआ
2	संस्मरण	–	कन्हैयालाल मिश्र 'प्रभाकर' – बयालिस के ज्वार की उन लहरों में
3	रेखाचित्र	–	रामवृक्ष बेनीपुरी– रजिया
4	विज्ञान	–	गुणाकर मुले – शनि सबसे सुन्दर ग्रह
5	निबंध	–	अगरचन्द नाहटा – राजस्थान की सांस्कृतिक धरोहर
6	व्यंग्य	–	शरद जोशी – जीप पर सवार इल्लियाँ
7	पर्यावरण	–	अनुपम मिश्र – आज भी खरे हैं तालाब

पद्य भाग :– (कबीर ग्रंथावली से सं. – श्यामसुंदर दास)

1	कबीर	–	साखी सं. – गुरूदेव को अंग – 7,12,26,30 सुमरन को अंग – 10,17,24,26 विरह को अंग – 2,6,10,18
2	सूरदास सूरसागर सार	–	सं. डॉ. धीरेन्द्र वर्मा
		–	विनय भक्ति पद सं. – 21,33
		–	गोकुल लीला पद सं. – 55,58
			वृंदावन लीला पद सं. – 10,28
		–	उद्धव संदेश पद सं. – 77,79
3	तुलसीदास	–	विनय पत्रिका, गीताप्रेस, गोरखपुर पद सं. – 87,88,90,156,158
4	मीरां	–	पदावली सं. – नरोत्तम स्वामी पद सं. – 1,3,4,5,10
5	रहीम (दस दोहे)	–	रहीम ग्रंथावली संपादक विद्यानिवास मिश्र, गोविन्द रजनीश (दोहावली) 186,191,211,212,214,218,219,220,223,224
6	मैथिलीशरण गुप्त		मनुष्यता, हम राज्य लिए मरते हैं (गीत–साकेत के नवम सर्ग से)
7	सुमित्रानंदन पंत :	–	नौका विहार
8	सूर्यकान्त त्रिपाठी निराला	–	वह तोड़ती पत्थर
9	सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'	–	हिरोशिमा
10	रामधारी सिंह दिनकर	–	विपथगा, समर शेष है

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खण्ड – 'ख'

व्याकरण / व्यावहारिक हिन्दी खण्ड

2.	निबन्ध लेखन	–	शब्द सीमा 300 शब्द 50 अंक
3.	पत्रलेखन	–	शासकीय – अर्द्धशासकीय पत्र, कार्यालय ज्ञापन, विज्ञप्ति एवं कार्यालय आदेश, अधिसूचना, पृष्ठांकन 4 x 2 = 8 अंक
4	संक्षेपण	–	8 अंक
5	पल्लवन	–	4 अंक
6	शब्द निर्माण प्रविधि	–	उपसर्ग, प्रत्यय, संधि, समास 5 अंक
7	शब्द शुद्धि एवं वाक्य शुद्धि		5 अंक
8.	मुहावरे एवं लोकोक्ति		5 अंक
9.	पारिभाषिक शब्दावली		5 अंक
10	शब्द के प्रकार	–	संज्ञा, सर्वनाम, विशेषण, क्रिया एवं क्रिया विशेषण 5 अंक

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2. GENERAL ENGLISH

B.Com. Part-I

Duration: 3 hrs. **Max. Marks: 100**

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives :

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation (sounds and word stress)
2. Reinforcing selected components of grammar and usage
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing. CVs and job applications.

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics and Translation **(20 marks)**

(10 periods)

I Phonetic Symbols and Transcription of Words (05)

III Translation of 5 Simple sentences from Hindi to English (05)

from English to Hindi (05)

IV Translation of 05 Words from Hindi to English ($2^{1/2}$)

from English to Hindi ($2^{1/2}$)

Unit B: Grammar and Usage **(25 marks)**
(10 periods)

I Elements of a Sentence (05)

II Transformation of Sentences (05)

a. Direct and Indirect Narration
b. Active and Passive Voice

II Modals (05)

III Tense (05)

IV Punctuation of a Short Passage with 10 Punctuation Marks (05)

(As discussed in Quirk and Greenbaum)

Unit C: Comprehension **(25 marks)**

Following Essays and Stories in *Essential Language Skills* revised edition compiled by Macmillan for University of Rajasthan General English B A. /B. Com./B. Sc.

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Candidates will be required to answer 5 questions out of ten questions from the prescribed texts. Each question will be of two (2) marks. (10)

Sujata Bhastt	Voice of the Unwanted Girl
Ruskin Bond	Night Train for Deoli
M.K. Gandhi	The Birth of Khadi
J.L. Nehru	A Tryst with Destiny
A.P.J. Abdul Kalam	Vision for 2020

The candidates will be required to answer 5 questions from an unseen passage. (10)

One vocabulary question of 10 words from the given passage.

(5)

Unit D: Compositional Skills (30 marks)

(15 periods)

I Letters-Formal and Informal		(10)
II CV's Resume and Job Applications	and Report	(10)
III Paragraph Writing		(10)

Recommended Reading:

Sasikumar, V., Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation Books. 2005.

Sawhney, Panja and Verma eds. English At the Workplace, Macmillan 2003.

Singh, R.P. Professional Communication. OUP. 2004

Judith Leigh. CVs and Job Applications. OUP. 2004

Arthur Waldhorn and Arthur Zeiger, English Made Simple. Upa and Co.

Gunashekar ed. A Foundation English Course for Undergraduates. Book I, CIEFL, Hyderabad.

Quirk and Greenbaum: A University Grammar of English Longman, 1973

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3. COMPULSORY PAPER OF ENVIRONMENTAL STUDIES

B.Com. Part-I

Scheme of examination

Time	Min Marks	Max. Marks
3 hrs	36	100

This paper will contain 100 multiple choice questions. Each question will carry 1 mark.

Students should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

Unit.1: The Multidisciplinary nature of environmental studies

Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

a. Natural resources and associated problems, Classification of resources: renewable resources,non renewable resources, classes of earth resources, resources regions: Definition and criteria, resource conservation.
b. Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problems.
d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.
f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
g. Land resources: Land as a resource, Land degradation man induced Landslides, soil erosion and desertification.
   - Role of an individual in conservation of natural resources.
   - Equitable use of resources for sustainable lifestyles.

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Unit 3: Ecosystems, Concepts, Structure, Functions and Types

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types characteristics features, structure and function of the following ecosystem:

a. Forest ecosystem, Tropical Temperate and Alpine Ecosystem

b. Grassland ecosystem and Their Types

c. Desert ecosystem with emphasis on Thar Desert

d. Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries) and Wet Lands

Unit 4: Biodiversity and its conservation

- Introduction –Definition, genetic, species and ecosystem diversity
- Biogeographically classification of India
- Value of biodiversity :consumptive use, productive use, social ethical., aesthetic and option values
- Biodiversity at global, National and local level
- India as a mega-diversity nation
- Hot-sport of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered, Threatened and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
- Red Data Book

Unit 5 : Environmental Pollution and Control Measures

Definition

- Causes, effects and control measures of:

a) Air Pollution
b) Water Pollution
c) Soil Pollution
d) Marine Pollution
e) Noise Pollution
f) Thermal Pollution
g) Nuclear Hazards

- Solid waste management" Causes, effects and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution

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- Pollution case studies
- Disaster management: floods earthquake, cyclone and landslides

Unit 6 : Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain ozone layer depletion, nuclear accidents and holocaust. Case studies
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act.
- Air (Prevention and Control of Pollution)Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations
- Population explosion-Family Welfare Programme
- Environment and Human health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case Studies

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Suggested Readings:-

1. Diwan A.P. and Arora D.K.1995. Human Ecology Anmol Publication Pvt.Ltd.,New Delhi.
2. Dubey, R.M.1992. Human Ecology and Environmental Education,Chaugh Publications,Allahabad.
3. Goudie,Andrew.The Human Impact.
4. Husain Maxia.1994 Human Geography,Rawat Publication,Jaipur.
5. Johnston, R.J.Ed.1986 Dictionary of Human geography,National Publication,New Delhi.
6. Malik,S.L.and Bhattacharya D.K.1986. Aspects of Human Ecology,Northern Book Center,New Delhi.
7. Mishra,R.P and Bhooshan,B.S.1979.Human Settlements in Asia.Public,Polices and programmes Haritage publisher,New Delhi.
8. Nathawat, G.S.1985. Human Ecology,An Indian perspective,Indian Human Ecology Council,Jaipur.
9. Russel, Bartrand, 1976.Impact of Science of society Unwin,Publisher,Indian. (paper back).
10. Sinha Rajiv, 1996.Gloobal Biodiversity Ina..Shri publication,Jaipur.
11. Sinha Rajiv K., 1994. Development without Desertrction 14.Environmentalist,Jaipur. Sinha Rajiv K., 1996.Environmental Crises and Human at Risk,In A Shri Publication,Jaipur.
12. Smith, Dlanne, 1984.Urban Ecology,George Allen,London.
13. Swarnkar, R.C.1985.Indian Tribes.Printwell publisher,Jaipur.
14. Tivy,Joy and O'Hugegreg,1985.Human Impact on the Ecosystem Edinburgh George Allen Boyd.
16. United Nations Development Report, 1996.Human Development Report, 1996.Oxford University Press,Delhi.
17. Vannathony & Rogers Paul, 1974. Human Ecology and World Development,Flehum Press,New York.

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Elementary Computer Applications

Maximum Marks- 100 (Main University Examinations)
Theory Max. Marks -60
Practical Max. Marks- 40

The candidate has to pass in Theory and Practical Examinations separately

Question paper for Elementary Computer Applications, (Compulsory paper common for B.A. / B.Sc./ B.Com. Part-I) be so set that it has 120 multiple choice questions (Bilingual) of ½ marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit – I

Introduction to information technology : Evolution and generation of computers, type of computers, micro , mini , mainframe and super computer. Architecture of a computer system : CPU , ALU, Memory (Ram, Rom families)cache memory, input /output devices, pointing devices.

Concept of Operating system, need types of operating systems. batch, single user, multi - processing , distributed and timeshared operating systems, introduction of Unix Linux, Windows, Window NT. Programming languages Low level and high level languages, generation of languages , 3 GL and 4 GL languages .Graphic User interfaces.

Unit – II

Word Processing tool : Introduction , Creating, Saving, Copy, Move and Delete. Checking Spelling and Grammer. Page Layout. interface, toolbars, ruler, menus keyboard shortcut , editing. Text Formatting, insert headers and footers. Bullets and Numbering. Find and Replace etc. Insert Table and Picture . Macro, Mail Merge.

Power Point : Creating and viewing a presentation, managing slide shows navigating through a presentation using hyperlinks, advanced navigation with action setting and action buttons. Organising formats with Master Slides applying and modifying designs adding graphics , multimedia and special effects.

Unit - III

Electronic Spreadsheet : Worksheet types of create and open a worksheet Entering data text numbers and formula in a worksheet inserting and deleting cells, cell formatting, inserting rows and columns in a worksheet formatting worksheet. Using various formula and inbuilt function. Update worksheet using special tools like spell check and auto correct setup the page

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printing. Format the data in the worksheet globally or selectively ... worksheets using charts, multiple worksheets-concepts

Unit - IV

... and Functions of the Internet. Working with Internet. Web Browsers. World ... Resource Locator and Domain Names. Uses of Internet. Search for ... Chatting, Instant messenger services, News, Group, Teleconferencing, Video- ... E-commerce and M-Commerce

... an E-mail Account. E-mail Address, configure E-mail Account, log to an E-mail, Receive ... sending mails, sending files an attachments and Address Book. Downloading Files, online form filling. E-Services - E-Banking and E-Learning.

Unit - V

Social, Ethical and Legal Matters - Effects on the way we: Work Socialise, Operate in other areas. Cyber crime, Prevention of crime, Cyber law; Indian IT Act, Intellectual property, Software ... Copyright and Patent. Software licensing, Proprietary software, Free and Open source software

Network Security - Risk assessment and security measures, Assets and types (data, applications, ... and network). Security threats and attacks (passive, active), types and effects (e.g. Identity ... denial of services, computer virus etc.), Security issues and security measures (Firewalls, ... (encryption decryption). Prevention

Question Paper pattern for Main University Practical Examination *Max Marks: 40*

Practical

The practical exercises will be designed to help in the understanding of concepts of computer and the utilization in the areas outlined in the theory syllabus. The emphasis should be on practical usage rather than on theoretical concepts only

The practical examination scheme should be as follows

- Three Practical Exercise (including Attendance & Record performance) 30 marks
  - Operating system
  - MS Word
  - MS Excel
  - MS Power Point
  - Internet
- Viva-voce 10 marks

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5. प्रारम्भिक हिन्दी

अवधि 3 घण्टे

[illegible]	50 अंक
[illegible]	24 अंक
[illegible]	26 अंक

(क) मुहावरों एवं लोकोक्तियों
(ख) पत्र लेखन अथवा निबंध

पाठ्यक्रम

1. गद्य संग्रह
2. व्याकरण शब्द विचार, वाक्य विन्यास, वाक्य खण्ड, पद क्रम का ज्ञान तथा इनमें होने वाली सामान्य त्रुटियों का ज्ञान।
3. (क) मुहावरों एवं लोकोक्तियों का प्रयोग, वाक्यों में रिक्त स्थानों की पूर्ति, समान दिखने वाले शब्दों का अर्थ भेद अथवा वाक्यों में प्रयोग।
   (ख) पत्र लेखन अथवा निबंध

– पाठ्य पुस्तकें

1. गद्य–संग्रह–राष्ट्रीय गौरव के चिन्ह– डॉ. हरिकृष्ण देवसरे
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली

व्याकरण एवं रचना

1. आधुनिक हिन्दी व्याकरण तथा रचना – लेखक कृष्ण विकल
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली
2. सुबोध व्याकरण एवं रचना–सम्पादक व्यथित हृदय–संशोधनकर्ता–डॉ.अम्बा प्रसाद सुमन
   प्रकाशक – श्रीराम मेहरा एण्ड कम्पनी, आगरा

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B.Com Part – I (PASS COURSE)

ABST : PAPER – I

Corporate and Financial Accounting

TIME: 3 hour **Max.Marks-100**
Min. Marks 36

Note: There will be five questions in all. The candidate will require to attempt all the questions selecting one question form each unit with an internal choice (either/or).

UNIT – I

Accounting principles, Conventions and Concept, General Introduction of Indian Accounting Standards AS-I and AS-9 Issue of Shares Issue of Right Shares, Buy back of Shares ESOS in the present scenario.
Redemption of Preference Shares.

UNIT – II

Issue and Redemption of Debentures, Underwriting of Shares & Debentures. Acquisition of Business, Pre-and Post Incorporation Profit.

UNIT – III

Final Accounts of Companies including Managerial Remuneration. Disposal of Profits and Issue of Bonus Shares.

UNIT – IV

Valuation of Goodwill & Valuation of Share

UNIT – V

Hire Purchase and Installment Sale Transaction. Valuation of Inventory (As-2) Insurance Claims

Note: The Candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. R.L. Gupta : Advanced Accountancy
2. S.N. Maheshwari : Advanced Accountancy
3. Sehgal and Sehgal : Advanced Accountancy
4. Agarwal, Sharma : Corporate and Financial Accounting

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B.Com Part – I (PASS COURSE)

PAPER – II

Business Statistics

TIME: 3 hour **Max.Marks-100**
Min. Marks 36

Note: There will be five questions in all. The candidate will require to attempt all the questions selecting one question form each unit with an internal choice (either/or).

UNIT – I

Introduction of Statistics: Growth of Statistics, Definition, Scope, Uses, Misuses and Limitation of Statistics, Collection of Primary & Secondary Data, Approximation and Accuracy, Statistical Errors.

Classification and Tabulation of Data: Meaning and Characteristics, Frequency Distribution, Simple and Manifold Tabulation, Presentation of Data: Diagrams/Graphs of Frequency Distribution Ogive and Histograms.

UNIT – II

Measures of Central Tendency: Arithmetic Mean (Simple and Weighted), Median (including quartiles, deciles and percentiles), Mode, Geometric and Harmonic Mean-Simple and Weighted, Uses and Limitations of Measures of Central Tendency.

UNIT – III

Measures of Dispersion: Absolute and Relative Measures of Dispersion; Range, Quartile Deviation, Mean Deviation, Standard Deviation and Co-efficient of Variation. Uses and Interpretation of Measures of Dispersion. Skewness: Different measures of Skewness.

UNIT – IV

Correlation: Meaning and Significance, Scatter Diagram, Karl Pearson's Coefficient of Correlation between two Variable: Grouped and Ungrouped Data, Coefficient of Correlation of Spearman's Rank Differences Method and Concurrent Deviation Method.

UNIT – V

Index Numbers: Meaning and Uses, Simple and Weighted Price Index Numbers, Methods of Construction, Average of Relatives and Aggregative Methods, Problems in construction of Index Numbers. Fishers Indeal Index Number, Base shifting, Splicing and Deflating.

Interpolation: Binomial, Newtons Advancing differences Method and Lagrange's Method.

Note: The Candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Sancheti and Kapoor: Business Statistics.
2. SP Gupta: Business Statistics
3. Yadav, Jain, Mittal: Business Statistics. (Hindi & English)
4. K.N. Nagar Elements of Statistics. (Hindi & English)

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Time: 3 hours

Min. Marks 36

Paper I – Business Laws

Max. Marks 100

Unit -I

The Indian Contract Act, 1872: Section 1 to 75.

Unit -II

The Indian Contract Act, 1872: Special Contracts – Indemnity, Guarantee, Bailment, Pledge, Agency.

Unit -III

The Sale of Goods Act, 1930.

Unit -IV

The Indian Partnership Act, 1932.

Unit -V

The Limited Liability Partnership Act, 2008

The Consumer Protection Act, 1986

Recommended Books

1. Elements of Mercantile Law : N. D. Kapoor, Sultan Chand & Sons, New Delhi.
2. Business Law : P.C. Tulsian, Tata Mchow-Hill Publishing Company, New Delhi
3. Business Law : S. S. Gulshan, Excel Books, New Delhi.

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4. Business Law : Nirmal Singh, Deep & Deep., Publication Pvt. Ltd., New Delhi.

5. Business Law: R.L. Nolakha, R.B.D. Jaipur.

6. Mercantile Law : N. M. Sharma, Shivam Book Depot, Jaipur

7. Business Law : Sharma, Arya, Gupta, Ajmer Books Company, Jaipur

8. व्यापारिक सन्नियमः जे. पी. सिंघल, अजमेरा बुक कम्पनी, जयपुर

9. व्यापारिक सन्नियमः आर.एल. नौलखा, आर. बी.डी., जयपुर

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Paper II - Entrepreneurship and Small Business Management

Max. Marks. 100

Unit –I

Concept of Entrepreneurship, Role of Entrepreneurship, Types of Entrepreneurship, Entrepreneurship Traits, Entrepreneurship and Manager, Problem of Entrepreneurship.

Unit –II

Entrepreneurship Training and Development, Government Encouragement to Entrepreneurship.

Unit –III

Concept of Small and Medium Enterprises, Role of SMEs, Policies governing small enterprises in India.

Unit –IV

Start up process of small enterprises, organization structure of small scale industries in India, Taxation Benefits and Concessions to small scale industries, problems of small scale industries.

Unit –V

Management of small business enterprises, Role of Financial Institutions and DICS in promoting small business.

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Recommended Books

1. Small Scale Industries and Entrepreneurship Development : C.S.V. Murthy, Himalaya Publishing House Pvt. Ltd.
2. Developing Entrepreneurship : Pareek and Rao.
3. Entrepreneurship Development : Bhansali, HPB
4. Fundamentals of Entrepreneurship : G.S. Sudha, RBD, Jaipur.
5. Fundamentals of Entrepreneurship and Small business management : Drevasant Desai, Himalaya Publishing House Pvt. Ltd.
6. Fundamental of Entrepreneurship : Dr. K.K. Patna, Himalaya Publishing House Pvt. Ltd.
7. Entrepreneurship Development : G.S. Sudha, RBD, Jaipur.
8. A Practical Guide to Industrial Entrepreneurship : S. B. Srivastava, Sultan Chand and Sons.
9. A Practical Guide to Industrial Entrepreneurship : Rajpurohit, Vyas and Sharma, Ajmer Book Company, Jaipur.

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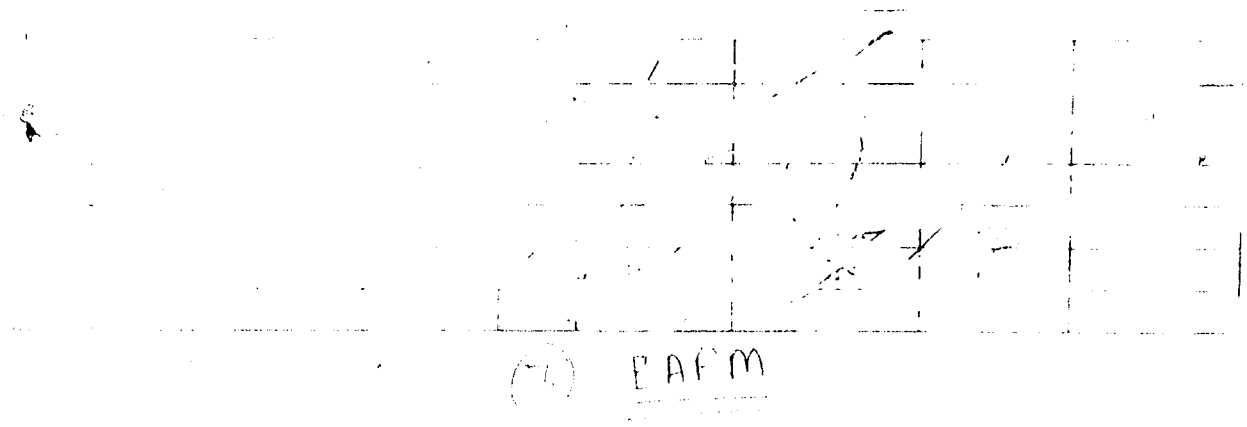

B.COM PART - I

Paper I : Business Economics

Time : 3 hours.
Min. Marks : 36

Max. Marks : 100

Unit-I Introduction to Business Economics : Definition, Meaning, Nature and scope of Business Economics, Business Economics and Economic Theory, Business Economics and Decision Sciences- The Nature & Process of Business Decision Making, The type of Business decision; Market Coordination V/s Business Coordination.

Unit-II Consumer Behaviour : Cardinal Utility Analysis- Critical evaluation of Marshall's cardinal Utility Analysis- Indifference curve approach, Marginal Rate of Substitution Relationship between MRS and Marginal Utility, Budget line and Consumer Equilibrium; Price, Income and Substitution effect; Price-Demand Relationship.

Unit-III Production Function – Types of production functions, laws of returns and returns to scale, law of variable proportions, isoquant curves, expansion path. Revenue and Cost Analysis : Revenue Analysis, total revenue, marginal revenue and average revenue, elasticity and its relationship with revenue curves. Various concepts of cost, short and long run cost curves.

Unit-IV Market Analysis : Price and output determination under perfect competition, Monopoly, Discriminating Monopoly, Imperfect Competition and Oligopoly, Non-Price Competition : Advertising Expenditure.

Unit-V Factor Pricing: Determination of Rent, Wages, Interest and Profit. Marginal Productivity theory of Distribution. Business Cycles-Theories and Phases. Measures to check business cycles, Relationship between National Income and Economic welfare.

Books Recommended:

1. D.M. Mithani , Fundamentals of business and managerial economics, Himalaya Publishing House.
2. Mote and Paul and Gupta : Managerial Economics, TATA McGraw Hill, New Delhi
3. Ahuja, H.L. : Managerial Economics, S. Chand & Company Ltd., New Delhi.
4. N.D. Mathur : Business Economics, Shivam Book House (P) Limited Jaipur

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... Vyavsayik Arthashastra (Hindi), Malik and Company, Jaipur.
... Agarwal and Agarwal : Vyavsayik Arthshastra, (Hindi) Ramesh Book Depot., Jaipur
... C.M. Chaudhary : Business Economics
... M.D. Agarwal and Som Deo: Business Economics, Ramesh Book Depot, Jaipur
... Sumit Munjal : Managerial Economics, RPH, Parnami Mandir, Jaipur.

PAPER – II
Indian Banking and Financial System

Time : 3 hours.
Min. Marks : 36 **Max. Marks : 100**

Unit-I Bank-Definition and Functions, commercial banks, a study of commercial banks public and private sector, assets and liabilities management of commercial banks. RBI and NABARD. Monetary policy and credit control by RBI.

Unit-II Universal banking, E-banking, mobile banking and innovations in banking sector.
Relationship between Banker and customer – General and Special.

Unit-III Negotiable Instruments – Cheques, Bills of Exchange and promissory notes.
A study of Banking regulations act 1949.

Unit-IV Financial System : Functions, major issues in Indian Financial System, Financial sector reforms in India.

Unit-V Financial Market – Money Market, Capital Market, Bill Market, Foreign Exchange Market and Debt Market.
Financial Instruments – Treasury Bills, Certificate of Deposits, Commercial Paper, Currency Options – Credit Card.

Books Recommended:

1. Vasant Desai Indian Banking Nature and Problems, Himalaya Publishing House, Delhi.
2. Natarajan S, Parameshwaran R : "Indian Banking", S. Chand & Company Ltd., New Delhi.
3. Averbach, Robert D; Money, Banking and Financial Markets Macmillan, London.
4. Varshney, P.N. : Indian Financial System, Sultan Chand & Sons, New Delhi.
5. Khan, M.Y. : Indian Financial System, Tata McGraw Hill, Delhi.
6. Bhole L.M. : Financial Markets and Institutions, Tata McGraw Hill, Delhi.
7. J.K. Tandon And T.N. Mathur – Banking And Finance, Shivam Book House (P) Ltd., Jaipur (Hindi and English Version)
8. Vashitha, Swami, Gupta : Banking and Finance, Ramesh Book Depot, Jaipur.

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(Extra Paper – For Non-Commerce Students only)

Book - Keeping

TIME: 3 hour **Max.Marks-100**
Min. Marks 36

Note: There will be five questions in all. The candidate will require to attempt all the questions selecting one question form each unit with an internal choice (either/or).

UNIT – I

Introduction: Meaning, Definition, Features, Scope & Objectives, Book-keeping and Accounting, Basic Terminology of Accounting.

UNIT – II

Books of Original Entry: Journal and Subsidiary books, Ledger and Trial Balance.

UNIT – III

Errors and their rectification, Bank reconciliation Statement.

UNIT – IV

Classification of Capital and Revenue Transactions, Final Accounts: without Adjustment, with Adjustment and Adjusted Trial Balance.

UNIT – V

Depreciation Accounting (including AS-6), Accounts of Non-Profit Organization and Professional People.

Note: The Candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Financial Accounting: P.C. Tulsian
2. Elements of Accounts: T.S. Grewal
3. Practical Accounts: Paul

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ADDITIONAL OPTIONAL SUBJECTS

1. Textile Craft

Scheme:

			DURATION	MAX.MARK	MIN.MARK
(i)	**Theory:**	One paper	3Hrs	60	22
(ii)	**Practical:**	One	3Hrs	80	28
(iii)	**Submission:**	Two		60	22

(Theory): Introduction to Textile Craft

UNIT-I

1. Introduction to Textiles
2. Definition of fibre, Properties of textile fibres, Primary & Secondary properties.
3. Classification of fibres
4. Production, manufacturing, properties and uses of Natural vegetable fibres- cotton, linen and jute
5. Yarn manufacture by Takli and Charkha

UNIT-II

1. Warp and Weft, Difference between warp and weft
2. Handloom, Parts of Handloom
3. Warp path on Handloom
4. Motion of Handloom(primary & secondary)
5. Elementary Weaves(Basic weaves): Plain, Twill, Satin & Sateen

UNIT-III

1. Concept of colours, Colour Wheel, Colour schemes, Achromatic & Monochromatic colours
2. Dyes and Pigments (colourless dyes)
3. Classification of Dyes
4. Dyeing of cotton fabric by Tie and Dye process
5. Fabric finishes- Introduction and Importance, basic finishes- bleaching, scouring, singeing, mercerising

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(Practical):

Samples preparation

(i) Tie and Dye (Marbling, pleating & folding, laheria and bandhej)
(ii) Elementary weaves (plain, twill, satin and sateen) on graph paper
(iii) Primary colour, secondary colour, colour scheme, achromatic & monochromatic colour
(iv) Hand painting
(v) Stencil Preparation and Painting

Submission:

Develop any two products

(i) Dupatta / scarf/table cover using tie and dye
(ii) Cushion cover or table mats using hand painting or stencil painting

Examination Scheme:

Major Problem: 50 Marks

Tie and dye/ stencil printing / hand painting on a product

Minor Problem: 30 Marks

Preparation of any weave or colour scheme

Reference books :

Dantyagi, S. (2012) Fundamental of Textiles, Orient Blackswan private limited.

Gohl, E. P. G. & Vilensky, L.D. (2005) Textile Science, CBS publishers & distributors PVT.Ltd New Delhi

Taggart, W. (1920) Cotton Spinning, London; New York: Macmillen. London

Bannergee, N.N. (1986) Weaving Technology, 9th edition, Textile book house

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2. GARMENT PRODUCTION & EXPORT MANAGEMENT

. PART – I

PAPER- I: UNDERSTANDING TEXTLES

B.A/B.Com. -M.M. 60 **Hrs.3**

B.Sc. M.M. 50

OBJECTIVES: -

1. To know different textile fibers & their performances.
2. To gain knowledge on different textiles fiber processes and finishes.
3. To become familiar with traditional textiles & embroideries of India.
4. To understand the selection criteria's of clothes

SECTION A: Textile Technology

1. Textile fibers: : General properties of Natural Fibers – Cotton, Wool. Silk, Regenerated – Rayon, Acetate Synthetic Fibers – Nylon, Acrylic
2. Fibers to yarn : The basic process involved in making yarns including blending, carding, combing, mechanical and chemical spinning
3. Fabric construction : Weaving : plain, twill, & satin weave
4. Fabric Finishes : Calendering, mercerization and tentering

SECTION B : Traditional Textile

5. Woven fabrics : Dacca muslin jamdani, chanderi, brocade baluchari, kashmiri shawls, doria, kanjivaram
6. Dyed Fabrics : Bandhej. ikat, patola.
7. Printed Fabrics : kalamkari, madhubani
8. Traditional embroideries of India :
   a) Kashida of Kashmir
   b) Kasuti of Karnataka
   c) Manipuri
   d) Chamba rumal of Himachal Pradesh
   e) Kantha of Bengal
   f) Phulkari of Punjab
   g) Chikankari of Uttar Pradesh

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SECTION – C

SELECTION CRITERIA

9. Selection of suitable fabrics for infants, toddlers, pre- school children, school going children, adolescents, adults and special needs
10. Buying criteria for readymade garments, definition, origin & evolution of ready to wear garments

References:

1. Corbman, B. P. (1983). Textiles fibre to fabric. Mc Graw Hill education.
2. Phyllis, G. T., & Billie J. C. (2009). Understanding textile. Pearson publication.
3. Naik, S.D. (1996). Traditional Embroideries of India. APH publishing.
4. Bhatnagar, P. (2009). Traditional Indian costumes and textiles. Abhishek publication.
5. Dhantyagi, S. (2012). Fundamentals of textile and their care. Orient Black swan.
6. Singh, B. Vastra vigyan avam paridhan.
7. Marjory, J. L. (1966). Introductory textile science. Holt McDougal.
8. Marjory, J. L. (1976). Essentials of textiles. Holt McDougal.
9. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER -- II
BUSINESS AND GARMENTS INDUSTRIES

B.A/B.Com.-M.M.60 **Hrs.- 3**

B.Sc.- M.M.50

OBJECTIVES: - To enable students to:-

1. Acquaint with different types of Business ownership.
2. Understand merchandising in Apparel Industries.
3. Understand the garment industry and project planning.

SECTION A
BASICS OF BUSINESS

1. Meaning and scope of business with special reference to garment export trade in India
2. The important factors to be considered at the same time of commencement of business - legal, economical, and social
3. Different types of business-
   a) individual organization

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b) partnership
c) co-operative
d) public sector
e) company

4. Objectives, importance and utility of book keeping.

SECTION – B
MERCHANDISING THEORY

5. Introduction to fashion merchandising. merchandising planning, scheduling, buying and evaluation
6. Visual merchandising.
7. Careers in Apparel industries.

SECTION –C
GARMENT INDUSTRY

8. Project planning for garment production unit.
9. Production and storage space, laundry area of garment industry.
10. Site selection for unit
11. Budgeting for garment production unit.

References :

1. Kaplan, S. R. & Anthen A. A. (2014). Management. Darling kindesley Pearson education.
2. Frings, G.S. (2007). Fashion from concept to consumer. Pearson G edition.
3. Jindal, R. (1998). Handbook of fashion, best drafting techniques. Mittal publications.
4. A.K. Sharma , S. Sharma, R. Nagar, A. Jain, S. A. Bakshi, 2016, Entrepreneurship and small business management (Hindi) 1st ed. Ajmera Book Company, Jaipur

PRACTICAL – 1
BASICS OF GARMENT CONSTRUCTION

B.A./B.Com.- M.M. 80 **Hrs. 4**

B.Sc. - M.M. 50

OBJECTIVES: - To enable students to:-

Develop skill in understanding all stitching technique.

Develop expertise in basic and traditional embroidery which gives creative, decorative and ornamental effect on dress.

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Contents

1. **Sample making :**

   Basic seams - Basting (even, uneven) back stitch, blanket)

   Hems – visible, invisible

   Lace edging – (machine)

   Gathers - (machine), darts

   Pleats – knife, box, inverted box

   Frills one side, two sided

   Tucks – pin, cross, shell

   Fasteners – hook , press button, shirt button, button hole, loop with button, zip

   Plackets – continuous, two piece

   Pockets – patch, bound, inseam, kurta

   Edge finishing - piping and facings

2. **Basic Embroidery stitches :**

   Chain, stem, running, lazy-dazy, satin, herring- bone, buttonhole, bullion, feather patch and appliqué work.

3. **Make samples of following traditional embroideries** :

   kashida, kantha, kasuti, phulkari, chamba

   Taking body measurements and knowledge of standard measurements from child to adults

Examination Scheme:

B.A.\B.COM:-Max Marks:-80
1. Major Problems:-40
2. Minor Problems:-25

Internal:-15

B.Sc:-Max Marks:-50
1. Major Problems:-20
2. Minor Problems:-20

Internal:-10

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3. INVESTIGATIVE BIOTECHNOLOGY

Paper I : Bio-Chemistry and General Bacteriology

Max. Marks 60 — 3 hrs. duration — Min. Pass Marks 22

Teaching Peirods 60

Section-A : Bio-Chemistry (Teaching Period 30)

1. Introduction and Scope of Bio-Chemistry.
2. Simple Analytical techniques : Weighing of solids and liquids; Preparation of solutions : Simple acid-base titration.
3. pH, Buffers types and their uses.
4. Mole, Molar and normal solutions, concentration units.
5. Classfication and metabolism of Carbohydrates, Lipids, Proteins, Nucleic acids and Nucleo proteins.
6. Introduction of Vitamins and Enzymes; Clinically important Enzymes and their estimation.
7. Metabolism of inorganic substances like Iodine, Phosphorous, Copper, Iron and Calcium.
8. Electrolytes in various tissue fluids in health and disease.
9. Gastric Analysis-Functional test of Lever, KIdney Pancreas and alkalosis, acidosis.

Section-B General Bacteriology (Teaching Period 30)

1. Microbial World.
2. Structure of bacterial cell; functions of cell organelles.
3. Sterilization and disinfection.
4. Culture media.
5. Cultivation of Bacteria.
6. Identification methods in bacteriology.

Paper II-Elementay Anatomy, Physiology and Halmatology

Max. Marks 60 — 3 hrs. duration. — Min. Pass Marks 22

Teaching Periods 60

Section-A : Elementary Anatomy and Physiology

(Teaching Period 30)

1. Introduction to human body.
2. Important landmarks in surface anatomy for L.M. and I.V. injection in adults, children and infants
3. Musceulo-Skeleton and Respiratory systme.
4. C V S (Cardio Vascular System) circulation.
5. G I T (Gestro Intestine Tract), Lever, Gallblader & Pancreas
6. Urinary System

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C.N.S. (Central Nervous System) and A.N.S. (Autonomic Nervous System)

8. Endrocrines and Reproductive system.
9. Skin and temperature regulation.

Section-B : Haematology (Teaching Period 30)

1. Structure of cell and cell division.
2. Blood forming tissues and Bone-marrow.
3. Formatioin of RBCs. granulocytes, Mononuclear cells, Platelets and their normal counts.
4. Blood coagulation.
5. Anaemias-classification, diagnosis.

PRACTICALS

Max. Marks 80 **(52×3 periods)** **Min. Pass marks 28**

Unit-I Bio-Chemistry

1. Glassware used in Bio-chemistry.
2. Cleaning of Glassware, weighing and measuring volumes.
3. Making and testing of distilled water.
4. Importance of caliberation of glass apparatus used in estimation.
5. Collection, coding, preservation and disposal of biological specimen material for biochemical analysis.
6. Principles of Coloritierty and verification of Lumber-Bear's Law.
7. Bio-chemical estimation of-
   (a) Sugar, (b) Urine, (c) Stool, (d) Protein, (e) A.G. ratio.
8. Detection of Organic poisions like opium, oliander and vomice.
9. Detection of Inorganic poisons like copper, arsenic, antimony, tin, murcery, lead, barium and zinc phosphate, cyanides & insecticides.

Unit-II General Bacteriology and Hematology

General Bacteriology :

1. Introduction to microscopy, various types of microscopes and their uses.
2. Wet bacterias mount and hanging drop preparation and dark field examination.
3. Preparation of smears for bacterial examination and Gram's Stain.
4. Preparation of various stains.
5. Staining of Smears- Sputum C.S.F. Body fluids, pus, aspirations.

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4 Hematology

1 Collection of blood from various sites in adult and children
2 Cleaning of slides and cover slips and identification of various pipettes and their cleaning.
3 Making of stains used in Hematology.
4 Staining and examination of blood films.
5 Differential RBC and WBC counts.
6 Estimation of Haemoglobin by comparator and calorimeter.

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ADD-ON SUBJECTS

1. COMPUTER APPLICATIONS

Scheme :	Min. Pass Marks	Max. Marks
Arts/Commerce	72 (Th 47 Pr. 25)	200
Science	54 (Th. 36 Pr. 18)	150
Paper-I 3 hrs. duration	Computer Fundamentals and Introduction to IBM PC	Arts/Com. 65 Science 50
Paper-II 3 hrs. duration	Operating Systems & Business Data Processing	Arts/Com 65 Science 50
Paper-III Practical		Arts/Com. 70 Science 50

Paper I : Computer Fundamentals and Introduction to IBM PC

What is Computer? An introduction. Uses of computers in modern society *e.g.* weather forecasting, census, oil exploration, speech recognition, banking publishing, accounting, research etc.

Information concepts and processing-hardware, software-computer capabilities and limitations. Concept of files and directories

Computer arithmetic and number system. ASCII & EBCDIC character sets.

Elements of a computer processing system-hardware, software computer capabilities and limitations. Concept of files and directories.

Hardware features and use-CUP, I/O devices. Storage devices and media.

Introduction to networking, multiprocessing, time sharing, multiprogramming and real time computing.

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ety of hardware system and features. Various types of computers available in market. Micro, Mini and Main frames, Super computers.

Evolution of personnel computers. Commodore, Atari, Apple, IBM, PC Basic block diagram of computer. Difference between personal and main frames-Simple operating system, Easy to use, Less Memory, Dedicated, Normally single user.

Introduction to microprocessors and associated computers. Timers. display controllers, DMA controllers.

Block diagram of IBM PC. Introduction to 8086 and 8088. Functional description of various modules and cards.

Boot process in IBM PC. System files. Self test.

Various types of displays and other peripherals used in IBM PCs.

Disk Operating System-Introduction. Batch files.

Configuration files. COM, EXE, SYS, BIN and TXT files. Introduction to programming in BASIC. Development of programs in Q BASIC. Use of graphics facilities using Basic.

Diagnostics for IBM PC. Use of Norton Utilities and other packages for undeleting files and other system maintenance jobs.

Advance version of IBM and compatibles.

Paper II : Operating Systems and Business Data Processing

Introduction to various categories of softwares. Operating system and its functions. Interaction of operating system with hardware and user programs.

Various components of operating system with reference to DOS Single user operating system. Task loader. Memory management.

File management, Directory structure in DOS. Moving, renaming, copying, deleting and undeleting files under DOS.

Practical

Visit to computer Lab. Introduction to various components of a computer. A simple documentation preparation and printing. Usage of printer and other components.

Physical inspection of IBM PC and internal cards. Introduction to nomenclature (COM1, COM2, etc.) Writing batch files for various purposes. Modifying config-sys files. Creating RAM disk. Diagnostics on IBM PC. Controlling PC hardware using BASIC progmas.

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TAX PROCEDURE AND PRACTICE

Model for preparation of outline of courses :

1. Subject Title : Tax Procedure and Practice — 15 weeks
2. Subject Objectives : General Objectives
   (a) To familiarise the students with the Indian Tax system.
   (b) To acquaint the students with the procedure and practice of direct and indirect taxes.
3. Job Potential :
   (i) Self Employment : Prepare returns and relevant documents for small traders, small industries and people engaged in small and medium business, necessary under direct and indirect tax law
   (ii) Wage Employment : Junior level positions in the various orginisations such as :
      (a) Practicing Chartered Accountant Firms
      (b) Business Houses.
      (c) Industrial undertakings & establishments
      (d) Sales Tax and Income Tax departments
      (e) Custom and Excise departments
      (f) Accounts Department of various Central, State, Local and Government Societies etc.
4. (i) This can not go with Science Subjects.
   (ii) It can go with commerce (B. Com. Pass)
   (iii) It can go with B.A. provided a student has done 10+2 with Accounting and Business Studies of Commerce.
5. (i) Contents :
   (a) Syllabus (Theory & Practicals)
   (b) Business Lab should be equipped with the following :
      (i) All Bare Acts related to direct and indirect taxes and various tax forms/returns/documents.
      (ii) Reference Books :
         (1) Palkhiwala-*Income Tax*. (2) Chaturvedi & Pathisana
      (iii) Text Books :
         (1) Singhania-Direct Taxes
         (2) H.C. Mehrotra-*Income Tax Law & Practice*.
      (iv) Journals :
         (1) The Institute of Chartered Accountants of India.
         (2) *Central Excise Law System*, (3) *Taxman*

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Note : (1) In addition to the above books the new text books should be prepared on the lines of the prescribed syllabus.

(2) Equipment-Computer facilities must be made available in the Business Lab.

(ii) On the Job Training (After Ist year)-

Proper training should be given to students to prepare various returns/forms/documents etc. related to Income-Tax and Sales Tax/Excise duty to enable the students to acquire necessary skills so that they can prepare these documents independently. Students can be attached for the purpose of training with local industrial houses, Excise and Custom departments, Income and Sales tax departments and practising firms of the Chartered Accountants.

(iii) On the Job Training (After 2nd year)-

Students should be attached for practical training with the organisations as suggested in (ii) Students can prepare the necessary documents/returns forms, etc. related to direct and indirect taxes.

6. Unit cost for 30 students :
   (a) Building as per the norms of the UGC
   (b) Rupees one lakh for books, journals and equipments.
7. Modalities of Examination and Evaluation :
   (a) Weightage between theory and practicals should be 70% and 30% respectively.
   (b) Continuous evaluation-Assignment, surprise test, quiz.

Paper I : Indian Tax System and Income Tax Law

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Section-A

Meaning of Tax Central and State Powers of Taxation. Distribution of revenues between Central and States. Direct and Indirect Taxes.

Direct Taxes of the Central Government—Income Tax, Wealth Tax, Interest Tax Act, 1974 with effect from 1.4.93; Expenditure Tax Act, 1987.

Indirect taxes of the Central Government—Central Excise, Customs duty, Central Sales Tax.

Taxes of the State Government Taxes on sales and purchase of goods, Octroi duty; Tax on profession, trade and business; Tool

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Tax on luxuries, entertainment and amusements; Tax on betting and gambling; Tax on electricity; Stamp duty; Agricultural income tax and Land revenue.

Section-B

Income Tax Law : Extent and application, Definitions, Previous Year, Residential Status, Incomes which do not form part of Total Income, Computation of Total Income; Heads of Income; Salaries, Income from House Property; Profit and Gain from business and profession.

Section-C

Capital gains, Income from other sources, Income, Aggregation of income and set off and earn, Forward of losses, Deduction from Gross Total Income-under Chapter VI A. Rebate of Income Tax under Section 88.

Paper II : Central and State Sales Tax-Procedure & Practice

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Section—A

Rajasthan Value Added Tax Act, 2003.

Introduction—Definitions, Extent and Commencement. Incidence and Levy of Tax. Registration of Dealers. payment of Tax. Filing of returns and assessment.

Tax liability, Recovery and Refund. Interest. Penalties, Composition and Prosecution.

Section—B

Regularity frame work-An overview of Central Sale Tax, 1956; an overview of Central Sale Tax (Registration and Turnover) Rules, 1957.

Import out terms and definitions.

Dealer, declared goods, goods, place of business, sale, sale price, turn over, Inter-State sale.

Principles for determining-When Central Sales Tax is leviable; the concept of sale and purchase of goods in the course of inter-State trade or Commerce.

When does a sale or purchase of goods take place outside the State?

When does the sale or purchase of goods is in the course of import or export ?

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Registration of dealers procedures thereof filling and filling of application in Form A for registration; relevant fee payable; security/surety for registration

Grant of certificate of Registration in Form

3. Procedure for amendment, cancellation and obtaining duplicate certificate of registration.

Section-C

Rates of Tax :

Concessional rate when an available, kind of forms for availing the concessional rates and maintenance of records related thereto.

(A) Sales to the registered dealers against Form-C

Purchasers obligations : Procedure for obtaining Form-C from Sales Tax authorities and issuing of Form-C to dealers. Application under prescribed form with requisite fee for obtaining Form-C Maintenance of records for receipts and issue of Form-C. Form 2 Sellers obligations : Obtaining Form 'C' from purchasers. Maintenance of records of "C' Form collected and submission 'C' Form at the time of assessment.

(B) Sales to the Government against D Form.

Form D- Use and custody and maintenance etc. of records of certificates in Form D.

(C) Subsequent sale in the course of Inter-State sale and receipt and issue of Form E-1 and E-2 in connection thereto.

Application for obtaining Form E-1 and E-2 and the relevant fee to be paid therewith, maintenance of records of E-1 and E-2 Forms for receipts.

Branch and Consignment transfer :

Inter State transfer of goods from the office to another or principal agent or agent to principal and issue and receipt of Form F.

Application for obtaining F Form and the relevant fee; maintenance of records of such forms and matters incidentals thereto. Form No. 5

Determination of turnover, deductions from turn over.

Return of Sales Tax payable under the Central Sales Tax Act, 1956.

Form No. 1 : Filling and Filing of Form No. 1.

Deposit of Central Sales Tax and Filling and Filing of Challan in the prescribed form

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PRINCIPLES AND PRACTICE OF INSURANCE

Scheme :

Max. Marks : 200 Min Pass Marks : 72

Paper-I 3 hrs. Duration Marks 100

Paper-II 3 hrs. Duration Marks 100

Paper-I : Life Insurance

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Note : Candidates to attempt at least one question each section and five questions in all.

Section-A

Need for security against economic difficulties; Risk and uncertainty; Individual value system; Individual Life Insurance. Nature and uses of Life Insurance; Life Insurance as a collateral, as a measure of financing business continuation, as a protection to property, as a measure of investment.

Section-B

Distinguishing characteristics, Utmost Good Faith, Insurable Interest, Caveat Emptor, unilateral and alleatory nature of contract. Proposal and application form, warranties, medical examination, policy contraction and delivery, policy provision, lapse revival, surrender value, paid-up policies, maturity, nomination and assignment. Suicide and payment of insured amount; Loan to policy holders.

Section-C

Factors governing sum assured; Methods of calculating economic risk in life insurance proposal. Measurement of risk and mortality table; Calculation of premium; Treatment of sub-standard risks. Life Insurance Fund; Valuation and investment of surplus; Payment of bonus.

Section-D

Types and their applicability to different situations, Important Life Insurance Policies issued by the Life Insurance Corporation of India. Life Insurance annuities, Important legal provisions and judicial pronouncements in India.

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Section-E

Rules of agency; Essential qualities of an ideal insurance salesman

...ales to canvass business from prospective customers. After ...le service to policy holders.

Suggested Books :

1. Huebner S.S. and Kenneth Black Jr. : *Life Insurance*-(Prentice Hall Inc., Eaglewood Cliffs, New Jersy)
2. Meher Robert L. : *Life Insurance : Theory and Practice* (Business Publication, Teaxas)
3. Maclean : *Life Insurance*
4. Gupta, O.S. : Life Insurance, (Frank Brothers, New Delhi)
5. Mishra, M.N. : *Insurance Principles and Practice*. (Delhi, Vikas Publishing House).

Paper-II : General Insurance

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Note : Candidates to attempt at least one question from each section and five questions in all.

Section-A

Introduction to risk and insurance-(a) Risk (b) The treatment of risk

Section-B

The structure and operation of the insurance business—

(a) Insurance contract fundamentals.
(b) Insurance marketing.
(c) Insurance loss payment.
(d) Underwriting, rating, reinsurance and other functions.

Section-C

General Insurance Corporation and other Insurance Institutions-Working of GIC in India; Types of risks assumed and specific policies issued by ECGC.

Section-D

Health Insurance-

(a) Individual health insurance.
(b) Group health insurance.

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Section-E

Motor Insurance.

Multiple line and All-Lines insurance-such as Rural Insurance-Hull Insurance etc.

Recommended course of reading :

General Insurance by Bickelhapupt and Magre, Eighth Edition published by Richard D. Irwin, Inc., Homewood, Illinois, Irwin-Dorsey Limited, Georgetown, Ontario, Chapters : 1 to 7, 13, 21, 27 and 28.

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E MANAGEMENT AND SECRETARIAL PRACTICE

Model for Preparation of outline of courses

Paper-I Shorthand in English/Hindi

(A) Shorthand theory

Maximum marks	35
Duration	1½ hours
(i) Two questions related with rules	10 marks
(ii) One questions related with grammalogues and phrases.	10 marks
(iii) One passage containing 100 words to be written in shorthand.	15 marks

(B) Shorthand Practice

Maximum marks	65 marks
Speed	
Hindi shorthand	50 w.p.m.
English shorthand	60 w.p.m.
Duration-Dictation	5 Minutes
Transcription by hand	1 hrs.

(A) Shorthand (Theory) English & Hindi

Unit-1 Introduction

Origin of shorthand with particular emphasis on Pitman Shorthand. definition and importance of stenography, qualities of a successful stenographer, writing techniques and materials.

Unit-2 Consonants

Definition, number, forms, classes, size, thinness, thickness, directions and joining strokes.

Unit-3 Vowels, Diphthongs and Diphones

Vowels-definition, number sounds, signs, places position of outlines, intervening vowels, Introduction of upwards/downwards strokes in Stenography.

Dipthongs-Definition, names, signs, placed joines diphthongs and triphones

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... phones-Definition, signs and application

... e of Vowels-Dipthongs and diphones in plural in Stenography.

Unit-4 Grammalogues and Phesengraphy :

Grammalogues : definition of grammalogues and logogram, list of grammalogues, punctuation signs; Phraseography : definition of phrases, how a phrase is written, qualities of a good phraseogram. list of simple phrases.

Unit-5 Circles, loops and hooks :

Circle : size and direction, application in Phraseography, attachment with straight and curved strokes, exception to the use of circle. Loops : Size and Direction.

(B) Shorthand (Practicals)

1. Repeated Practice of Consonants, writing each consonant from the text material with particular attention to their formation, length, angle, size and direction.
2. Repeated practice of vowels, dipthongs, diphones and triphones by copying the text materials and other printed shorthand book and reading book the same.
3. Repeated practice of grammalogues and phrases.
4. Repeated practice on the use of circles, loops and hooks.
5. Transcription from Shorthand into longhand.
6. Dictation from unseen passage.
7. Variety of drills : reading shorthand from black-board, copying shorthand from black-board, could not reading, delayed writing, students dictate to the class from shorthand books ,two minutes speeches by students, reading printed shorthand matter.

Paper-II Typewriting in English and Hindi

(A) Typewriting Theory

Maximum marks	35
Duration	1½ hours

(Candidates are required to answer five questions out of 8 questions. All questions will carry equal marks)

(B) Typewriting Practice

Maximum marks 65 marks

(This paper will consist of two parts)

(i) Speed Text Maximum Marks 25

Duration	10 Minutes
Speed rate English	30 w.p.m
Speed rate Hindi	...

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(ii) Type writing
(Efficiency test)

Maximum marks	40
Duration	30 Minutes

(This paper will consist of two questions)

(a) Letter writing	20 marks
(b) Tabulation	20 marks

(A) Type Writing (Theory) (Hindi English)

Unit-I Typewriter and its Maintenance
- Typewriter-Its use and importance, a standard typewriter.
- Makes and categories of typewriters
  Essential parts of a typewriter and their use
- Care and upkeep of a typewriter
- Ribbon changing and ribbon economy

Unit-2 Methods of typewriting
- Touch
- Sight
- Approach of typing
- Horizontal
- Vertical

Unit-3 Keyboard Operation
- Need for proper type and size of tables and others for use by typist.
- Sitting postures
- Materials required
- Insection and removal of paper
- Learning the second row (Home row) (guide keys and home keys)
- Learning the third row (Upper row)

Unit-4 Keyboard Operation
- Learning the first row (Bottom row)
- Learning the fourth row (Number row)
- Special signs and symbols in the keyboard and their uses

Unit-5 Display in typewriting :
- Centering-horizontal, vertical.
- Types of headings
- Margin and line spacing
- Use of punctuation marks

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Figures-Arabic and Roman
Paragraphs-type and styles, numbering, pagination.
Styles of typing different kinds of letters.
Arrangements of tabular statements.
Syllabification
Foot-notes

(B) Type Writing Practice

Key Board Operations

1. Practising second row, third row, first row and fourth row.
2. Practicing words, sentences, paragraphs and passages.
3. Use of shift keys and other non-character keys.
4. Type writing of special symbols of the key board and Punctuation marks.

Speed Building

1. Different kinds of drills for typing.
2. Graded Speed test leading to accurate speed of about 30 w.p.m.
3. Typing of passages each containing 300 words in ten minutes.

Teaching Guidelines

Attractive hand words, balanced handwords, same letters in different words, drills of common words, drills of alphabetical sentences and words division drills.

Display Techniques

1. Centring-Horizontal and Vertical
2. Ensuring proper margins; line spacing
3. Typing different types of Headings including speed heading.

Letter Typing

1. Typing exercise of personal, official and business letters in different styles with proper display.
2. Typing of application for jobs.
3. Addressing the envelops.
4. Using Carbon papers for taking out Multiple copies.

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5. ADVERTISING, SALES PROMOTION AND SALES MANAGEMENT

Scheme :

Max. Marks : 200 Min Pass Marks : 72

Paper-I 3 hrs. Duration Marks 100

Paper-II 3 hrs. Duration Marks 100

Paper-I : Marketing Communication-I

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Max. Marks : 100 3 hrs. duration Min. Pass : 36

- Nature and Importance of Communication
- Communication process. Elements of the Communication process
- Application of Communication process in marketing. Steps in developing effective marketing communication.
- Methods of Marketing Communication.
- Advertising, personal selling, public relations, sales promotion, their meaning and distinctive characteristics.
- Setting up of Targets-Policies, strategies and methods of achievements.
- Integrated Communication in Marketing.

Suggested Readings :

1. Philip Kotler *Marketing Management* 7th Edition (Prentice-Hall of India, New Delhi-1991)
2. William J. Stanton Charles & Futrell *Fundaments of Marketing*, 8th Edition (McGraw Hill Chap. 18)
3. Subroto Sengupta : *Case in Advertising and Communication Management in India* (IIM, Ahmedabad)

Paper-II : Advertising-I

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

- Importance of advertising in modern marketing. Role of advertising in the national economy.
- Type of advertising : Commercial and non-commercial advertising, primary demand and selective demand advertising, classified and display advertising; comparative advertising; co-operative advertising.
- Setting of advertising objectives
- Setting of advertising budget. Factors affecting the advertising expenditure in a company.
- Advertising message. Preparing an effective advertising copy; elements of a print copy, Headlines, illustration, bodycopy, slogan, logo, seal of approval, Role of Colon, Elements of a broadcast copy. Copy for direct mail.

Suggested Readings :

1. Wright, Winters and Zeiglas : *Advertising Management* (McGraw Hill Relevant Chapters)
2. Duna and Darban : *Advertising : Its role in modern marketing* (the Dryden Press) relevant chapters)

- Jahendra Mohan : *Advertising* (Tata McGraw Hill) (relevant chapters)
- Philip kotler : *Marketing Management* 8th Ed. (Prentice Hall of India) Chap-22
- Subroto Sen Gupta : *Cases in Advertising and Communication Management in India* (IIM, Ahmedabad)

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TOURISM AND TRAVEL MANAGEMENT

heme

ax. Marks 200 Min. Pass Marks 72

aper I 3 hrs. duration Marks 70

aper II 3 hrs. duration Marks 70

nternal Assessement Marks 30

0 Marks for Project and 10 Marks for Viva-Voce)

Com. Part-I

Paper-I Tourism Business

Paper-II Tourism Product

aper-I Tourism Business

heme

ax. Marks 200 Min. Pass Marks 72

aper I 3 hrs. duration Marks 70

aper II 3 hrs. duration Marks 70

ax. Marks : 70 3 hrs. duration Min. Pass Marks : 36

Section-A

Definition, Nature, Importance, Components and Topology of Tourism.

Section-B

Concept of Domestic and International Tourism, recent trends.

Section-C

Tourism as an industry, visitor, tourist, excursionist.

Section-D

Growth and development of Tourism of India.

Section-E

Impacts of Tourism—Economic, Social, Physical and Environmental.

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Suggested Readings :

1. Christopher J. Holloway : *The Business of Tourism* Macdonald and Evans, 1983.
2. A.K. Bhatia : *Tourism Development, Principles and Practices* : Sterling Publishers (p) Ltd. New Delhi.
3. Anand, M.M. : *Tourism and Hotel Industry in India* : Sterling Publishers (P) Ltd. New Delhi.
4. Kaul, R.H. : *Dynamics of Tourism : A Terilogy* Sterling Publishers (P) Ltd. New Delhi.
5. IITTM : *Growth of Modern Tourism Monograph* : IITTM, New Delhi 1989.
6. IITTM : *Tourism as an Industry-Monograph* : IITTM, New Delhi, 1989
7. Burhat & Madlik : *Tourism-Past, Present and Future*, Heinemann, London.
8. Wahab, S.E. : *Tourism Management* : Tourism International Press, London, 1984.
9. Brymer, Robert A : *Introduction to Hotel and Restaurant, Management*, Hub Publication Co. Lova, 1984.
10. Riecline J.R. Brent : *Travel and Tourism Hospitality Research*, London, 1982.
11. Surinder Aggarwal : *Travel agency Management* : Communication India, 1983.

Paper-II Tourism Product

Max. Marks : 70 3 hrs duration Min. Pass Marks : 36

Introduction

This paper is for the study of the product of India covering the resources both natural and man-made. Historical and Geographical background. The people, the heritage, Ancillary activities like arts, crafts, flora fauna environmental ecology and a study of the suitable development of Tourism connected with planning and development.

Section-A

Tourist Resources-Definition and Differentiation.

Tourist Resources of India-types and topologies, cultural resource-Arts and Architecture, Historical moments, religious and spiritual centres, fairs and festivals, craftsmanship, folk customs, costumes and fetes, museum monument and art galleries etc. Natural

Rich diversity in Land form and landscape, geographic features, climate waterbodies and flora and fauna

Section-B

Natural Tourist Resource-I

Tourist resource potential in mountain with special reference to Himalaya : Resources and resource use patterns in the past, present and future perspective.

India's main desert areas, their geological structure development as desert tourism-existing trends and facilities available : desert safaris and desert festival.

Coastal areas, Beaches and Islands : Resources and resource pattern.

Resources in Island with special reference to Andaman and Nicobar Islands, Overview on Tourism Development strategies.

Section-C

Social Cultural Resource-I

Architectural Heritage of India : Glimpses of India's architectural styles adopted over the ages. Historical monuments of touristic significance-ancient, medieval and modern-their spatial and regional dimensions. Important historical/archaeological sites. Important historical/archaeological sites, museum, art galleries and libraries-their location, asseate and characteristics.

Popular Religious shrines/centres-Hindu, Buddhist, Jain, Sikh, Muslim, Christian and others. Yoga, mediation and other centres.

Section-D

Social Cultural Resources-II

Performing art of India, Classical Dances and Dance Styles : Centre of learning and performances. Indian folk dances. Music and musical instruments : different schools of Indian music; status of vocal and instrumental music; New experiment.

Section-E

Handicrafts of India as a potential tourist resources. Fairs and Festivals-Social, religious and commercial fairs : festivals; promotional (Tourism) fairs, *viz* : Kite festival, White water festival, Snake boat race etc.

Indian folk culture-folk custom and costumes, settlement patterns, religious observations, folk lore and legends. Created tourist destinations, Academic, Scientific and industrial institutions

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(1) Readings :

2. Bhasin : *Indian Architecture Hindu and Buddhist period*
3. [illegible] : *The Art and Architecture of Indian Sub Continent*
4. Bharatiya Vidya Bhawan : *Imperial Unity.*
5. Bharatiya Vidya Bhawan : *Classical Age.*
6. Acharya Ram : *Tourism & Cultural Heritage of India* : RBSA Publication (Jaipur, 1986)
7. Bachan A.L. : *The Wonder that was India*, Rupa and Co.), Delhi-1988
8. Beecham A.L. : *The Gazette of India : History and Culture*, Vol 2, Publication Division, Ministry of Information and Broadcasting, Government of India 1988.
9. Hussain, A.A. : *The National Culture of India*, National Book Trust, (New Delhi-1987)
10. Mukerjee R.K. : *The Culture and Art of India* : George Allen Unwin Ltd., London, 1959.
11. *The Treasure of Indian Museums* : Marg Publication, Bombay.

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7. FOREIGN TRADE : PRACTICES AND PROCEDURES

Subject Objectives :

1. To familiarise the students with the basic principles of foreign trade and the environment in which foreign trade takes place.
2. To familiarise the students with the position of India's foreign trade, import and export policies and various export promotion measures adopted by the Government.
3. To familiarise the students with the nature and scope of International marketing and also with the four Ps of international marketing.
4. To familiarise the students with the various methods and procedures of foreign trade financing, foreign exchange rates, costing and pricing for exports and the various institutions involved in export finance.
5. To make the students aware of the shipping and insurance practices and procedures which constitute the essential services for the operation of foreign trade
6. To familiarise the students with the basic documents involved in foreign trade, processing of an export order, customs clearance

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dential :

employment can start an export business either singly or in partnership with fellow students; can take up export documentation work for others

can take up employments in exporting firms, banks, insurance companies or with freight forwarders.

(i) Permissible combination of subjects :
B A.—Any subject preferably with Economics, Psychology, Social Work, Foreign Languages.

(ii) Prerequisities of admission.
10+2 preferably with Economics or Commerce.

Contents for Non-Semester Courses

Paper-I. Basis of Foreign Trade

Unit-I	Periods
Why trade takes place ? Theories of International trade	6
Balance of Trade and Balance of Payments	4
Unit-II	
Objectives of Trade policy and role of foreign trade in economic growth.	2
Instruments of trade Policy-tariffs, quantitative restrictions, exchange control and exchange rate adjustments.	9
Unit III	
International Economic Institutions-GATT, W.T.O. UNCTAD. IMF and World Bank.	6
Trade Blocks and Regional Economic Cooperation	3

Paper-II : Indian's Foreign Trade

Objectives :

To familiarise the students with the position of India's foreign trade, import and export policies and various promotion measures adopted by the Government.

Unit-I

Analysis of India's Foreign Trade, Growth trends, Composition and direction

India's Balance of Payments including invisibles

Assessment of Prospects-Products and markets

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Unit-II

... trade agreements 3

... features of India's export-import policy 4

... and set up for export promotion 3

Unit-III

Export Assistance measures, free trade zones and 100% EOUs State trading in India 2

Sources and analysis of foreign trade statistics 2

Sources and analysis of foreign trade statistics 2

Books For :

Paper-I *International Economics* by P.T. Ellsworth
International Economics by C.P. Kindelberager

Paper-II *Annual Reports of the Ministry of Commerce*
Annual Economic Surveys
Import and Export Policy 1992-97

SUMMARY CHART

Academic Programme-Examination Scheme

Annual Examination			
I Year (2 papers) hours Trade	(i) Basics of Foreign	30 Periods	3
	(ii) India's Foreign for each examination Trade paper		
II Year (2 papers)	(i) Elements of	30 periods	3 hours
	Marketing foreach	examination	
	(ii) Export Finance &	paper Procedures	
III Year	(i) Shipping and	30 periods	3hours
(2 papers)	Insurance Practices	for each examination	
	& Procedures	paper	
	(ii) Foreign Trade Documentation and Procedures		

Practical Training-3 to 4 weeks each at the end of I & II years 100 marks each. The candidates are required to submit a small mono graph of 4,000 words in Triplicate within two months from the last date of examination.

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8 TOURISM

Paper I : Tourism in India

Theory Paper : **Max. Marks 70**

Project Report : **Max. Marks 30**

3 hrs. duration for Theory Paper

- Historical evaluation and development of tourism in India. Tourism phenomenon, forms of tourism alternative tourism (i.e. Health & Medical Tourism, Spiritual Tourism, Adventure Tourism, Rural Tourism, Ethnic Tourism). Objectives & importance of tourism in India. Domestic Tourism.

  Tourism Administration in India. Ministry of tourism at centre and state level. India Tourism Development Corporation (ITDC), State tourism development corporations and informal tourism sector.

- Tourism Regulations in India : Passport & Visa Requirements, Special Permits, Health Regulations, Law & order Regulation, Accommodation & Catering Regulation and Environment Regulations.

- Tourism Information : Source of tourism information : Government Agencies, Travel Agencies, Hotels & Media.

- Historical Monuments in India (Taj Mahal), Museums. Important fairs & festivals. Cultural heritage in India (Khajuraho), Dance, Music, Painting, Handicrafts.

- Geography and Tourism : Hill station in India, wildlife, parks and sanctuaries, Maps & charts, Biodiversity, Land Scape Destination and Ecology.

- Tourism Impact : Economic impact, social impact, political impact and environment impact. Threats & obstacls.

- Recent Tourism Policy in India.

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References :

1. Mukherjee, R.K. : The Cultural and Art of India.
2. Bhatia, A.K. : Tourism Development, Principles & Practices.
3. Kaul, R.H. : Dynamics of Tourism.

Paper II : Rajasthan Tourism

Theory Paper : Max. Marks 70

Project Report : Max. Marks 30

Hrs. duration for Theory Paper

History, Geography and Topology of Rajasthan.

Historical Monuments, Forts, Palaces and Havelies in Rajasthan.

Cultural heritage in Rajasthan.

Living style of Peoples, Religions, Cuisine & Customs of the people

Fairs & Festivals in Rajasthan : Puskar, Nagaur, Kaila Devi Ramdevara, Uras.

Dances of Rajasthan : 'Ghoomer', 'Kalbelia Dance', 'Tehra Tali'.

Wild Life and Sanctuaries in the State : Ranthambore, Sariska, Talchhaper, Dara, Kavaladev.

Architecture & Painting in Rajasthan (Bundi and Kishangarh)

Important Tourist Destinations :

Hill Resort	-	Mount Abu
Desert Resort	-	Jaisalmer
Pink City	-	Jaipur
Venis of Rajasthan	-	Udaipur
Sun City	-	Jodhpur

References :

1. झालाणी, सीताराम : राजस्थान वार्षिकी।

2. राजस्थान सरकार (सूचना एवं जनसम्पर्क निदेशालय) : राजस्थान सुजस संचय।

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9. PRINCIPLES AND PRACTICE OF BANKING AND INSURANCE

Paper I : Bank Lending : Policy and Techniques

Theory Paper : Max. Marks 70

Project Report : Max. Marks 30

3 hrs. duration for Theory Paper

- Establishing bank lending policies under changing socio-economic and legal environment.
- Types analysis techniques for bank lending.

- Techniques of analysis techniques for bank lending.
- Assessment of credit needs for term assets.
- Assessment of credit needs for working capital.
- Credit Disbursement : Terms and conditions; Documentation, Scheduling.
- Monitoring of advances.
- Renewal and recovery of advances.
- Nursing of problem accounts, including non-performing assets.
- Present credit policy and various schemes of bank lending to industry, commerce and trade and agriculture in India.
- Refinance and credit guarantee facilities for banks in India.
- Current issues and problems of bank lending in India.

References :

1. Jha, S.M. : Bank Marketing, Himalaya Publishing House, Delhi.
2. Mithani and Gordon : Banking theory and Practice, Himalaya Publishing House, Delhi.
3. Suneja, S.R. : Management of Bank Credit, Himalaya Publishing House, Delhi.
4. Varshney, P.N. : Banking Law and Practice, Sultan Chand & Sons, New Delhi.
5. Parameswaran, R. and Natarajan, S. : Indian Banking, S. Chand & Sons, New Delhi.
6. Seth : Marketing of Banking Services, Macmillan India Ltd., New Delhi.
7. Nanda, K.C. : Credit and Banking, Response Books (A division of Sage Publications), New Delhi.

Paper II : Fundamentals of Insurance

Theory Paper : Max. Marks 70

Project Report : Max. Marks 30

3 hrs. duration for Theory Paper

- Introduction to Insurance : Purpose and need of insurance; Insurance as a social security tool; Insurance and economic development.
- Fundamentals of Agency Law Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation

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Procedure for becoming an Agent - Pre-requisite for obtaining a licence, Duration of License; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices

Functions of the Agent : Proposal form and other forms for grant of cover; Financial and medical underwriting; Material Information; Nomination and assignment; Procedure regarding settlement of policy claims.

Company Profile : Organizational set-up of the company; Promotion strategy; Market share; Important activities; Structure Product; Actuarial profession; Product pricing–actuarial aspects; Distribution channels.

Fundamentals/principles of Life Insurance/Marine/Fire/Medical/ General Insurance. Contracts of various kinds; Insurable Interest.

Suggested Readings

1. Mishra M.N. : Insurance Principles and Practice; S. Chand and Co., New Delhi.
2. Insurance Regulatory Development Act, 1999.
3. Life Insurance Corporation Act, 1956.
4. Gupta OS : Life Insurance; Frank Brothers, New Delhi.
5. Vinayakam N., Radhaswamy and Vasudevan SV; Insurance – Principles and Practice, S. Chand and Co., New Delhi.
6. Mishra MN : Life Insurance Corporation of India, Vols I, II & III; Raj Books, Jaipur.

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10. FOREIGN TRADE PROCEDURE

Paper-I : Basis of Foreign Trade

Theory Paper : Max. Marks 70

Project Report : Max. Marks 30

3 hrs. duration for Theory Paper

- Concept and Importance of International Trade, Theories o International trade, Gain from International trade.
- Current trends & issues in International Trade
- Balance of Trade and Balance of Payments.
- Objectives of Trade Policy and role of foreign trade in economic growth.

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- Instruments of trade Policy – tariffs, quantitative restrictions, exchange control and exchange rate adjustments.
- International economic institutions – WTO, IMF, Asian Development Bank and World Bank.
- Multinational Corporation : Nautre, Role Types & Operations.

References :

1. Keshkamat, Finance of Foreign Trade.
2. Lall, G.S., Finance of Foreign Trade.
3. Ellsworth, P.T., International Economics.

Paper-II : Indian's Foreign Trade

Theory Paper : **Max. Marks 70**

Project Report : **Max. Marks 30**

3 hrs. duration for Theory Paper

- Analysis of India's Foreign-Trade, Growth trends, composition and direction
- India's Foreign Trades in Global Context.
- India's Balance of Payments including invisibles.
- Assessment of Prospects – Products and markets
- India's trade agreements
- Salient features of India's export-import policy
- Institutional set-up for export promotion.
- Export Assistance Measures, Free trade zones and 100% EOUs.
- State trading in India.
- Sources and analysis of foreign trade statistics.
- Foreign Investment Policy : Indian Joint Venture in abroad, Multilateralism and Bilateralism in India's foreign trade.

References :

1. टंडन, जे.के. : अन्तर्राष्ट्रीय व्यापार एवं वित्त, मलिक एण्ड कम्पनी जयपुर।
2. अग्रवाल एम.डी. सिंह, गोपाल एवं गुप्ता, ओ.पी. : अन्तर्राष्ट्रीय व्यापार एवं वित्त, एसेश बुक डिपो, जयपुर।
3. Government of India, Import Export Policy (Latest).
4. Government of India, Annual Reports of Ministry of Commerce.
5. टंडन, जे.के. : अन्तर्राष्ट्रीय व्यापार एवं वित्त, मलिक एण्ड कम्पनी जयपुर।

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SYLLABUS

B.Com. Part –II

Examination 2025

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Distribution of Marks

S. No.	Name of the Subject/Paper	Duration Hours	Max. Marks	Min. Pass Marks
1.	**Accountancy & Business Statistics**			
	Paper I – Income Tax and Practice	3	100	36
	Paper II – Cost Accounting	3	100	36
2.	**Business Administration**			
	Paper I – Company Law & Secretarial	3	100	36
	Management	3	100	36
	Paper II – Management			
3.	**Economic Admin.& Financial Management**	3	100	36
	Paper I - Economics Environment in Rajasthan	3	100	36
	Paper II – Element of Financial Management			

Additional Optional Subject

1.	**Textile Craft**			
	Paper I	3	30	
	Paper II	3	30	22
	Practical	6	70	25
	Submission		70	25
2.	**Garment Production & Export Management**		30	13
	Paper I – Fashion and Apparel Design		50	18
	Paper II – Element of Marketing and Finance		120	52
	Practical – I & II			

Add on Subject

1.	**Computer Application**			
	Paper I – Data Base Management System	3	50	8
	Paper II – Structured Programming and		65	29
	Computer Graphics		70	75
	Practical			

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S. No.	Name of the Subject/Paper	Duration Hours	Max. Marks	Min. Pass Marks
2.	**Tax Procedure and Practice**			
	Paper I-Direct Tax-I : Procedure and Practice	3	100	36
	Paper II-Direct Tax-II : Procedure and Practice	3	100	36
3.	**Principles and Practice of Insurance**			
	Paper I-Fire and Marine Insurance	3	100	36
	Paper-II-Insurance Finance and Legislation	3	100	36
4.	**Office Management and Secretarial Practice**			
	Paper I-Office Practice and Office Procedure	3	100	36
	Paper II-Typewriting and Shorthand			
	Theory	-	35	36
	Practice	-	65	
5.	**Advertising Sales Promotion and Sales Management**			
	Paper I-Advertising (II)	3	100	36
	Paper II-Personal Selling and Salesmanship	3	100	36
6.	**Tourism and Travel Management**			
	Paper I-Tourism Marketing	3	100	36
	Paper II-Travel Agency, Tour Business and Accommodation	3	100	36
7.	**Foreign Trade Practices and Procedures**			
	Paper I-Elements of Export Marketing	3	100	36
	Paper II-Foreign Trade Financing and Procedures	3	100	36
8.	Tourism			
	Paper I : Tourism Services	3	70	30
	Paper II : World Tourism	3	70	30
9.	Principles and Practice of Banking and Insurance			
	Paper I : Rural Banking	3	70	30
	Paper II : Insurance Management	3	70	30
10.	Foreign Trade Procedure			
	Paper I : Elements of Export Marketing	3		
	Paper II : Foreign Trade Financing and Procedures	3		

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UG SYLLABUS

B.COM (PASS COURSE) Part – II

EXAMINATION

Economic Administration and Financial Management

Scheme of Examination

The number of papers and the maximum marks for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of a subject/paper, wherever prescribed, separately, classification of successful candidates shall be as follows:

First Division	60%	of the aggregate marks prescribed at (a) Part I Examination, (b) Part II Examination, (c) Part III Examination taken together
Second Division	48%	

All the rest will be declared to have passed the examination if they obtain the minimum pass mark in each subject viz. 36%. No division shall be awarded at the Part I and the Part II Examination.

There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

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B.COM. PART – II

ABSTPAPER – I

INCOME – TAX LAW AND PRACTIVE

UNIT – I	Introduction, Resedential Status and Income from Salaries
UNIT – II	Income from House Property and Income from Business and Profession.
UNIT – III	Income form Capital Gain and Income from Other Sources.
UNIT – IV	Clubbing, Set off and Carry Forward of Losses and Deduction from Gross Total Income,Assessment of Individual.
UNIT – V	Assenssement of Hindu Undivided Family and Firms, Advance Payment of Tax, TDS, Procedure of E-Filling of Return.

Books recommended:

- Singhania and singhania: Student's guide to Income tax, taxman.
- Gupta and Gupta: Student's notes to Income Tax, Taxbooks.
- Ahuja and Gupta: Direct Taxes.
- Bangar and Bangar: Income Tax, AadhyaPublicaiton, allahbad.

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B.COM. PART – II (Pass Course)

ABSTPAPER – II

Cost Accountancy

TIME: 3 hour **Max. Marks-100**
Min. Mark36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit – I

Introduction: Meaning and definition of cost, cost centre, costing, cost accounting and accountancy, Objectives, significance and limitations of cost accounting. Systems, methods and techniques of cost accounting. Distinction between Financial and Cost Accounting, Material purchasing and storing. Valuation and issue of material, Material cost control.

Unit – II

Labour: Recording of time and wages, Methods of remuneration, incentive plans. Allocation of wages, labour turnover and treatment of idle time and overtime. Overhead: Meaning, collection, Classification, Allocation, Apportionment and Absorption of Overhead.

Unit – III

Unit Costing: Cost sheet, statement of cost per unit, computation of tender price by preparing statement of cost. Operating Costing: Meaning and Objectives. Preparation of statement of operating cost only related to transportation for passengers and goods only.

Unit – IV

Job Costing and Contract Costing: Cost-plus contract, escalation clause, work in progress, profit on completed, incomplete and contracts nearer to completion. Process Costing: Meaning and significance, treatment of normal and abnormal losses in process accounts. Inter process profit (Excluding Joint product, By-product & Equivalent Production).

Unit – V

Marginal Costing: Meaning, concept, significance and limitations of marginal costing as well as BEP analysis. CVP and BEP analysis, Break even Charts (Excluding stock valuation under marginal costing and absorption costing and advanced problems related to managerial decisions). Standard Costing: Meaning, concept, significance and limitations of standard costing. Setting standards and computation of material and labour variances only.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Saxena, and Vashist :- Cost Accounting
2. B.K. Bhar :- Cost Accounting
3. Agarwal and Chaturvedi:- Cost Accounting (Volume I & II)

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B.COM. Part IInd (Pass Course)

Paper I Company Law and Secretarial Practice

Paper II Management

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2. BWS-Addform

B.COM. Part IInd (Pass Course)

Paper I Company Law and Secretarial Practice

Unit I

Meaning, Characteristics of a Company, Lifting of Corporate Veil, types of Company, Privileges of a Private Company.

Unit II

Formation of a Company, Functions and Duties of Promoters, Memorandum of Association : Contents and Alterations, Articles of Association.

Unit III

Prospectus, Share Capital, Types of Shares and Debentures, Membership, Provisions of Dividend.

Unit IV

Directors- Qualifications and Disqualifications, Appointment and Removal, Power and Duties, Managing Director, Wholetime Director.

Meetings of the Company, Proxy, Agenda, Resolution, Minutes, Methods of Winding-up.

Unit V

Company Secretary- Qualifications, Role and Position, Secretarial Practice relating to allotment of shares, transfer and transmission of shares, payment of dividend.

Note: All Provisions as per Companies Act, 2013.

Books Recommended:

1. आर. सी. अग्रवाल एवं एन. एस. कोठारी : कम्पनी अधिनियम एवं सचिवीय पद्धति
2. एस.एम. शुक्ला एवं सहाय : कम्पनी अधिनियम एवं सचिवीय पद्धति
3. S.A. Sharlekar : Secretarial Practice.
4. J.C. Bahl : Secretarial Practice.
5. N.D. Kapoor : Company Law.
6. M.C. Kuchhal : Secretarial Practice.
7. Avvatar Singh : Company Law
8. [illegible] कम्पनी अधिनियम एवं सचिवीय पद्धति (रमेश बुक डिपो, जयपुर)
9. [illegible] कम्पनी अधिनियम (अजमेरा बुक कम्पनी, जयपुर)

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B.COM. Part IInd (Pass Course)

Paper II Management

Unit I

Management: Concept, Nature, Principles, Importance and Process; Schools of Management Thought; MBO; Planning- Importance, Process and Components; Decision Making- Process, Types and Techniques.

Unit II-

Organisation-Goals, Structure, Importance, Process and Principles; Theories of Organisation; Environment and Organisation; Formal and Informal Organisation; Organisational Change and Development; Authority and Responsibility; Power and Authority; Sources of Authority; Delegation of Authority; Centralisation and Decentralisation; Span of Control.

Unit III-

Communication-Significance, Channels, Types, Process, Barriers and Remedies; Co-ordination and Co-operation; Co-ordination as an essence of management; Principles and Techniques of co-ordination; Obstacles in co-ordination; Direction-Essentials of effective co-ordination; Direction-Concept, Importance and Principles.

Unit IV-

Leadership-Functions, Qualities Styles and Theories; Motivation-Importance, Types, Process and Techniques; Theories of Motivation (Maslow, Herzberg, McGregor); Sound Motivation System.

Unit V-

Control-Nature, Process, Techniques and Essentials of Effective Control; Business Process Re-engineering; TQM, Six Sigma.

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Recommended:

1. B. S. Mathur: Principles of Management. (1978)
2. Satya Saran Chatterjee : Introduction of Management.
3. Mritunjoy Banerjee : Business Administration.
4. Richard, Hatman Tuwence P. Hogan and John Wholipan : Modern Business Administration
5. S. Sarlekar : Business Management.
6. Koontz O' Donnel: Essentials of Management
7. जे.पी. सिंघल : प्रबंध, अजमेरा बुक कम्पनी, जयपुर
8. P. Subba Rao: Management-Theory and Practice, HPH.

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3. E.A.F.M.

B.COM PART – II

Paper- I

Economic Environment in Rajasthan

Time : 3 hours.
Min. Marks : 36 Max. Marks : 100

Unit-I Economic Environment – Meaning, factors affecting Economic Environment, Basic features of Indian Economy. Rajasthan Economy an Overview : Population, Area, Agriculture, Land Reforms, Crops, Animal Husbandry, Dairy Development, Mineral Resources, occupational Structure and Human Resource Development; Current Environmental Issues.

Unit-II Planning in Rajasthan, Rajasthan Budget, Rural Development schemes-Evaluation & Impact of Development programmes; Human development Index; Problems of Rajasthan Economy- Poverty and Unemployment, Panchayati Raj Institutions.

Unit-III Agriculture – Agriculture policy of Rajasthan, Significance, new agriculture strategy. Agriculture inputs, food management, major schemes for agriculture sector. Agriculture Finance, Agriculture Insurance, Agriculture productivity, Commercialisation of Agriculture, minimum support price, demand and supply of agriculture products and their effect on general price level with reference to Rajasthan.

Unit-IV Infrastructure Development in Rajasthan: Road, Energy, Water Transport, social Infrastructure-Education, Health, Tourism Development in Rajasthan-Challenges and Prospects, Main Tourist places in Rajasthan, Socio-Economic Impact of Tourism.

Unit-V Industrial Development in Rajasthan - Industrial Policy, Role of cottage and Small industries in Rajasthan, Credit flow to Industrial Sector.

Rural Finance- Concepts, need and importance, Main source of Rural Finance in Rajasthan, Problems and Prospects of Rural Finance.

Books Recommended:

1. रूद्रदत्त एवं सुन्दरम : भारतीय अर्थव्यवस्थ
2. ए.एन. अग्रवाल : भारतीय अर्थव्यवस्था
3. लक्ष्मीनारायण नाथूरामका : भारतीय अर्थव्यवस्था
4. Rudra Dutt and Sundaram : India Economy
5. बी.एल ओझा : राजस्थान की अर्थव्यवस्था
6. Mishra and Puri : Indian Economy
7. Budget Study, an overview of Rajasthan's Economy and other publication by Directorate, Economics and Statistics Rajasthan.

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PAPER – II
Elements of Financial Management

Time : 3 hours.
Min. Marks : 36 Max. Marks : 100

Unit-I Meaning, Scope, Importance and Limitations of Financial Management, Tasks and Responsibilities of a Modern Finance Manager. Financial Analysis: Financial Statements – Income Statement and Balance-sheet. Techniques of Financial Analysis.

Unit-II Ratio Analysis, Liquidity, Activity, Profitability and Leverage Ratios. Fund Flow analysis: Changes in working capital, sources and uses of fund : Cash flow analysis: sources and uses of cash. Cash flow statement as per AS(Accounting Standard)-3.

Unit-III An Introduction of Financial Planning and Forecasting. Break-even Analysis. Sources of Short-term and Long-term Finance. Equity v/s Debt.

Unit-IV Working Capital Management-Concept and Significance. Determinants and Estimation of Working Capital, Adequate Working Capital, Merits and Demerits.
Management of Cash and Marketable Securities.

Unit-V Receivables and Inventory Management.
Elementary Study of Capital Budgeting including Methods of Evaluating Capital Expenditure proposals under uncertainty. Dividend Policy.

Books Recommended :

1. Financial Management: M.R. Agarwal (English & Hindi Version)
2. Elements of Financial Management : M.D. Agarwal & N.P. Agarwal (English & Hindi Version)
3. वित्तीय प्रबंध के मूल तत्व : जाट, गुप्ता, मेन्दीरत्ता, मिश्रा, सैनी

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

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Textile Craft

B.Com. Part-II

SCHEME : B.A/B.Com/B.Sc. PART-II

			Duration	Max mark	Min mark
1.	Theory:	Paper-I	3Hrs	30	22
		Paper-II	3 Hrs	30	
2.	Practical :	Paper-I	3Hrs	35	25
		Paper-II	3 Hrs	35	
3.	Submission	Paper-I		35	25
		Paper-II		35	

Paper-I : Weaving Theory-I

UNIT-I

Yarn numbering system –Indirect (cotton, metric, woollen and worsted count) and Direct (Tex and Denier)

Yarn Twist and their types, Balance of fabric

Methods of fabric construction: Braiding &Lacing, knitting, felting and weaving

UNIT-II

Types of loom- Shuttle & Shuttle less; introduction to shuttleless looms- airjet, waterjet. projectile and rapier loom

Preparation of Warp and Weft for weaving

Draft, Peg plan, Weave, Repeat, Design

UNIT-III

Derivatives of Plain weave- Rib and Basket
Derivative of twill weave- Regular, Irregular, Left hand, Right hand,
Pointed and curved twill
Fabric defects, Selvedge, Types of Selvedge's

Paper-II: Dyeing Theory –I

UNIT-I

Difference between dyeing and printing
Mechanical finishes- basic process of beating, singeing, napping, calendaring and embossing.

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UNIT-II

Stages of Dyeing (fibre, yarn & fabric)
Wool dyeing and silk dyeing
Dyeing machines- Jigger and Winch dyeing machine

UNIT-III

Steps of printing- preparation of cloth & colour
Methods of Direct printing- Block & Roller printing
Thickeners and types of thickeners

Practical (Paper-I)

1. Thread count and Balance of the cloth
2. Weave samples of derivatives of plain and twill weave

Practical (Paper-II)

1. Introduction to motif, repeat and layout
2. Block printing- samples preparation
3. Batik-spot, crack, scratch and painting (samples)

Submission (Paper-I)

1. Assessment of samples
2. Preparation of weave samples

Submission (Paper-II)

1. Any one article using block
2. Any one article using batik

Examination Scheme:

One Major Problem: 20 Marks
One Minor Problem: 15 Marks

Reference books :

Sahnai, V.A. (1989) Theory of Dyeing, Sevak publications. Mumbai

Trotman, E.R. (1985) Technology of Dyeing, John wiley & sons Inc London. London

Pryag, R.S. (1994) Technology of Printing, India publisher.

Pryag, R.S. (1995) Technology of Finishing, India publisher.

Bucker, (1998) Textiles, Abhishek spublications.

Kulkarni, M.M., Weaving technology, Virindra publication, Jalgon

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Garment Production & Export Management

B.Com. Part-II

B.A/B.Com.– Maxmium Marks 40 Hrs.3
B.Sc. Maxmium Marks 50

THEORY PAPER – 1
Fashion and Apparel Design

OBJECTIVES : -

1. To Develop Sensitivity & Understanding towards Historical World Costumes.
2. To Focus on Design Elements & Principles and their Details on Garments.
3. To Create Awareness About the Techniques of Pattern Making & Principle of Fittings.

SECTION –A

TRADITIONAL COSTUMES

1. Study of traditional costumes of various regi ns of India.
2. History of costumes of Indian civilization.
3. Brief knowledge of world costumes ; French German, Greek, European

SECTION –B

TECHNIQUES IN PATTERN MAKINC

4. Eight head theory – principles and advantage s.
5. Pattern making techniques- drafting, draping , flat pattern.
6. Colour and colour schemes, psychological e fects of colour on clothes.
7. Fitting – principles of fitting, factors to be considerd while fitting, common fitting problems, remedying fitting defects of bodi e, sleeves, and skirts.

SECTION – C
DESIGN

8. Classification of design – structural and decorative
9. Elements and principles of design.
10. Layout of design of fabric in cutting - floral , checks, plaids, lines.

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References :

1. Erwin, M. D., Kinchen, L.A. & Peters, A. (1979). Clothing for moderns. Macmillan publishing new York.
2. Jo, K. M. (1985). Clothing construction I&II. Prentice Hall.
3. Mathews, M. (1974). Practical clothing construction part I & II. Chennai,Cosmic press.
4. Doogaji, & Deshpandey, R. (1988). Basic process and clothing construction. Raaj Prakashan.

THEORY PAPER – 1I

ELEMENTS OF MARKETING AND FINANCE

B.A./B.Com.-Maxmium Marks 40 Hrs. – 3

B.Sc. – Maxmium Marks 50

OBJECTIVES :

1. To create awareness about the procedures to select, proceed & start the Small Scale Industry.
2. To guide the process of product development according to the market needs.
3. To become familiar with the methods of payment in foreign trades & about types or bills.

SECTION A

1. Market structure- Types of market, market survey, elements of cost.
2. History of readymade garment industry, Problem and prospects in global market
3. Branded versus non -branded market.
4. Types of garments exported.

SECTION B

5. Elementary knowledge of working capital factors affecting working capital, operating cycle.
6. Sources of finance.
7. Letter of credit
8. Methods of payment in foreign trade
9. Various typed of bills.
10. Insurance

SECTION C

Brief study of ;

11. ECGC (export credit and guarantee corporation)

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12. EIC (export inspection council)
13. IIP (Indian institute of packaging)
14. ICA (Indian of arbitration)

References :

1. Srivastav, & Aggarwal. (). Vipdan prabandh.
2. Mamoria, C.B., Joshi, R. L. & Mulla, N.I. (2003). Principles & practice of marketing in india. Kitab Mahal distributers.
3. Satya narayan; Sales management.
4. Daver R.S. (2009). Salesmanship and Publicity. Vikas publishing house Pvt Limited.

PRACTICAL- 1
APPAREL DESIGNING

B.A/B.Com.–Maxmium Marks 60 Hrs.- 4

B.Sc. – Maxmium Marks 25

OBJECTIVES :

To familiarize with basics of color

To develop expertise in drawing croquis and draping dresses on them.

Contents:

1. Colour wheel and colour schemes.
2. Introduction to eight head theory and stick figure 9.5", 10.5".
3. Developing an adult croquis from block figure.
4. Draping of garments on croquis (at least 8 sheets) using different colours schemes and occasions.
5. Preparation of a portfolio.

Examination Scheme :

B.A.\B.COM:-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20

B.SC:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10

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Internal:-10 Internal:-5

PRACTICAL – II

CLOTHING CONSTRUCTION

B.A./B.Com.–Maxmium Marks 60 Hrs- 4

B.Sc. – Maxmium Marks - 25

OBJECTIVES :

1. To be able to make basic drafts of bodice, sleeve and collar.
2. To learn the knowhow of stitching and all basic processes and ornamentation techniques.

Contents :

1. Pattern making
   1. Child basic block and sleeve block.
   2. Sleeve variations; slash and spread method-puff, bell, legomutton, bishops sleeves.
   3. Sleeve bodice combination; Magyar, raglan, dolman sleeves.
   4. Different types of collars.
   5. Different types of yokes
2. Stitching of each sleeve, collar and yokes on bodice block.
3. Fashion designing (5 each) on sheet baby frocks, a line frocks , rompers. sun suits skirts and tops, bush -shirts with shorts.
4. Redesigning of old garment using the idea such as; to consider factors such as money, creativity, individuality, skills, needs,
   (i) Patchwork
   (ii) Ornamental fabric.
   (iii) Decorative embroideries
   (iv) Trims
   (v) Paints and dyes
   (vi) Introduction of fashion designing in fashion shows.
5. Introduction fashion designing in fashion shows.

References :

1. Jo, K.M. & Beazley. (1985).The sewing book of a complete guide. Prentice Hall.
2. Ireland, P. J. (1982). Fashion designing drawing and presentation. Batsford Ltd. 4th Revised edition.
3. Chase, R.W. (1997). CAD for fashion design. Prentice Hall; Pap/DSKT edition.

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Examination Scheme :

B.A.\B.Com.-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20
Internal:-10

B.Sc:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10
Internal:-5

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Add – On Subjects

1. COMPUTER APPLICATION

	Max. Marks Com.
Paper I Data Base Management System	50
Paper II Structured Programming and Computer Graphics	65
Practical Programming Laboratory	
On – the-Job training (4 Weeks)	

The Duration of these papers will be 3 hours

Paper I : Data Base Management System

Categorization of DEMS systems. Network. Hierarchical and relational databases. Application of DEMS system.

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COMPUTER APPLICATION (VOCATIONAL COURSE) FOR

B.A./B.Com/B.Sc. Part II

Paper-I

Paper Name : Operating System

Unit I

Concepts: Operating System & its need, Objectives of Operating System, Functions of Operating System, Types of OS: Simple Batch Systems, Multi-programmed Batch System, Time Sharing Systems, Parallel System, Distributed Systems and Real-Time Systems, Booting Process of OS, Operating System Structure.

Unit II

Process Management: Process Concept, Process States, Process Scheduling.
CPU Scheduling Algorithms: Basic Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multiple Feedback Queue, Multiple- Processor Scheduling.

Unit III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

Unit IV

Memory Management: Background, Why use memory management in OS, Logical versus Physical Address Space, Swapping, Contiguous Allocation (Fragmentation), Paging, Segmentation, Basic concept of Virtual Memory and Demand paging.
Introduction to File System : File Concepts(Operations and Attributes), Directory Structure, File System Structure

Unit V

Introduction of different Operating System(Linux, Unix, Windows Server), Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Input and Output, Inter Process Communication, network Structure, Security.

Recommended reference books:

1. A. Silbersachatz and P.Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.
2. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.
3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.
4. Peterson Richard, " The Complete Reference Linux " Tata McGraw Hill.
5. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6. Achyut S. Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.
7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001

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Paper-II

Paper Name : Database Management System

Unit I

Data, Data Processing, Merits and demerits of file organisation. Database Overview, Purpose of the Database system, File systems Vs. Database Systems, View of Data: Data Abstraction, Instances, Schema, Data Models: Overview of Network, Hierarchical, and Relational Model, Database Architecture and Administrators, Codd's Rules.

Unit II

ER Model: Basic Terminology, Entity, Entity sets, attributes and keys, Relation and Relationship sets, Entity-Relationship Diagram, Weak and Strong entity types, Features of E-R Model, Specialization, Generalization Aggregation, Creating table from ER diagram.

Unit III

Basic Concept of functional dependencies, loss less decomposition and dependency preservation. Normalization and its types: 1NF, 2NF, 3NF and BCNF. Introduction to transactions, Transaction States.

Unit IV

Query Languages: DDL, DML, DCL, Introduction to SQL, Data Types, Basic SQL commands like Create, Alter, Drop, Truncate, Insert, Update, Delete etc.

Unit V

Transaction management and Concurrency control, Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),database recovery management.

Recommended Books:

1. Korth H.F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill,2010
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4th Edn: BPB,2009
4. Navathe S.B. Elmasri R,; Fundamentals of Database Systems, 5th Edn, Pearson 2011.
5. Ramakrishan and Gharke, Database Management Systems, 3rd Ed, TMHI, 2007.
6. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

Paper-III

Paper Name : DBMS Lab
Content : Lab practical's based on paper II.

(b) To acquaint the students with the procedure and practice of direct and indirect taxes.

3. Job Potential :

(i) Self Emloyment :

Prepare returns and relevant documents, for small traders, small Industries and people engaged in small medium business, necessary under direct and indirect tax law.

(ii) Wage Employment :

Junior level portions in the various organisations such as --

(a) Practising Chartered Accountant firms.
(b) Business Houses.
(c) Industrial undertaking & establishment.
(d) Custom and Excise departments.
(e) Accounts department of various Central, State, Local self Government departments of various Central, State, Local self Government, Societies etc.

4. (i) This cannot be associated with Science subjects.
(ii) It can go with commerce (B.Com. Pass)
(iii) It can go with B.A. provided a student has done 10+2 with Accounting and Business studies of Commerce

5. (i) Contents :
(a) Syllabus (Theory & Practicals - enclosed)
(b) Business Lab should be equipped with the following ;

(i) All Bare Acts related to direct and indirect taxes and various tax forms / returns/ documents.

(ii) Reference Books :
1. Palkiwala – Income Tax
2. Chaturvedi & Pathisana : Income Tax

(iii) Text Books :
1. Singhania – Direct Taxes
2. H.C. Mehrotra : Income Tax Law & Practice4

(iv) Journals :
1. The Institute of Chartered Accountant of India.
2. Central Excise Law System.
3. Taxman.

Note : In addition to the above books the new text books should be prepared on the lines of the prescribed syllabi.

(ii) On the Job Training (After Ist year)-

Proper training should be given to students, to prepare various returns/ forms/ documents etc. related to Income Tax and Sales Tax / Excise duty to enable the students to acquire necessary skills so that they can prepare these documents independently. Students can be attached for the purpose of training with local industrial excise departments, income and sales tax departments, and practising firms of the Chartered Accountants.

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(iii) On the Job Training (After 2nd year) –

Students should be attached for practical training with the organuisation as suggested in (ii) . Students can prepare the necessary documents/ returns/ forms etc. related to direct and indirect taxes.

5. Unit cost for 30 students—
   (a) Building as per the norms of the UGC.
   (b) Rupees one lakh for books, journals and equipm3ents.
6. Modalities of examination and evaluation.
   (a) Weightage between theory and practicals should be 70% and 30% respectively.
   (b) Continuous evaluation – assignment surprise test quiz.

Paper–I : Direct Tax-I, Procedure and Practice

Max. Marks 100 **3 hrs. duration** **Min. Pass Marks : 36**

Section – A

1. Regulatory frame work-An overview of Income Tax Act, 1961 and Income Tax Rules, 1962
2. Income Tax Authorities.
3. Basis of Charge – who is liable to pay income-tax –person, assessee, assessment year, previous year, residential status and incidence of tax.
4. Permanent Account No. – Procedure for obtaining Permanent Account No. (PAN) – filling and filing of application under form No. 49A.

Section – B

5. Computation of total income for filing of return – Head of Income Deductions under Chapter VIA Computation of Tax in case of individual, Hindu Undivided Family, Firm, Companies, Rebate of Income Tax under Section 88.
6. Payment of Tax : Tax deducted at source, Advance Tax, Self Assessment Tax.
   (a) Tax deducted at source : filling and filing of application form for obtaining TDS number under form No. 49B – obligation of the person making payment, who and when the person is liable to deduct tax at source. Procedure and rate of Tax deducted at source on various payments.

Employers Obligations :

Stage-I : Certificate to be issued to the recipients – filing and issue of the various TDS forms (16, 16A and 16B)

Stage-II : deposit of tax deducted at source – filling and filing of the challan and deposit of tax.

Stage-III : Submission of returns of TDS under Form No. 26,26A,26B,26BB,26D, 26E.

Recipients Obligations :

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A. To obtain TDS certificate from payer; filling and filing of relevant certificates for lower or no deduction of tax at source (Form No. 13C, 14, 14B, 15, 15A, 15AA, 15B, 15D, 15E, 15F, 15G, 15H, 15I).

2. TAX PROCEDURE AND PRACTICE

MODEL FOR PREPARATION OF OUTLINE OF COURSES

1. Subject Title ; Tax Procedure Practice 15 weeks.

2. Subject Title : General Objectives.

(a) To familiarise the students with the Indian Tax system.

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Section – C

7. Advance Tax – who is liable to pay advance tax, computation of advance tax, instalment and due date of Advance Tax, Interest Payable by the assessee. Filling of challan and deposit of Advance Tax.
8. Self Assessment Tax - Filling of the challan and depositing of the tax there of, interest under self-assessment.
   Return of Income : who is liable to file return of income, time limit, return of loss, related return. Revised return, Defective return, Return by who to be signed, filling and filling of Income under :

   Form No. 1 in case of companies other than those claiming exemption under section II
   Form No. 2 for aassesses (other than companies and those claiming exemption under Section 11). Whose total income include profit & gain from business and profession.
   Form No. 3A For assesses including companies claiming exemption under Section 11

Paper – II : Direct Tax – II, Procedure and Practice

Max. Marks : 100 **3 hrs. duration** **Min Marks : 36**

Section – A : Wealth Tax

1. Regulatory frame work ; An overview of Wealth Tax Act. 1957 and Wealth Tax Rules 1957.
2. Wealth Tax Authorities.
3. Important terms and definitions- valuation date, assessment year, meaning of Assets.
4. Exempted Assets, Valuation of invaluable property and Jewellers computation of Net Wealth, Computation of Wealth Tax, Filling of challan for payment of Wealth Tax, and deposit tax.
5. Return of Wealth tax, limit for filing return, filling and filing of return of Wealth under Form A & B.
6. Assessment and Post Assessment Procedure in brief.

Section – B : Income Tax

7. Assessment Procedure : Inquiring before Assessment. Assessment under Section 143(1). Regular Assessment under Section 143(2). Best Judgement Assessment, income escaping Assessment, issue of notice where income has escaped assessment, Time limit for Notice. Time limit for compilation of assessment and re-assessment.

Section – C

Post Assessment Procedure :

8. Refund : who can claim refund, Form No. 30 for Refund, Time limit for claiming refund, Refund on appeal, Interest on refunds.
9. Rectification of mistake (s).
10. Appeals and revision : When an assessee can file appeal, appellate authorities, procedure for filing appeal, filling and filing of form No. 35, From No. 36. Time limit for filing appeal. Revision by Income Tax Commissioner.

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SYLLABUS

B.Com. Part –III

Examination 2025

B.Com. (Pass) Course

SCHEME OF EXAMINATION

The number of papers and the maximum for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject paper, wherever prescribed, separately classification of successful candidates shall be as follows :

First Division 60%
Second Division 48%

Of the aggregate marks prescribed at (a) Part-I Examination, (b) Part-II Examination (c) Part-III Examination, taken together

All the rest shall be declared to have passed the examination if they obtain the minimum pass marks in each subject, viz., 36% No division shall be awarded at the Part-I and Part-II examination.

CONTENTS

1. Accountancy and Business Statistics 5
2. Business Administration 18
3. Economics Administration and Financial Management 25

Additional Optional Subjects

1. Textile Craft 34
2. Garment Production and Export Management 44

Add – on Subjects

1. Computer Applications 47
2. Tax Procedure and Practice 47
3. Principles and Practice of Insurance 53
4. Office Management and Secretarial Practice 55
5. Advertising Sales Promotion and Sales Management 57
6. Tourism and Travel Management 59
7. Foreign Trade Practice and Procedure 60
8. Tourism 63
9. Principals and Practice of Banking and Insurance 64
10. Foreign Trade Procedure 66

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B.Com Part- III Examination

Distribution of Marks

S No	Name of the Subject/Paper	Duration Hours	Max Marks	Min Pass Marks
1.	**Accounting & Business Statistics**			
	Paper-I Auditing & Management Accounting	3	100	36
	Paper-II Optional (Any one of the following)			
	Paper-II (1) Advanced Accountancy	3	100	36
	Paper-II (2) Advanced Cost Accounting	3	100	36
	Paper-II (3) Advanced Business Statistics	3	100	36
	Paper II (4) Cost and Management Audit	3	100	36
	Paper-II (5) Direct Tax	3	100	36
	Paper-II (6) Goods And Service Tax	3	100	36
	Paper-II (7) Computerized Accounting (For Regular Students only)	3	100	36
2	**Business Administration**			
	Paper-I Functional Management	3	100	36
	Paper-II Optional (Any one of the following)			
	Paper-II (1) Advertising & Sales Management	3	100	36
	Paper-II (2) E-Commerce	3	100	36
	Paper-II (3) Insurance	3	100	36
	Paper-II (4) Industrial Laws	3	100	36
	Paper-II (5) Organizational Behaviour	3	100	36
3.	**Economics Administration & Financial Management**			
	Paper-I Rural Development & Cooperation	3	100	36
	Paper-II Optional (Any one of the following)			
	Paper-II (1) Business Budgeting	3	100	36
	Paper-II (2) Public Economics	3	100	36
	Paper-II (3) International Finance	3	100	36
	Additional Optional Subjects			
4	Textile Craft			
5	Garment Production & Export Management			

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Add-on Subjects :

1. Computer Application
2. Tax Procedure and Practice
3. Principles and Practice of Insurance
4. Office Management and Secretarial Practice
5. Advertising Sales Promotion and Sales Management
6. Tourism and Travel Management
7. Foreign Trade Practices and Procedures
8. Tourism
9. Principles and Practice of Banking and Insurance
10. Foreign Trade Procedure

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A.B.S.T. **B.Com. Part III (Pass Course)**

Paper I (Compulsory)

Auditing and Management Accounting

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit – I

Auditing: Meaning, Objects, Fraud and Errors, Relationship in between Book-Keeping Accounting and Auditing, Elementary Knowledge of Standards on Auditing Practices, Type of Audit.

Internal Control Measures.

Audit Programme.

Unit – II

Vouching, Verification and Valuation of Assets and Liabilities (including Practical Verification).

Company Auditor: Appointment, Removal and Remuneration.

Unit – III

Company Auditor: Audit and Auditors (brief Knowledge of Sections 139 to 148 of Companies Act, 2013), Rights, Duties and Liabilities.

Company Audit, Audit Report and Certificates.

Unit – IV

Management Accounting: Meaning, Nature, Objectives, Scope and functions.

Capital Structure: Determinants and Theories.

Leverages: Operating, Financial and Combines.

Unit – V

Financial Statement Analysis: Meaning, nature, importance and techniques of financial analysis: Comparative Statements, Common Size Statement and Trend Analysis.

Ratio Analysis: Preparation of Income Statement and Balance Sheet on the Basis of Ratio.

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. H.S. Khandelwal: Auditing.
2. T.R. Sharma: Auditing.
3. Batty J: Management Accountancy.
4. Manmohan &Goyal: Principles of MagementAccouting.
5. Jain and Khandelwal: Auditing and Management Accounting.
6. Maheshwari S. N: Management Accounting and Financial Control.
7. M.R. Agarwal: Management Accounting.
8. C.P. Jain & HS Khandelwal: Auding& Management Accounting.

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ABST Optional Paper I

Advanced Accountancy

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit – I

Departmental Accounts.
Branch Accounts including Foreign Branch.

Unit – II

Investment Accounts
Royalty Accounts

Unit – III

Accounts of Holding and Subsidiary Companies.

Unit – IV

Amalgamation of Companies (excluding inter company holdings)
Internal Reconstruction (without scheme)

Unit – V

Liquidation of Companies : procedure contributories, statement of affairs, deficiency Accounts, Liquidator and receivers Final Statement of Account
Double Account System (Excluding accounts of electricity supply companies)

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1 R.L. Gupta; Advance Accounting
2 Shukla, Grewal; Advanced Accountancy
3 Agarwal, Sharma; Advanced Accounting
4 Sehgal and sehgal; Advanced Accounting Vol. II

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Optional Paper-II

Advance Cost Accounting

Time 3 hours Max. Marks.100

Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either\or)

Unit-I

Accounting Treatment and Control of Waste, Scrap, Spoilage, Defective and Obsolescence. Accounting Treatment and Control of Administrative, Selling and Distribution Ovrthead, Research and Development Costs. Learning Curve Theory

Unit-II

Integrated and non-integrated cost accounts (Cost Ledger or Cost Control Accounts), Reconciliation of cost and financial accounting.

Unit-III

Process Costing : Accounting treatment of losses during processing, inter-process profit. By Product and Joint-Product.Equivalent Production, Uniform Costing and Inter-firm Comparison. Ratios useful for inter-firm Comparison.

Unit-IV

Meaning of concept of Marginal Costing : Break-even Analysis and Differential costing. Valuation of stock under marginal and absorption costing; Production decisions based on Marginal Costing (Make or Buy, Manual or Machine, Key Factor based product mix only)

Unit-V

Marketing decisions and other decision based on Marginal Costing (Own or lease, repair or replace, now or later, shut down or continue only) Standard Costing (sales & overhead)

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Maheswari and Mittal : Cost Accounting, Mahaveer Book Depot, Delhi
2. Prasad N.K Principles and Practice of Cost Accounting
3. Saxena and Vashistha : Advanced Cost Accounts (Sultan Chand & Sons)
4. Ratanam P.V. : Costing Adviser (Kitab Mahal)
5. Ravi M. Kishor : Cost Accounting Taxmann Publication, New Delhi
6. Oswal, Mangal, Bidawat : Advanced Cost Accounting

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ABST Optional Paper III

Advanced Business Statistics

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit – I

Analysis of time series : Meaning, components of time series, methods of measuring trend, seasonal and cyclical variations, Multiple correlation and regression.

Unit – II

Theory of probability: Elementary problems based on permutations and combinations, additive and multiplicative rules. Bays Theorium:

Unit – III

Theoretical Frequency Distributions : Binomial, Poisson and Normal distribution, Moments &Kurthosis

Unit – IV

Sampling: Meaning, Sample of attributes and variables, Test of significance, large samples and small samples, t-test, and chi-square test.

Unit – V

Analysis of variance: One way and two way classifications, design of experiment. Statistical quality control

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. Matur, Khandelwal, Gupta: Business Statistics
2. Kailash Nath Nagar : Business Statistics
3. S.P. Gupta – Statistical Methods
4. Sancheti& Kapoor- Statistical Methods

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ABST Optional Paper IV

Cost and Management Audit

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit – I

Cost Audit; Meaning, Evolution, Scope, Aspects, Objects, Nature, Advantages, Difference between Statutory Audit and Cost Audit, Application of Cost Accounting Standards, Cost Auditor and Professional Ethics.

Unit – II

Cost Audit Programme, Cost Accounting Records Rules, Verification of Cost Records and Reports.

Unit – III

Cost Audit Report and its Review, Cost Audit leading to other services: Productivity, Energy, Inventory, Environmental Pollution Control and Corporate Service, Peer Review.

Unit – IV

Management Audit: Meaning, Need, Difference between Statutory Audit and Management Audit, Purpose/objects, Scope, Aspects, Techniques and Procedures of Management Audit, Review of Management Functions: Production, Distribution, Development, Personnel and Industrial Relations, Research and Development, Cost Accounting and Finance and General Management Functions.

Unit – V

Review of Purchasing Operations, Review of Manufacturing Operations, Appraisal of Management Decisions, Corporate Social Audit.

Books Recommended:

1. Chaudhary D: Management Audit and Cost Audit,
2. Ramanathan: Cost and Management Audit,
3. Rose T.G.: Management Audit
4. Kamal Gupta: Contemporary Audit
5. Saxsena&Vasisth : Cost & Management Audit.

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ABST Optional Paper V

Direct Tax

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Note: There will be five question in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or)

Unit –I

Advance Payment of Tax, TDS, Interest on Taxes and Tax Refund Procedure or E filing or return

Unit –II

Assessment of Trust, Assessment of Local Authorities

Unit –III

Assessment of Non- residents and Representative Assessee.

Advance Ruling, Double Taxation Relief and Foreign Collaboration

Unit –IV

Assessment of Co-operative Societies

Penalties and Prosecutions, Appeal, Revision and Tax Authorities

Unit –V

Assessment of Companies

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

Books Recommended:

1. SinghaniaV.K : Direct Taxes
2. Girish Ahuja : Direct Taxes
3. Lal B.B. : Income Tax Law and Practice
4. LakhotiaR.N : Assessment of Companies and their officers
5. Patel &Choudhary : Corporate Tax

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ABST Optional Paper VI

GOODS AND SERVICES TAX

TIME: 3 hour **Max. Marks-100**
Min. Marks 36

Unit –I

Introduction of GST, IGST Act, 2017. Definition, Benefits, Constitutional Aspects and Legal Framework of GST Including CGST, IGST, SGST and UTGST.

Unit –II

Identification of Nature of Supply- Inter State and Intra State Supply, Composite and Mixed Supply, Continuous Supply and Zero Rated Supply, Taxable and Non- taxable Supply, Exemptions, Composite Scheme of GST, Applicable Rates of GST.

Unit –III

Concept Relating to Input Tax Credit and Computation of Input Tax Credit.

Unit –IV

Procedure of Registration Under GST, Maintenance of Books and Records, Filling of Returns, Computation of GST, Payment of Tax, Reverse Charge, Refund of Tax.

Unit –V

Administration of GST Regime, Assessment, Demand and Recovery, Inspection, Search, Seizure, Provisions with Respect to offences and Penalties.

Books Recommended:

1. Nitya tax associates:Basics of GST, Taxman, Delhi.
2. Dr. Harsh Vardhan :Goods & Service Tax, Bharat Publication, Delhi
3. Shah and Mangal :Goods and Service Tax, RBD, Jaipur
4. Goods and Service Tax : P.C. Publications, Jaipur.
5. Bangar and Bangar :Beginor's guide to GST, Aadhya Publication, Allahabad.

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ABST Optional paper – VII

Computerized Accounting

(Theory- 50 Marks and Practical 50 Marks For Regular Students only)

Unit –I

Basics of Accounting: Introduction, Double Entry System of Book-Keeping, Types of Accounts, Mode of Accounting, Financial Statements, Manuals Accounting v/s Computerized Accounting, Accounting with Tally: Introduction, Company Creation, Company Features and Configurations.

Unit –II

Creating Accounting Masters in Tally: List and Charts of Accounts, Creation of Groups and Ledgers, Display and Alter of Groups and Ledgers, Accounting vouchers, Accounting Voucher Entry. Use of Excel in Accounting.

Unit –III

Creating Inventory Masters in Tally: Creation of Stock Group, Stock Categories, Units of Measures, Godowns, Stock Items, Inventory Vouchers, Inventory Voucher Entry of Invoicing, GST Tax Calculations, Input Tax Credits, GST Returns.

Unit –IV

Financial Report Generation Through Tally, Accounting Through DBMS (Data Base Management System).

Unit –V

Technological Advantages of Tally: Security Controls, Backup and Restore, Export and Import of Data & Printing Reports.

Practical

Syllabus will cover above topics. Practical will be conducted by Internal as well as external examiner. External Examiner Will be Appointed by the University.

Books Recommended:

- Tally, Shridharan, Narmadha Publications.
- Tally, ERP 9 With GST, Tally Education Pvt. Ltd.

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ABST

Paper-II Optional Papers

Paper- II (1)	**Advanced Accountancy**
Paper- II (2)	**Advanced Cost Accounting**
Paper- II (3)	**Advanced Business Statistics**
Paper- II (4)	**Cost and Management Audit**
Paper- II (5)	**Direct Tax**
Paper- II (6)	**Goods and Service Tax**
Paper- II (7)	**Computerised Accounting (Theory- 50 Marks and Practical 50 Marks For Regular Students only)**

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B.Com Part III-

Business Administration

Paper I Functional Management

Unit I

Meaning, Scope, Role and Functions of Human Resource Management, Organisation of Human Resources Department, Human Resource Planning, Recruitment, Selection, Placement and Induction.

Unit II

Job Analysis, Job Enlargement and Job Enrichment, Training and Development, Performance Appraisal and Merit Rating.

Unit III

Marketing-Meaning, Evolution, Modern Concept, Scope and Importance, Product Planning and Development; Marketing Research; Channels of Distribution; Pricing Policies and Strategies.

Unit IV

Finance Functions; Importance and Scope of Financial Management; Functions and Role of Finance Manager; Financial Planning and Capital Structure; Sources of Finance; Working Capital and its Sources.

Unit V

Meaning, Nature, Scope and Importance of Production Management; Production Process, Production Planning and Control; Quality Control; Product Design and Product Research; Meaning, Scope and Functions of Materials Management; Inventory Planning and Control.

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Recommended:

1. Gupta C.B. : Human Resource Management, Sultan Chand and Sons, New Delhi
2. P. Subba Rao: Essentials of HRM and Industrial Relations (Himalaya Publishing House)
3. Butta, E.S.: Modern Production Management
4. Dutta, S. K.: Materials Management
5. Gopal Krishanan and Sonderiam: Integrated Material Management
6. Kotler, Keller, Koshy, Jha: Marketing Management(Pearson)
7. शर्मा ,शर्मा..सुराणा : मानव संसाधन प्रबन्ध (रमेश बुक डिपो)
8. जी.एस. सुधा : क्रियात्मक प्रबन्ध (रमेश बुक डिपो)
9. भदादा, पारवाल : विपणन प्रबन्ध के सिद्धान्त एवं व्यवहार (रमेश बुक डिपो)
10. अग्रवाल, अग्रवाल : वित्तीय प्रबन्ध (रमेश बुक डिपो)
11. पोरवाल, सुथार : उत्पादन प्रबन्ध (रमेश बुक डिपो)
12. पोरवाल, सुथार : सामग्री प्रबन्ध के सिद्धान्त एवं व्यवहार (रमेश बुक डिपो)

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B.COM. Part IIIrd

Paper II Optional Paper

1. Advertising and Sales Management

Unit I

Advertising Concepts; Objectives and Significance of Advertising; DAGMAR Approach; 5M Model; Types of Advertising.

Unit II

Advertising Budget, Advertising Campaign Planning; Advertising Message.

Unit III

Advertising Media Planning; Reach, Frequency, Media Scheduling, Factors Affecting Selection of Media; Measuring Advertising Effectiveness; Advertising Agency- Structure and Functions.

Unit IV

Role of Selling in a Planned Economy; Selling as a Career; Qualities of a Salesman; Product Knowledge; Effective Speaking, Customer Relations; Sales Organisation; Recruitment and Selection of Salesman; Training, Motivation, Remuneration of Salesman.

Unit V

Planned Selling Approach- Steps involved; Sales Call; Sales Forecasting, Sales Quotas and Territories; Consumer Psychology; Buying Motives, Control of Sales Operations; Salesman's Reports; Meeting Selling Costs and Sales Cost Control.

Books Recommended:

1. Batra, Myres and Akar: Advertising Management, Prentice Hall of India, New Delhi
2. Chunawalla and Sethia: Foundations of Advertising, Himalaya Publishing House, New Delhi
3. S.Shyam Prasad & Sumit Kumar: Advertising Management, Ramesh Book Depot, Jaipur

4. आर. एस. भोलरा विक्रय संवर्धन एवं विक्रय प्रबन्ध (रमेश बुक डिपो)

5. जी. एस. सुधा विक्रय संवर्धन एवं विक्रय प्रबन्ध (रमेश बुक डिपो)

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B.COM. Part IIIrd

Optional Paper

2. E-Commerce

Unit I :

Meaning, Characteristics, Origin, Process, Key Drivers of E-Commerce, Elements, Traditional Commerce Vs E-Commerce, Benefits, Standards, Technologies, E-Commerce Models, Mobile Commerce, Barriers to E-Commerce.

Unit II :

Internet and E-Commerce, Networking-LAN, WAN, Business Uses of Internet, www, Protocols, Intranet and Internet, Multimedia Application. Hardware and Software.

Unit III :

Electronic Payment Systems- Methods, Security Issues, Electronic Banking, Electronic Stock Trading.

Unit IV :

Data Warehousing, Client-Server Computing, Data Mining, Website Management - Steps.

Unit V :

ERP - Meaning, Functions, SAP Applications, Business Intelligences, Ethics, Security and E-Governance.

Books Recommended:

1. C.S. Rayudu: E-Commerce and E-Business, Himalaya Publishing House.
2. V.D. Dudeja: Information Technology : E Commerce & E-Business, Commonwealth Publisher, New Delhi
3. B. Bhasker: Electronic Consumer Framework- Technologies and Applications, Tata McGraw-Hill
4. Parag Diwan and Sunil Sharma: Electronic Commerce A Managers Guide to E-Business, Vanity Books International, New Delhi

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Optional Paper

3. Insurance

Unit I :

Insurance: An Introduction, Risk Management and Insurance, Principles of Insurance Contract, Types of Insurance Contract.

Unit II :

Fire Insurance, Marine Insurance, Life Insurance, Development of Life Insurance in India.

Unit III :

Life Insurance Corporation of India, Life Insurance Agents, Life Insurance Plans, Life Insurance Selling and Underwriting.

Unit IV :

Premium Calculation in Life Insurance, Settlement of Claims in Life Insurance, General Insurance, The General Insurance Corporation of India.

Unit V :

Liberalisation and Insurance, The Insurance Act,1938; The Insurance Regulatory and Development Authority (IRDA), Prospects and Challenges in Insurance Sector.

Books Recommended :

1. Mishra, M.N.: Principles & Practice of Insurance, S.Chand & Company, New Delhi.

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B.COM. Part IIIrd

Optional Paper

4. Industrial Laws

Unit I :

The Factories Act, 1948; The Payment of Wages Act, 1936.

Unit II :

The Minimum Wages Act, 1948.

The Indian Trade Union Act, 1926.

Unit III :

The Industrial Disputes Act, 1947

The Payment of Bonus Act, 1965

Unit IV :

Workmen's Compensation Act, 1923.

Employees State Insurance Act, 1948.

Unit V :

Employee's Provident Fund and Miscellaneous Provision Act, 1952.

Gratuity Act, 1972. Maternity Benefit Act,1961

Books Recommended :

1. Inderjeet: Labour Laws
2. Sarkar: Labour Laws of India
3. D.P. Gupta: *Industrial and Labour Laws*
4. Taxmann's Labour Laws
5. शर्मा, सक्सेना, पोरवाल : औद्योगिक सन्नियम
6. भुमावत : औद्योगिक सन्नियम

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Optional Paper

5. Organizational Behaviour

Unit I :

Meaning and Concept of Organization Behaviour, Role of OB in Today's Business organization, Challenges and Opportunities, Theories of Organizational Behaviour, Scope of Orgainisational Behaviour.

Unit II :

Perception, Nature, Importance, Difference between Sensation and Perception; Personality: Meaning, Determinants of Personality, Personality Traits and Types, Values, Attitudes and Job Satisfaction.

Unit III :

Interpersonal Behaviour, Group Dynamics- Meaning, Norms and Role, Types of Groups, Cohesiveness, Dynamics of Informal Group, Team and Team building.

Unit IV :

Conflict: Meaning, types process of conflict, approaches to conflict, conflict stimulation and resolution strategies. Stress- causes, effects, management of stress.

Unit V :

Meaning, Nature and factors of Organizational Change, Planned Change, Resistance to Change, Change Agent, Concept of Organizational Development, Organizational Development Interventions.

Books Recommended :

1. Prasad, L.M., Organizational Behaviour, S. Chand, New Delhi.
2. Robbins, Stephen P.,Organizational Behaviour: Concept, Controveries, Applications, Prentice Hall of India, Pvt. Ltd. New Delhi.
3. Luthans Fred: Organizational Behaviour, McGraw-Hill.
4. P. S. Kumar, Anukriti Sharma and K. S. Krishna: Organizational Behaviour, Jahanvi Publications.

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3. E.A.F.M

B. COM PART – III

PAPER – I

Rural Development and Cooperation

Time : 3 hours.
Min. Marks : 36 Max. Marks : 100

Unit-I Concept and significance of Rural Development, Strategy of Rural Development; Current issues.
Rural Development Administration – Rural Development Agencies. Village level. Block level and District level Administration for Rural Development. District Rural Development Agencies.

Unit-II Constitutional Provisions regarding Panchayati Raj, 73rd Constitutional Amendment. Sailent Features of Rajasthan Panchayati Raj Act., 1994.
Rural Infrastructure Development : Rural Roads, Rural Markets, Electrifications, Water Supply, Education and health.

Unit-III Rural Development Programmes: Critical study of Rural Development Schemes : Swarnajayanti Gram Swarojgar Yojana (SGSY), Jawahar Gram Samridhi Yojana (JGSY), Sampurna Gramin Rojgar Yojana (SGRY), Pradhan Mantri Gram Sadak Yojana (PGSY), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Main features and achievement of these schemes.

Unit-IV Programmes related to Tribal Welfare, Drought Prone Area Development, Desert Development, Nature and forest conservation, Woman and child development.

Unit-V Concept of Co-operation, Principles of Co-operation, An evaluation of co-operative principles and modifications therein from time to time. Co-operation v/s Capitalism and Socialism.
Co-operative credit, marketing, consumers, housing and industrial cooperatives. State and Co-operation. A study of Rajasthan State Co-operative Bank. (Apex Co-op. Bank) and RAJFED.

Books Recommended:

1. B.S. Mathur : Co-operation in India
2. R.D. Bedi : Theory History and Practice of Cooperation
3. F.R. Fay : Co-operation at Home and Abroad
4. बी.एस माथुर सहकारिता
5. बी पी गुप्ता सहकारिता के सिद्धांत एवं व्यवहार
6. V. Sharda . The Theory of Co-operation.

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PAPER – II (1)
Business Budgeting

Time : 3 hours.
Min. Marks : 36

Max. Marks : 100

Unit-I Business Budgets and Budgeting : Meaning, Nature, Objectives, Advantages and Limitations of Budgets and Budgeting. Budget Terminology, Preparation of Budgets. Budget Co-ordination. Essentials of an Effective Budgeting.
Types of Budgets : Fixed and Flexible Budget, Finance Budget Master Budget, Sales Budget, Production Budget, Cost of Production Budget-Direct Material Budget, Direct Labour Budget and Overhead Budget, Performance Budgeting, Zero Base Budgeting.

Unit-II Business Forecasting : Meaning, Theories, Importance and Limitations of Business Forecasting. Techniques and Tools of Business Forecasting. Essentials of Business Forecasting.

Unit-III Cash Budgeting : Meaning, Importance and Forms of Cash Budget. Preparation of Cash Budget. Methods of Preparing Cash Budget.
Budgetary Control : Meaning, Characteristics, Objects and Benefits of Budgetary Control; Budgetary Control v/s Standard Costing- Sales Variances, Material Variances, Labour Variances.

Unit-IV Product and Production Decision : Meaning, Product, Product Decision areas, use of alternative production facilities, determination of the profitable level of production. Utilization of full production capacity. Starting a new product in place of existing product. Determination of product mix on the basis of key factor.

Unit-V Project Planning and Feasibility Study : Types of projects, Analysis of projects, profitability estimates of projects, feasibility-Economic Financial and Technical.
Cost of Capital : Computation of Cost of Debt Fund, Preference Share Capital, Equity Share Capital, Retained Earnings and Weighted Average Cost of Capital.

Books Recommended:

1. Gupta S.P. : Management Accounting
2. Kulshrestha N.K. : Theory and Practice of Management Accounting.
3. Man Mohan Goyal : Principles of Management Accounting.
4. अग्रवाल, विजय एवं सुरोलिया व्यवसायिक बजटन (Hindi and English editions)
5. अग्रवाल, एम.आर. व्यावसायिक बजटन

Note: The candidate shall be permitted to use battery operated pocket calculator that should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless.

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PAPER – II(2)
Public Economics

Time : 3 hours.
Min. Marks : 36 Max. Marks : 100

Unit-I Nature and scope of Public Economics. Role in augmenting allocative efficiency, distributive justice and economic stability in the economy. Meaning and importance of fiscal policy, current fiscal policy of India.

Unit-II The Principle of Maximum Social Advantage. Public Expenditure, canons and effects on production, distribution and consumption recent trends in public expenditure.

Unit-III Sources of Public Revenue, Taxation – meaning, classification, canons and effects of taxation, Social justice.

Taxable capacity : Meaning, concept and classification.

Unit-IV Public Debt : Loan v/s Tax, Debt as a source of development, internal and external debts.

Deficit Financing, Non Tax Revenues, Profits from Public Enterprises. Recent Trends in Fiscal Deficit.

Unit-V Theory of Federal Finance. Centre-State Financial Relations Role of Finance Commission, Study of Current Finance Commission

Financial Administration – Centre and States : Budgets-Tax Evasion and parallel Economy. Concept and implications of VAT and GST

Books Recommended:

1. L.N. Nathuramka – कराधान एक सैद्धान्तिक विवेचन
2. R.N. Bhargava – Theory and Working of Union finances in India (Chaitanya, Allahabad)
3. Dalton – Public Finance
4. Findlay Shirras – Public Finance
5. पी.एन शर्मा लोक वित्त
6. एण्डले एव सुन्दरम लोक वित्त
7. Philip E. Taylor – The Economics of Public Finance
8. R.A. Musgrave – Theory of Public Finance
9. R.C. Agarwal – Public Finance – Theory and Practice

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PAPER – II(3)
International Finance

Time : 3 hours.
Min. Marks : 36 Max. Marks : 100

Unit-I International Finance : Meaning, importance need, scope, methods of payment, letter of credit – types, parties, procedure.

Unit-II International Financial Market : Meaning and functions of Financial market : Difference between Domestic and Foreign Financial Market, International debt instruments – Euro notes, Euro commercial papers, Euro bonds.

International Monetary System : Gold Standard, Gold Bullion Standard, Bretton Woods System, Post Bretton Wood agreements.

Unit-III IMF & Word Bank, IFC & IDA, ADB – Objectives, Recent Developments, Progress and Criticism.

Unit-IV Determination of exchange rates – Equilibrium Rate of exchange – Mint Parity Theory – PPP Theory and Balance of Payment Theory. Causes of fluctuations in exchange rates. Fixed and flexible exchange rates.

Foreign Exchange Transaction : Spot, Forward Exchange, Futures, Options, and Arbitrage.

Unit-V Exchange Control : Meaning, Features, Objectives, Methods, Merits and Demerits. FEMA.

Foreign Aid to India : Role, Impact of Foreign Aid on India's Economic Development and Problems of Foreign Aid. WTO-Introduction, Objectives, Functions. India & WTO.

Books Recommended

1. Mithani D.M. : Introduction to International Economics, Himalaya Publishing House, Mumbai.
2. Seth M.L. : Money, Banking, International Trade and Public Finance – Lakshmi Narain Agarwal Educational Publisher, Agra.
3. S.K. Vargheese : Finance of Foreign Trade And Foreign Exchange.
4. M.C. Vaish : International Economics.
5. S.K. Mathur : International Trade and Finance, Shivam Book House (P) Ltd., Jaipur
6. Cherunilam Francis : International Economics, Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Avadhani V.A. : International Finance Theory and Practice, Himalaya Publishing Company, New Delhi

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TEXTILE CRAFT

B.Com. Part III – [illegible]

SCHEME: BA/B.Com PART-III

		Duration	Max mark	Min mark
1. **Theory:**	Paper-I	3Hrs	30	
	Paper -II	3Hrs	30	22
2. **Practical:**	Paper -I	3Hrs	35	
	Paper-II	3Hrs	35	25
3. **Submission:**	Paper -I		35	
	Paper-II		35	25

Paper-I : Weaving Theory II

UNIT-I

1. Types of Spinning: Mechanical and Chemical
   Mechanical spinning process: picking, ginning, combing/carding, drawing etc. Types of chemical spinning-melt spinning, dry spinning and wet spinning.
2. Types of Yarns: Simple and Fancy
   Simple yarn: single and double/plied/folded yarn
3. Calculation of resultant count for folded yarn

UNIT-II

1. Manmade and Synthetic fibres
   Man-made fibres: Basic methods of producing rayon fibre, Different types of man-made fibres
   Synthetic fibres: Different types of synthetic/chemical fibre, method of their production. properties of polyester fibre, nylon fibre, glass fibre.
2. Silk and Wool
   Production, spinning, properties and uses of silk, different types of silk
   Classification of wool, wool spinning process, difference between woollen and worsted fabric
3. Concept of Mixing and Blending, Basic difference between mixing and blending. Concept of Staple and Filament fibre; difference between staple fibre and filament fibre

UNIT-III

1 Derivatives of Twill weave: Broken weave, Herringbone weave and Diamond weave

2 Towel weaves: Huckaback and Honeycomb; quality of yarn and weave selected for towels

3 Concept of shedding mechanism; Dobby and Jacquard shedding mechanism

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Paper-II: Dyeing Theory II

UNIT-I

1. Dye molecule; Concept and Importance of Chromophores and Auxochrome in a dye
2. Objectives of Fabric finishes; different mechanical and chemical fabric finishes: Determinants of finishes
3. Different types of natural and synthetic dyes.

UNIT-II

4. Method of direct printing: Screen printing; colour preparation and screen preparation
5. Discharge and Resist printing; different styles of discharge and resist printing
6. Factors affecting colour fastness: composition of fibre, chemical structure of dye, techniques of dyeing/printing, addition of other useful additives

UNIT-III

7. Importance of fabric finishes
8. Different types of chemical finishes- crease resistant finish, water proof finish, fire proof finish, moth proofing finish and absorbency finish.
9. Determinants of fabric finishes.

Practical (Paper-I)

1. Concept of yarn twist(S twist and Z twist) and plied yarn(single and double yarn)
2. Calculation of Ends and Picks per inch in given piece of fabric
3. Towel weaves preparation using paper strips

Practical (Paper-II)

1. Screen preparation (simple tracing method)
2. Table cover preparation by screen printing

Submission (paper-I)

1. Assessment of yarn and fabric samples 2. Assessment of weave samples

Submission (paper-II)

1. Assessment of samples 2. Any one article using screen printing

Practical Examination Scheme:

Major Problem: 20 Marks Minor Problem: 15 Marks

Reference books:

Booth, J.E. (1996) Principles of Textile Testing, 1st edition, CBS publishers & distributors PVT.Ltd New delhi

Sahnai, V.A. (1980) Technology of Dyeing, Sevak publications. Mumbai

Sahnai, V.A. (1979) Technology of printing, Sevak publications. Mumbai

Sahnai, V.A. (1999) Technology of finishing, Sevak publications. Mumbai

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5. GARMENT PRODUCTION & EXPORT MANAGEMENT

B.Com. Part III – [illegible]

PAPER – 1 : APPAREL TECHNOLOGY

B.A./B.Com. – M.M 40 **B.Sc.- M.M. 50** **Hrs. – 3**

OBJECTIVES:

1. To create awareness on the basics of Fashion
2. To study the psychological effects of clothing on the individual in social situation.
3. To develop understanding of manufacturing technology of the garment Industry.
4. To understand the fundamental concepts of dyeing and printing.

SECTION-A : INTRODCUTION TO FASHION

1. Fashion terminology, sources of fashion, factors influencing fashion.
2. Fashion forecasting and fashion cycle.
3. India and international fashion designers (five each).
4. Sociological and psychological significance of clothing

SECTION-B : MANUFACTURING TECHNOLOGY

5. Product development, design development, developing a sample garment.
6. Apparel production
   - I. Costing a garment
   - II. Purchasing pattern making
   - III. Production scheduling
   - IV. Spreading and cutting procedure
   - V. Contracting
   - VI. Garment assembly
7. Introduction to industrial machines-
   - I. cutting : round , straight and band
   - II. fusing: collars, facing
   - III. sewing: chain stitch, lock stitch, button hole, blind stitching
8. Use of components and trims --
   - (i) Performance and properties of components and trims.
   - (ii) labels and motifs
   - (iii) linings and interlinings
   - (iv) face, braids, elastics
   - (v) fasteners; loops
   - (vi) seam binding and tapes
   - (vii) shoulder pads, eyelets

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SECTION –C : DYEING AND PRINTING

Application of design:

7. i. Printing methods – block, screen, stencil, roller.
   ii. Styles of printing – direct, discharge and resist.
8. Dyeing – introduction to natural and synthetic dyes (acid, basic, sulphur, vat, reactive and direct dyes)
9. Stages of dyeing : Fiber, yarn and fabric

References:

1. Rouse Blizabeth, 1999, Understanding Fashion, Blackwell science.
2. Carr Harold and John pomerory, 1996. Fashion design and product development. Blackwell science.
3. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER- II : INTERNATIONAL MARKETING

B.A./ B.Com.- M.M. 40 **B.Sc. – M.M. 50** **Hrs. -3**

OBJECTIVES:

1. To study the importance of marketing in the global economy
2. To develop insight into the development of marketing strategies for international markets
3. To Identify business opportunities in an international business environment

SECTION –A

1. International Marketing: nature and scope of international marketing.
2. International marketing v/s domestic marketing.
3. Importance of international marketing.
4. Problems and challenges of international marketing.
5. Selection of agents.

SECTION – B

6. Identification of markets for readymade garments.
7. Market entry conditions.
8. Channels of distribution.
9. Direct and indirect export
10. Trade fair and Exhibitions.

SECTION – C

11. Pricing, role of price and non price factors, factors influencing pricing, price quotation, information needed for export pricing.
12. Role of trading and export houses.

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13. Institutional segments and packaging for exports: packing material, boxing and pressing department, machinery and equipments used in packaging department.
14. Quality control
15. Labeling and consumer protection meaning and its role.

References :

1. R. K. Kothari, B. S. Rathore, P. C. Jain (2009) International Marketing (2009) I[st] ed. Ramesh Book Depot, Jaipur, New Delhi
2. R. Kothari and P. C Jain (2009) International Management 1[st] ed. Ramesh Book Depot, Jaipur, New Delhi
3. M. J. Methew International Marketing (Procedures and practices) 1[st] ed RBSA publishers. Jaipur

PRACTICAL – 1 : APPAREL PRODUCTION

B.A/B.Com.-M.M.60 **B.Sc.-M.M. 25** **Hrs.- 4**

OBJECTIVES :

1. To develop basic adult drafts of bodice, sleeve and collar.
2. To develop various patterns of textile techniques
3. Guidance for preparation of portfolio

CONTENT

1. Prepare an adult's bodice and sleeve block.
2. Sketching and designing of men/women garments (5 each)
3. To prepare with specific details of necklines and sari blouses. (20)
4. To identify patterns and its application for women designer dress on fashion figures:
5. Types of patterns include --
   I. Structural
   II. Geometrical
   III. Stripes and plaids
   IV. Floral
6. Design and prepare an adult dress for fashion shows.

Examination Scheme:

B.A.\B.Com. -Max Marks:-60
1.Major Problems :-30
2.Minor Problems:-20
Internal :-10

B.Sc:-Max Marks:-25
1.Major Problems :-10
2.Minor Problems:-10
Internal :-5

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PRACTICAL – II : DYEING AND PRINTING

B.A/B.Com.-M.M. 60 **B.Sc.- M.M. 25** **Hrs.- 4**

OBJECTIVES:

1. To learn the various types of skills in dyeing
2. To develop various textile printing techniques
3. Guidance of practical knowledge of export houses

Contents

1. Prepare and article of each: Tie and dye, stencil printing, block printing and batik
2. Field trips to Export houses and mass production centers.
3. Exhibition ;

References:

1. Bhargava, Ritu, 2005, fashion illustration and rendering, Jain Publications Pvt. Ltd. New Delhi.
2. Ireland, fashion designing drawing and presentation.
3. Prayag: Technology of textile printing.
4. Shenai: Technology of dyeing

Examination Scheme :

B.A.\B.COM:-Max Marks:-60

1.Major Problems :-30

2.Minor Problems:-20

Internal :-10

B.SC:-Max Marks:-25

1.Major Problems :-10

2.Minor Problems:-10

Internal :-5

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COMPUTER APPLICATION (VOCATIONAL COURSE) FOR

B.A./B.Com/B.Sc. Part III

Paper-I

Paper Name : Web Authoring tools

Unit I

Data communication, Components of Data Communication System, Transmission Media- Coaxial, UTP, Optical-Fibber, Wireless, Transmission Mode- Simplex, Half Duplex, Full Duplex, Introduction to networking, LAN, MAN, WAN, network topologies.

Unit II

Evolution of Internet, Basic internet terms (Client, Server, MODEM, Web page, Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & Offline etc), Internet applications (Remote login, VoIP, Video Conferencing, Audio-Video streaming, Chatting etc). E-Mail, Advantages, working, Anatomy of an e-mail Message, basic of sending and receiving, E-mail Protocol.

Unit III

Introduction to World Wide Web: History, Working of Web Browsers, Its functions, Search engine category, Concept of Hyper Text Transfer Protocol (HTTP), Web Servers, Internet Explorer, Component of Web Publishing, Site and Domain Name, Overview of Intranet and its applications. Introduction to Advanced Technologies: Big Data, Cloud Computing, Internet of Things, Artificial Intelligence(Introduction only).

Unit IV

HTML, Designed Tools, HTML Editors, Issue in Web Site Creations and Maintenance, FTP S/W for Upload Website, Elements of HTML & Syntax, Building HTML Documents, Use of Font Size and Attributes, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, Use of Frames and Forms in Web Pages.

Unit V

Basic of Cyber Security and Cyber Crime: Computer Ethics and Application Programs, Cyber Law, Introduction to IT laws &Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, Legal System of Information Technology, Mail Bombs, Bug Exploits. Software Piracy, Firewall, Threats, Hacking and Cracking (basic concepts only for these topics).

Recommended Books:

1. The Colete eference: HTML & XHTML; Thomas A. Powel, 4th Edn.
2. Mastering HTML 4.0 by Deborah S.Ray an Eric J. Ray From BPB
3. Mastering Java Script, BPB publication.
4. Internet and web technology by Raj Kamal, TMH Publication 2. Steven Holzner,
5. The Complete Reference Java Scripts,, Tata McGraw – Hill,3rd Edn.
6. Java Script, Don Gosselin,Vikas publications

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Paper-II

Paper Name : Software Engineering & E-Commerce

Unit I

Introduction to software engineering: What is software engineering, software engineering principles, Software characteristics, applications. Software Development life-cycle, Models: Waterfall model, Incremental model, spiral model, Prototyping Model.

Unit II

Software requirements: Functional- non-functional requirements, User requirement, System requirements, Software requirements documentation, Software Requirement engineering process, Feasibility studies, Requirements elicitation and analysis, software prototyping, Software Reliability, Software Reusability. Software design: Basics of software design, Software Design Techniques, Data design, Data Flow Diagram.

Unit III

A strategic approach to software testing, test strategies for convention software, Black-box and white box testing, validation and system testing, and debugging; System implementation, maintenance and documentation;

Unit IV

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Security Threats of E-Commerce, E-Commerce models.

Unit V

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash. Introduction to e-banking and support services.

Recommended Books:

1. Pressman, Roger (2001) Software Engineering; A Practitioner's Approach, 8th ed. M Graw-Hill,2014.
2. Girdhari Singh, Shalinipuri; Software Engineering;2022 Edn.Genius Publications
3. Jalote, Pankaj (7) An integrated Approach to Software Engineering 2nd Ed.
4. Simon Bennett, Steve McRobb and Ray Farmer, " Object-Oriented Systems Analysis and Design Using UML" 4th Edition,McGraw Hill Education, 2010
5. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition 2012.
6. Ian Daniel, "E-Commerce get it Right", Neuro Digital Publication, 2011.
7. Lexis Leon; Enterprise Resource Planning;TMH

Paper-III

Paper Name : Web Authoring Tools Lab
Content : Lab practical's based on paper I.

Add-on Subjects

1. COMPUTER APPLICATIONS

Paper I : Computer Aided Drafting	50	65
Paper II : Advanced Topics in Computer	50	65
Paper III : Report, Report on the Job training and entrepreneurship, Development	50	70

The duration of these papers will be 3 hours each

Paper I : COMPUTER AIDED DRAFTING

Introduction to AUTOCAD/ROBOCAD or a similar package Advanced features of these package. Drawing the plan of building using AUTOCAD etc. Analysis features of AUTOCAD.

Paper II : ADVANCED TOPICS IN COMPUTER

Computer animation. Artificial intelligence Desiccated computers ATMs. Data encryption. Data communication and networking (course to be modifed every year to take care of the latest development) Visits to computer industry

Practical :

Design of layout of a building. Design of interior of its rooms Printing and plotting the prepared drawings

It will also include Project Report. Report on the job training and Entrepreneurship development

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2. TAX PROCEDURE AND PRACTICE

MODEL FOR PREPARATION OF OUTLINE OF COURSES

1. Subject title TAX PROCEDURE AND PRACTICE (16 weeks)
2. Subject objectives : General objectives
   (a) To familiarize the students with the Indian Tax System.
   (b) To acquaint the students with the procedure and practices of direct and indirect taxes.
3. Job Potential
   (i) Self Employment Prepare returns and relevant documents, for small traders, small industries and people engaged in small and medium business, necessary under direct and indirect tax law
   (ii) Wage Employment Junior level positions in the various

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organisations such as :

(a) Practising chartered Accountant firms.
(b) Business Houses.
(c) Industrial undertakings and establishments.
(d) Sales Tax and Income tax departments.
(e) Custom and Excise departments.
(f) Accounts departments of various central, state, local and Government societies etc.

4. (i) This cannot go with Science subjects.
(ii) It can go with commerce (B.Com. Pass).
(iii) It can go with B.A., provided a student has done 10+2 with Accounting and Business studies of Commerce.

5. (i) Contents:
(a) Syllabus (Theory & Practical - enclosed).
(b) Business Lab should be equipped with the following :
(i) All Bare Acts related to direct and indirect taxes and various tax forms/returns documents.
(ii) Reference Books.
1. Palkiwala : Income Tax
2. Chaturvedi & Pathisana : Income Tax
(iii) Text Books :
1. Singhania : Direct Taxes
2. H.C. Mehrotra : Income Tax Law & Practice.
(iv) Journals :
1. The Institute of Chartered Accountants
2. Central Excise Law System
3. Taxman.

Note : *In addition to the above books the new text books should be prepared on the lines of the prescribed syllabi. Equipment computer facilities must be made available in the business Lab.*

(v) On the Job Training (After 1 year)

Proper training should be given to students, to prepare various returns/ forms/ documents etc. related to Income Tax and Sales Tax/ Excise duty to enable the students be acquired necessary skills so that they can prepare these documents independently. Students can be teached for the

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purpose of training with local industrial houses, Excise and Custom departments; Income and Sales tax departments, and practising firms of the Chartered Accountants.

(vi) On the job Training (After 2nd years) :
Students should be prepared for practical training with the organisations as suggested in (ii). Students can prepare the necessary documents/ returns/ forms, etc. related to direct and indirect taxes.

6. Unit cost for 30 students :
   (a) Building as per norms of the UGC.
   (b) Rupees one lakh for books, journals and equipments.
7. Modalities of Examination and Evaluation :
   (a) Weightage between theory and practicals should be 70% and 30% respectively.
   (b) Continuous evaluation : Assignments, surprise test quiz.

Paper-I : INDIRECT TAX—PROCEDURE & PRACTICE

Max. Marks : 100 **3 hrs. duration** **Min. Marks : 36**

Section-A

1. Nature of meaning of Central Excise—Excise and Central Excise: Distinction between Central Excise duties and Customs, Sales Tax, Octroi duty.
   Basis of Excise Duty : Specific duty, advalorem duty, levy of slabs, compounded duty.
   Leviability : on what duty is leviable and who is liable to discharge the duty liability.
   Kinds of excise duty : Basic additional duty of excise, special duty
2. Organisation of Central Excise in India Administrative operational authorities.
3. Regulatory Framework—An overview of Central Excise and Salt Act, 1944; An overview of Central Excise Tariff Act, 1985 Central Excise Rules, 1944.
   Important terms and definitions, Assessee, Assessable value, excisable goods, manufacture, manufacturer.

Section-B

4. General procedure under Control Excise :
   A. Registration for Central Excise—Purpose and procedure there-

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of, exemption from registration, filling and declaration for claiming exemption, forms of application for registration and filling and filing of the same.

B. Classification lists—filling and submission of classification lists and its approval. Form—I : Classification lists of excisable goods provided.

C. Price lists—When prior approval of price lists required, when submission of price lists not required; submission of price lists under Part-I and Part-VII. Valuation of excisable goods—Items included and excluded in the value.

D. Maintenance of production records—R.G.I. Register of daily production : Stock Register for issue of raw materials under form No. RG 23A (Pt.I) : Account of raw material in Form No.4.

5. Clearances : Types of clearances :
Clearances of excisable goods under physical control; self removal procedure; compounding scheme; clearance of non-excisable goods; removable of goods for home consumption; removal of goods for exports.

(i) Removal of goods for home consumption.

(a) Clearance under physical control—making an application under Form No. ARI to Circle Inspection before removal of goods.
Preparation of TR6 and depositing the duty, removal of excisable goods under GP I.

(b) Removal of goods under compounded levy scheme Application for exercise of this option.

(c) Self removal procedure applicability and its salient features-Record based control and production based control.
Depositing of excise duty under challan TR 6.
Preparation of GP I and Maintenance of other records of removal like P.L.A., TG 23A Part-II Register.

(d) Clearance of non-excisable goods.

(ii) Removal of goods for export :
Export of excisable goods, excise concession in case of exporter. Types of exporter.
Export of excisable goods under claim for rebate, export under bond and procedures thereof. Form No. A4 and A4A.

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Section-C

CENVAT

What is CENVAT, Salient features of CENVAT.

CENVAT declaration for claiming CENVAT.

Small Scale Industry:

(i) Eligibility of SSI which are exempted from licensing control.

(ii) SSI availing concession rate of duty. General exemption in small scale Exemption Scheme under Notification No. 175/86.

Books of Accounts, Records and their preservation :

(a) Records—RGI, EB-4 for daily production and clearance.

(b) Account of principal raw material.

(c) CENVAT and proforma Credit Record.

(d) Personal ledger account.

(e) Goods received for reprocessing.

(f) Excise Control code No.

Return :

Periodical/Quarterly Return of material used.

For obtaining excisable goods for special industrial purposes without payment of whole or part of the duty and state the nature and quantity of such goods used for finalized products. monthly returns.

Paper-II : INDIRECT TAX II-PROCEDURE & PRACTICE

Max. Marks : 100 **3 hrs. duration** **Min. Marks : 36**

Section-A

1 Role of customs in international trade.

2 Organisation of customs in India—administrative and operational authorities.

3 Regulatory framework—An overview of customs Act, 1962; An overview of customs Tariff Act, 1975.

Important terms and definitions :

Assessable value; baggage; bill of entry; bill of exports suitable goods; duty exporter; foreign going vessel; aircraft goods; import; import manifest; importer; prohibited goods; shipping bill; stores, bill of loading; export manifest; DOS, FAS, CIF, GATT; Letter of Credit.

Section-B

4 Kinds of duties—basic, auxiliary, additional or counter moving;

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Basis of levy – adalorem, specific duties's.

5. Prohibition of exportation and importation of goods and provisions regarding notified and specified goods.
6. Import of goods : Free import and restricted import: types of restricted import – prohibited goods, canalised goods; import against licensing. Types of import: import of cargo, import of personal baggage, import of stores.

   Import of cargo; (a) import by land, sea or air route, (b) by post. Clearance procedure – for home consumption, for warehousing exbond clearancy.

Section – C

7. Steps and documents to be prepared and filed, viz. Bill of entry---
   - Form No. 22 bill of entry for home consumption.
   - Form No. 23 bill of entry for warehouse.
   - Form No. 24 shipping bill for expound clearance for home consumption and other accompanying document.
   - Clearance procedure for Import by post.
   - Clearance of baggage ; import of baggage-meaning and kinds of baggage, rule and procedure of import thereof – general passenger, tourist passenger and transfer of residence passenger, (Form No. 37: for baggage declaration).
8. Export of goods : Free export and restricted exports; types of restricted exports; canalised export of cargo; export of baggage; types of exporters : manufacturer exporter and merchant exporter.

   Export of cargo : (a) by land, sea and air route

   (a) by post

   Clearance procedure : Procedure and filling and filing of relevant documents

   Form No. 94 : Shipping bill for export of suitable goods.

   Form No. 95 : Shipping bill for export duty free goods.

   Form No. 96 : Shipping bill for export of duty free goods exbond.

   Form No. 98 : Bill of export of dutiable goods.

   Form No. 99 : Bill of Export of duty free goods.

   Form No. 100 : +Bill of Export for export of duty free goods exbond.

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Duty Drawback :	Meaning/Scheme, procedure and documentation thereof.
Form No. 93 :	Shipping bill for export of goods under claim for duty drawback.
Form No. 97 :	Bill of export for export of goods under claim for duty drawback.

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3. PRINCIPLES AND PRACTICE OF INSURANCE

Note : Candidates are required to attempt at least one question from each unit and five questions in all.

Scheme :

Max. Marks : 200		**Min. Pass Marks : 72**
Paper-I	**3 hrs. duration**	**Marks 100**
Paper-II	**3 hrs. duration**	**Marks 100**

Paper I : PROPERTY AND LIABILITY INSURANCE

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Section-A

1. **Introduction :** Risk and Insurance : Insurable and non-insurable risks : Nature of property and liability insurance. crop and cattle insurance. Types of liability insurance, Reinsurance

Section-B

2. **Basic Concepts of Liability Insurance :**
   (a) Basic concept : Specific and all risk insurance : Valuation of risk : Indemnity contracts and specific value contracts; Average and contribution: Excess and short insurance careers.
   (b) Liability Insurance : Procedure for obtaining liability insurance. Legal position of insurance agent, Construction and issue of policy: Reports of liability insurance; Policy conditions.

Section-C

3. **Types of Liability**--Insurance Policy : Mandatory Public Liability Insurance
4. Dwelling property Losses : business interruption and related losses. Theft insurance contracts Budgetary covers Auto Insurance Medical Benefit Insurance: Dishonesty, disappearance and destruction insurance, employees liability; Aviation insurance; personal and residential insurance, Boiler machinery insurance: Commercial enterprises and industrial property insurance.

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Section-D

5. **Insurance Problems of Institutions :** Insurance problems of educational and religious institutions - hospitals, clubs and association; professional package contracts: Errors and omissions insurance; Professional liability insurance; Accountants liability insurance: Limits in amount of insurance, Marketing and underwriting of liability insurance; Finance of liability insurance.

Section-E

6. Adjustment of Losses and Claims Compensation : Adjustment of losses and their adjustment; Procedure of adjustment; Functions of adjuster's : Responsibilities of adjuster's Survey of losses; Procedure for preparing claims statements, Documents in use in claim settlement. Requirement of the insured in the event of loss. Appointment and loss valuation; statutory control over liability insurance in India. Liability policies by General Insurance Corporation of India.

Books Recommended :

1. Rodda : Property and liability Insurance (Prentice Hall, New Jersey)
2. John Carydon L. : Introduction to liability claims Adjusting Cinenati (The National Underwriting Co.)
3. Long and Gregg : Property and Liability Insurance (Hand book, Homewood, Richard D. Irwin)

Note : Candidates are required to attempt at least one question from each unit and five questions in all

Paper-II : GROUP INSURANCE & RETIREMENT BENEFIT SCHEMES

Max. Marks : 100 3 hrs. duration Min. Pass Marks : 36

Section-A

Introduction

Section-B

Superannuation Scheme I.
Superannuation Scheme II.
Superannuation Scheme III.

Section-C

Gratuity Scheme

Section-D

Group Life Insurance scheme

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Group Life Insurance scheme II.

Provident Fund and Employee's family pension and Deposit-linked Insurance Schemes.

Section-E

Taxation Treatment of Provisions of Retirement Benefit-I.

Taxation Treatment of Provisions of Retirement Benefit-II.

Group Schemes and Data Processing.

Note : Candidates are required to attempt at least one question from each unit and five questions in all.

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4. OFFICE MANAGEMENT & SECRETARIAL PRACTICE

Paper-I : OFFICE PRACTICE

Part (A) Theory

Maximum Marks : 75 **Duration : 2½ Hrs.**

Unit-1. Office Stationery :

Types of papers and envelopes, control of consumption of papers, ink, typewriting ribbons, carbon papers, pins, clips, erasers etc. issue thereof, stock and stock record.

Unit-2. Duplication Methods :

Photocopying.

Unit-3. Meeting :

Notice, Agenda, Physical facilities, quorum, providing Secretarial assistance.

Unit-4. Using information :

Working knowledge of making use of information from different sources :

Telephone Directory, Post Office Guide, Railway Time Table, Teleprinter, Telex, Facsimile telegraphy.

Unit-5. Making travel arrangement :

Preparing tour programme, railway and air reservation, booking hotel accommodation, filling of form for tour advance, preparing T.A. Bills.

Part-(B) Practice-Max. Marks : 25

Practicals

1 Practice on Operating Following machines :

i. Duplicator	6 hrs.
ii. Photocopier	6 hrs.
Word Processor	20 hrs.

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Scanner 6 hrs.

2. Working in the Office :
   - Maintenance of Register
   - Preparation of Notice, Agenda, Resolutions
3. Telephone handling.

Paper-II : Computer Application Theory and Practice

Part-(A) Theory

Maximum Marks : 75 **Duration : 2½ Hrs.**

Note : Candidates are requested to attempt five questions out of nine questions.

Computer concepts : Computer system structure, Input-Process-Output (I-P-O), Principle input output processing and storage devices classification of computers. Working of the computers. Software (s/w) concepts.

Disk Operating System (DOS) L History, Philosophy and purpose, File system, simple commands, more involved commands, advanced options, hardware (h/w) and software (s/w) support.

MS Window Operating System : History, Philosophy and purpose. File system-changed conventions, simple options, more involved options, advanced options, h/w and s/w support.

Office Automation : Modern office setup, changed management hierarchy, expectations and demands from an automated office tools used, using MS word as the word processor, using Tally/Ex as the Accounting S/W.

Advance Office Automation : Advance option in MS word. Advance accounting options in Tally/Ex. Tracking inventory Tables and Charts. Using MS Power points for per print simple business presentations, using the printer

Electronic communications : History (Telephone and Telegraph, etc.) the Fascimile, computer networks, E-mails-sending and receiving and Internet Business, browsing the Internet.

Precautions, Emerging Trends and New Technologies : Computer virus, dealing with computer virus, paperless office on line Transaction processing (OLI) E-Commerce.

Part-(B) Practical

Max. Marks : 25

Note : Students are required to attain sufficient practical knowledge of the above course contents.

This practical will be supervised by the external examiner appointed by the University

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5. ADVERTISING , SALES PROMOTION AND SALES MANAGEMENT

Objectives :

This course is intended to impart knowledge and develop skill among the participants in the feiled of marketing communication, so as to equip them to man age junior and lower-middle level position in the fast growing and challenging business areas of advertising, sales promotion, selling and sales management and public relations. The under – graduate programme in Indian Universities and other Institutions. The six papers are :

1. Marketing communication-I
2. Advertising I
3. Advertising II
4. Personal selling and salesmanship
5. Management of the sales-force
6. Sales promotion of public relations

   All the papers will be handled so as to have practical, orientation, with Indian cases and examples.

Scheme :

Min. Pass Marks : 72		**Max Marks : 200**
Paper-I	**3 hrs duration**	**100 Marks**
Paper-II	**3 hrs duration**	**100 Marks**

Paper – I : MANAGEMENT OF THE SALES FORCE

Max. Marks : 100	**3 hrs. duration**	**Min. Pass Marks : 36**

- Importance of the sales force and its management
- Functions of Sales Manager
- Recruitment and selection
- Motivation and Compensation
- Appraisal of Performance
- Sales force – size, organisation of the sales department : Geographic, Product- wise, Market based.
- Sales planning and Central : Market analysis and sales forecasting, Methods of forecasting sales.

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- Sales Budget : Importance, process of sales budget, uses of sales budget.
- Sales territory : Considerations in allocation of sales territory.
- Sales quota : Objectives, principles of selling, sales quota, administration of sales quota. Uses of sales quota.
- Sales and cost analysis : Uses and methods.

Books Recommended :

1. Stanten and Biskirk : Management of the Sales force (Richard D. Irwin)
2. Philip Kotler : Marketing Management, 7th Ed. (Prentice Hall of India, Chap. 24)

Paper-II : SALES PROMOTION AND PUBLIC RELATIONS

- Nature and importance of sales promotion. Its role in marketing.
- Forms of sales promotion : Consumer oriented sales promotion, trade oriented sales promotion and sales force-oriented sales promotion.
- Major tools of sales promotion : Samples, Point of purchase. Displays and demonstrations, Exhibitions and Gashion shows, sales contests and games of change and skill, lotteries, gifts, premium and free goods. Prince packs, rebates, patronage, rewards.
- Conventions, conference and Gashims, specialities, novelties.
- Developing and sales promotion programmes, pre-testing implementing evaluating the results and making necessary modifications.
- Public relations : Meaning, features, growing importance, role in marketing, similarities of publicity and public relations.
- Major tools of public relations, news, speeches, special events, hand-bills and leaflets, audio-visual, public services activities, miscellaneous tools.
- Ethical and local aspects of sales promotion and public relations.

Books Recommended :

1. Philip Kotler : Marketing Management 7th Ed. (Prentice Hall of India), (Chap. 23).
2. Stanton & Futrell : Fundamentals of Marketing. (McGraw Hill), (Chap-20).
3. JSK Patel : Salesmanship and publicity (Sultan Chand & Sons, New Delhi).

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6. TOURISM AND TRAVEL MANAGEMENT

Min. Pass Marks-72 **Max. Marks-200**

Paper-I **3 hrs. duration** **70 Marks**

Paper-II **3 hrs. duration** **70 Marks**

PAPER-I : TOURISM MARKETING

Max. Marks 70 **3 hrs. duration** **Min. Pass Marks 36**

Internal Assessment Marks 30 (20 Project report, 10 viva voce)

TOURISM DEVELOPMENT

Max. Marks : 100 **3 hrs. duration** **Min. Pass Marks : 36**

Section-A

Relevant concepts and preaches for effective tourism development

- National Development Council Report on Tourism Development
- National Action Plan, 1992
- New policies on Tourism and its improvisation.
- Destination development
- Substantiable development

Section-B

Man power development needs.

Section C

Management strategies

Section-D

Tourism policy analysis

Section-E

Tourism legislation - a necessity.

Books Recommended :

1. National Development Council Report
2. National Action Plan, 1992
3. Reports of World Tourism Organisation
4. Report - Workshop on Tourism Legislation - August 10-11, 1987
5. Report - Workshop on Tourism Legislation - February, 23-23, 1988, IITTM, New Delhi.

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Paper-II : INFORMATION COMMUNICATION AND AUTOMATION

Introduction :

The course cover techniques of communication, presentation and

Collection information DATA. It also includes basic knowledge of computers in Travel fields. The attitude and behaviour the pattern w.r.t. customer services and their expectations profile of visitors from various destination is part of the study.

- Consumer expectation and services and legislation.
- National Tourism Civil Aviation & Policy.
- Information Technology
- Market Research
- Data Collection
- Consortiums of Airlines, Hotel and wholesalers.
- Practical Training Project Report.

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7. FOREIGN TRADE PRACTICES AND PROCEDURES

Subject title : FOREIGN TRADE PRACTICES AND PROCEDURES

Subject Objectives :

1. To familiarise the students with the basic principles of foreign trade and the environment in which foreign trade takes place.
2. To familiarise the students with the position of India's foreign trade, import and export policies and various export promotion measures adopted by the Government.
3. To familiarise the students with the nature and scope of International marketing as also the four Ps of international marketing.
4. To familiarise the students with the various methods and procedures of foreign trade financing, foreign exchange rates, costing and pricing for exports and the various institutions involved in export finance.
5. To make the students aware of the shipping and insurance practices and procedure which constitute the essential services for the operation of foreign trade.
6. To familiarise the students with the basic documents involved in foreign trade, processing of an export order, customs clearance of export and import cargo and negotiation of documents.

Job potential :

1. Self employment—can start an export business either singly or in partnership with fellow students can take.
2. Can take up employment in exporting firms, banks, insurance companies or with freight forwarders.

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3. (i) Permissible combination of subjects :
B.A. - Any subject preferably with Economics. Psychology, Social Work, Foreign languages.

(ii) Pre-requisites of admission :
10 + 2 preferably with Economics or Commerce.

Paper I : SHIPPING AND INSURANCE PRACTICES AND PROCEDURES

Objectives :

To make the students aware of the shipping and insurance practices and procedures which constitute the essential services for the operation of foreign trade.

SECTION-A	Periods
- Role of shipping, liners and tramps, bills of lading and Charter Party	4
- Determination of freight	2
- Containerization and other developments	2
SECTION-B	
- Air transport and procedures involved in the determination of freight and booking of cargo space	3
- Multi model transport and the procedures involved	2
- Packing and marking for exports	2
- Forwarding and clearing agents and their operations	3
SECTION-C	
- Cargo insurance, its importance, basic principles, types of cover types of losses and determination of premium	8
Obtaining a cover and filing a claim	4

Paper II : FOREIGN TRADE DOCUMENTATION AND PROCEDURES

Objectives :

To familiarise the student with the basic documents involved in foreign trade, processing of an export order, customs clearance of export and import cargo and negotiation of documents.

SECTION-A	Periods
- Need, rationale and types of documents	1
- Obtaining export and import licences	3
Processing an export order	4

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SECTION-B

- Preshipment inspection and quality control 2
- Foreign exchange and GR formalities 3
- Excise and customs clearance of export cargo 4
- Shipment of goods and port procedures 3

SECTION-C

- Customs clearance of import cargo 3
- Post-shipment formalities and procedures 3
- Claiming duty drawbacks and other benefits 3
- Need, rationale and types of documents 4
- Obtaining export and import licences 3
- Processing an export order 4

Books Recommended :

1. Handbook of Import and Export Procedures
2. Export What, here and How by Paras Ram

ON THE JOB TRAINING

3 to 4 weeks each at the end of I year and at the end of II year
Total : 6 to 8 weeks
A report has to be submitted after the training to be evaluated out of 100 marks.

Journal : Indian Export Bulletin
Publications of Indian Trade Promotion Organisation

Equipment :

Overhead Projector, photo-copying machine, VCR with Television set.

Examination at year end : 7 Marks for each paper
30% marks for internal evaluation
10 marks for tests (occasional)
10 marks of home assignment
10 marks for class participation

Linkage :

Down - plus 2 students may take it up independently. Those having studied export procedure will find this course and a follow up of their earlier studies

Up - Those having passed B.A. or B.Com. with this course, may take up course like Postgraduate Diploma of the IIFT or MBA courses.

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8. Tourism

PAPER-I : TOURISM MANAGEMENT

Theory Paper : Max. Marks 70

Project Report : Max. Marks. 30

3 hrs duration for Theory Paper

- Concept of Entrepreneurship and Management. Corporate from in Tourism Industry.
- Management Functions : Human Resource Management in Tourism, Financial Management & Financial Operation, Tourism Marketing and Information & Technology in Tourism.
- Behavioural Issues in Tourism : Guest Host Relationship, Hospitality, Group and Inter group Behaviour, Supervisory Behaviour.
- Managerial Practices in Tourism 1 : Tour Operator, Travel Agencies and Public Relations.
- Managerial Practice in Tourism 2 : Catering & Food services, Tourist transport, Airlines, Airport & Railway Stations.
- Events Managemen in Tourism : Reservation & Booking, Strike & Political unrest, miss ng of language, theft etc.

References :

1. Kotler, Philip : Marketing Management
2. Dougler Foster : Travel & Tourism Management.
3. Negi, M.S. : Tourism and Heterliering.
4. Meclean, Hunger : Marketing Management (Tourism in your business).

PAPER-II : PROJECT REPORT

Every student shall have an appropriate topic selected for doing project Report at the beginning of the session and shall submit the same in triplicate at least 3 weeks before the commencement of theory examination. For this purpose each student shall undergo for field work/practical training in concerned organisations for 150 hrs. Viva-Voce shall be held within one month of the last of written examination. (Project Report 70 marks and Viva- Voce 30 marks.)

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9. PRINCIPLES AND PRACTICE OF BANKING AND INSURANCE

PAPER I : COMMERCIAL BANK MANAGEMENT

Theory Paper : **Max. Marks 70**
Project Report : **Max. Marks 30**
3 hrs. duration for Theory Paper

- Principles of Banking : Definition of bank; Creation of money; Present structure of commercial banking system in India; Brief history; Functions; Working during 1947-1990 and thereafter.
- Management Principles in Banks : Managerial functions in banks; Hierarchy, individual and group behaviour; Management of personnel–Functions of manager, inspector, local advisory committee, Recruitment; Selection; Training; Promotion; Control of staff.
- Management of Deposits and Advances : Deposit mobilization; Classification and nature of deposit accounts; Advances; Lending practice; Types of advances; Principles of sound bank lending; Preparation of reports; Credit plans; Planning customers; Limits of credit; Security.
- Investment Management : Nature of bank investment; Liquidity and profitability; Preparation of cheques; Bills; Endorsement; Government securities; Documents of title to goods railway receipt; Bill of landing; Book debts; Securities–Government and commercial.
- Management of Finance : Bank accounts; Records; Reports; Statement of advances; Evaluation of loan applications; Profit and Loss Account; Balance sheet and statutory reports regarding cash revenue.

Suggested Readings

1. Tannan ML : Banking – Law and Practice in India, Indian Law House, New Delhi.
2. Radhaswami M. and Basudevan A : Textbook of Banking; S. Chand & Co. New Delhi.
3. Panikar K.K. : Banking – Theory & System : S. Chand & Co. New Delhi.

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4 Vinayakan N : Banking by 2000 A. D; Kanishka Publishers, Delhi.
5. Jessup P. F. : Innovations in Bank Management.
6. Reed E. W. : Commercial Bank Management
7. Desai Vasant . Principles of Bank Management.
8. Khubchandan B. S. : Practice and Law of Banking; Macmillan, New Delhi.

OR

PAPER I : LEGISLATIVE INSURANCE FRAMEWORK

Theory Paper : Max. Marks 70
Project Report : Max. Marks 30
3 hrs. duration for Theory Paper

- Insurance Act, 1938
- LIC Act 1956
- Insurance Regulatory & Development Agency Act, 1999
- Consumer Protection Act, 1985.
- Ombudsman Scheme
- Income Tax Act, Married Women's Property Act, Contact Act as relevant to the conduct of insurance business
- Code of conduct in advertisement and publicity area.

References :

1. Mishra M N Insurance Principles & Practice, S. Chand & Co New Delhi.
2. Insurance Regulatory Development Act, 1999.
3. LIC Act, 1956
4. Consumer Protection Act, 1985
5. Indian Contract Act, 1872.

PAPER-II : PROJECT REPORT

Every student shall have an appropriate topic selected for doing Project Report at the beginning of the session and shall submit the same in triplicate at least 3 weeks before the commencement of theory examinations. For this purpose each student shall undergo for field work/practical training in concerned organisations for 150 hrs. Viva-Voce shall be held within one month of the last date of written examination. (Project Report 70 marks and Vive Voce 30 marks).

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10. FOREIGN TRADE PROCEDURE

PAPER-I : EXPORT-IMPORT PROCEDURES AND DOCUMENTATION

Theory Paper : Max. Marks 70

Project Paper : Max. Marks 30

3 hrs duration for Theory Paper

- Documentation Framework for Exports and imports : Registration of an export firm and licensing regulations. Processing of an expert order : Export documents need and types : Overview of various export documents.
- International Business Contracts : Types and Formation.
- Payment Term : Instruments and Methods of financing, including documentary credits and collection : Uniform Customs and Practices (UCP) 500.
- Export Finance : Facilities, incentives and procedures for pre and post shipment finance.
- Business Risk Coverage : Cargo, credit and foreign exchange risk coverage, Cargo Insurance; Role and scheme of ECGC and commercial banks.
- Foreign Exchange Regulations and Formalities.
- Quality Control and Pre-shipment inspection: Concept, scheme and procedures.

Suggested Readings :

1. Paras Ram, Export: What, where and How; Anupam Publishers, Delhi.
2. Uniform Customs & Practice for Documentary Credits, International Chamber of Commerce, Paris.
3. Handbook of Import – Export procedures; Ministry of Commerce , Government of India, New Delhi.
4. Mahajan M.I. Exports : Do it yourself, Snowhite Publication, Mumbai.
5. Export Documentation and Procedures: Nabhi Publications, New Delhi.

PAPER-II ; PROJECT REPORT AND VIVA-VOCE

Every student shall have an appropriate topic selected for doing Project Report at the session and shall submit the same in triplicate at least 3 weeks before the commencement of theory examinations. For this purpose each student shall undergo for field work/practical training in concerned organisations for 150 hrs. Viva-Voce shall be held within one month of the last date of written examination. (Project Report 70 marks and Viva-Voce 30 marks).

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GLOBAL P.G. COLLEGE
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Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Bachelor of Science (B. Sc.)

Duration – 3 Years

GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will build a strong base in science subjects which will help them in higher studies and jobs.

PEO2: Students will learn how to do research and find out new things, so they can work on their own and add new knowledge in science.

PEO3: Students will learn practical skills through lab work, experiments, and field visits so they can connect theory with real life.

PEO4: Students will clearly understand their chosen subjects, useful topics, which will help them in higher studies or getting jobs.

PEO5: Students will learn to plan and perform experiments step by step, record accurate results, and make clear and logical conclusions

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will learn how to do research properly – planning studies, collecting and checking data, and finding meaning in results – and they will add new knowledge to science.

PO2: Students will always follow honesty and safety in their work, respect society, and keep high values in research and profession.

PO3: Students will learn hands-on skills by doing lab work, field visits, and solving problems, so they can use book knowledge in real-life situations.

PO4: Students will share scientific ideas and research results clearly, both in writing and speaking, so that classmates, teachers, and even common people can understand.

PO5: Students will clearly understand the main ideas in Physics, Chemistry, Mathematics subjects, giving them a strong base for future studies or jobs.

PSO1: Students will learn the main ideas and important concepts in their chosen science subjects and use this learning in research and protection of nature.

PSO2: Students will study plants – their growth, development, and genetic differences – and help in improving farming, environment, and plant science.

PSO3: Students will apply Chemistry knowledge to solve environmental problems, like reducing pollution and supporting sustainable living.

PSO4: Students will use Mathematics to solve tough problems in science and engineering.

PSO5: Students will use Physics knowledge in useful work like electronics, materials, and energy systems.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

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SYLLABUS

B.Sc. PART-I

Examination-2025

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Scheme of Examination

B.Sc. (Pass Course) Part-I

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows :

First Division 60%
Second Division 48%

} of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations :

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CONTENTS

SCHEME OF EXAMINATION & DISTRIBUTION OF MARKS		SYLLABUS :
Compulsory Subject (Four) :		PAGE NO.
1.	सामान्य हिन्दी (General Hindi)	4-5
2.	General English (Essential Language Skills)	6-7
3.	Environmental Studies	8-11
4.	Elementary Computer Application	12-13
5.	Elementary Hindi (In Lieu of Gen. Hindi for non-Hindi speaking students only)	14
	Optional Subjects :-	
1.	Physics	15-21
2.	Chemistry	22-26
3.	Zoology	27-32
4.	Botany	33-40
5.	Geology	41-44
6.	Mathematics	45-48
7.	Economics	49-50
8.	Geography	51-54
9.	Statistics	55-58
10.	Applied Statistics	59-60
11.	Psychology	61-64
12.	Electronics	65-70
Additional Optional Subjects :		
1.	Textile Craft	71-72
2.	Garment Production and Export Management	73-76
3.	Geology and Mining	77-78
4.	Environmental Science	79-82
Vocational Subjects :		
1.	Biotechnology	83-87
2.	Industrial Microbiology	88-95
3.	Computer Applications	96-98

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बी.ए./बी.एससी./बी.कॉम./~~बी.एस.सी.~~–प्रथम वर्ष
(कला, विज्ञान एवं वाणिज्य संकाय)
सामान्य हिन्दी

पूर्णांक 100 न्यूनतम उत्तीर्णांक 36

नोट : 36 से कम अंक लाने पर छात्रों को उत्तीर्ण नहीं किया जायेगा। इस प्रश्नपत्र में प्राप्त अंकों को श्रेणी निर्धारण हेतु नहीं जोड़ा जायेगा।

अंक विभाजन – प्रश्नपत्र में दो भाग होंगे – 1. साहित्य खण्ड एवं 2. व्याकरण खण्ड। साहित्य खण्ड में दो भाग होंगे – गद्य भाग एवं पद्य भाग। प्रत्येक खण्ड के लिए 50 अंक निर्धारित है।

अंक विभाजन **50 अंक**

- दो व्याख्या पद्य से (प्रत्येक में विकल्प देना है) 5 x 2 = 10 अंक
- दो व्याख्या गद्य से (प्रत्येक में विकल्प देना है) 5 x 2 = 10 अंक
- आलोचनात्मक प्रश्न पद्य से (विकल्प देना है) $7\frac{1}{2}$ x 2 = 15 अंक
- आलोचनात्मक प्रश्न गद्य से (विकल्प देना है) $7\frac{1}{2}$ x 2 = 15 अंक

क. साहित्य खण्ड – गद्य–पद्य की निर्धारित रचनाएं

गद्य भाग –

1.	कहानी	–	हार की जीत – सुदर्शन
2.	निबंध	–	नाखून क्यों बढ़ते हैं – आ. हजारी प्रसाद द्विवेदी
3.	संस्मरण	–	असीम औ' ससीम के बीच – अज्ञेय
4.	रेखाचित्र	–	गौरा – महादेवी वर्मा
5.	व्यंग्य	–	प्रेमचंद के फटे जूते – हरिशंकर परसाई
6.	रिपोर्ताज	–	स्टिल लाइफ – फणीश्वरनाथ रेणु
7.	साध्य–साधन एकत्व	–	नन्दकिशोर आचार्य
8.	पर्यावरणीय निबंध	–	आज भी खरे हैं तालाब – अनुपम मिश्र

ख. पद्य भाग

1.	कबीर	–	कबीर ग्रंथावली, संपादक – श्यामसुंदर दास
			सुमिरन कौ अंग – साखी संख्या – 17, 21, 27, 29 = 4
			विरह कौ अंग – साखी संख्या – 3, 5, 20, 29 = 4
			चितावणी कौ अंग – साखी संख्या – 2, 8, 12, 18 4
2.	सूरदास	–	सूरसागर सार, संपादक – डॉ. धीरेन्द्र वर्मा
		–	विनय भक्ति पद – 21, 33
		–	यशोदा हरि पालने झुलावै, खेलत में को काको गुसैंया
			मैया मोहि दाऊ बहुत खिझायों
			आये योग सिखावन पाण्डे = 6 पद
3.	तुलसीदास	–	रामचरित मानस – लंका काण्ड – (रावनुरथी विरथ रघुवीरा.....
			..... निज–निज प्रभुआन।
4.	मीरां	–	मीरां पदावली – सं0 शंभुसिंह मनोहर
			मन थें परस हरि के चरण (01), थारो रूप देख्यां अटकी (09)
			मो हे रावरे के रंग की रौंची (19) मैं तो गिरिधर के घर जाऊ(20)
			म्हाँ गिरिधर के रंग राती वहाँ (26)
5.	रहीम	–	रहीम ग्रंथावली, सं0 – विद्यानिवास मिश्र तथा डॉ. गोविन्द रजनीश
			दोहा संख्या – 186, 191, 211, 212, 214, 218, 219, 220, 223,
			224 = 10 दोहे
6.	मैथिलीशरण गुप्त	–	साकेत – कैकेयी अनुताप
			(तदनन्तर बैठी सभा उटज के आगे ..... विनय आज यह माता)
7.	निराला	–	वह तोड़ती पत्थर, भिक्षुक
8.	अज्ञेय	–	भीतर जागा दाता
9.	नागार्जुन	–	कालिदास के प्रति

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खण्ड 2. व्याकरण/व्यावहारिक हिन्दी – 50 अंक

1. निबन्ध लेखन	–	शब्द सीमा – 300 शब्द	8 अंक
2. कार्यालयी पत्र	–	शासकीय, अर्द्धशासकीय, कार्यालय ज्ञापन, कार्यालय आदेश, अधिसूचना, पृष्ठांकन	$3\frac{1}{2}x2 = 7$ अंक
3. संक्षेपण	–		5 अंक
4. पल्लवन	–		5 अंक
5. शब्द निर्माण	–	उपसर्ग, प्रत्यय, संधि, समास	5 अंक
6. शब्द के प्रकार	–	संज्ञा, सर्वनाम, क्रिया एवं क्रिया विशेषण	5 अंक
7. शब्द शुद्धि एवं वाक्य शुद्धि			5 अंक
8. मुहावरे एवं लोकोक्ति			5 अंक
9. पारिभाषिक शब्दावली (अंग्रेजी के 5 पारिभाषिक शब्दों के हिन्दी रूप)			5 अंक

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2. GENERAL ENGLISH

B.Sc. Part-I

Duration: 3 hrs. **Max. Marks: 100**

Minimum Pass Marks: 36

The syllabus aims at achieving the following objectives :

1. Introducing students to phonetics and enabling them to consult dictionaries for correct pronunciation (sounds and word stress)
2. Reinforcing selected components of grammar and usage
3. Strengthening comprehension of poetry, prose and short-stories
4. Strengthening compositional skills in English for paragraph writing. CVs and job applications.

The Pattern of the Question Paper will be as follows:

Unit A: Phonetics and Translation **(20 marks)**

(10 periods)

I Phonetic Symbols and Transcription of Words (05)

III Translation of 5 Simple sentences from Hindi to English (05)

from English to Hindi (05)

IV Translation of 05 Words from Hindi to English ($2^{1/2}$)

from English to Hindi ($2^{1/2}$)

Unit B: Grammar and Usage **(25 marks)**

(10 periods)

I Elements of a Sentence (05)

II Transformation of Sentences (05)

a. Direct and Indirect Narration
b. Active and Passive Voice

II Modals (05)

III Tense (05)

IV Punctuation of a Short Passage with 10 Punctuation Marks (05)

(As discussed in Quirk and Greenbaum)

Unit C: Comprehension **(25 marks)**

Following Essays and Stories in *Essential Language Skills* revised edition compiled by Macmillan for University of Rajasthan General English B. A. /B. Com./B. Sc.

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Candidates will be required to answer 5 questions out of ten questions from the prescribed texts. Each question will be of two (2) marks. (10)

Sujata Bhastt	Voice of the Unwanted Girl
Ruskin Bond	Night Train for Deoli
M.K. Gandhi	The Birth of Khadi
J.L. Nehru	A Tryst with Destiny
A.P.J. Abdul Kalam	Vision for 2020

The candidates will be required to answer 5 questions from an unseen passage.

(10)

One vocabulary question of 10 words from the given passage.

(5)

Unit D: Compositional Skills (30 marks)

(15 periods)

I Letters-Formal and Informal		(10)
II CV's Resume and Job Applications	and Report	(10)
III Paragraph Writing		(10)

Recommended Reading:

Sasikumar, V., Dutta and Rajeevan, A Course in Listening and Speaking-I Foundation Books. 2005.

Sawhney, Panja and Verma eds. English At the Workplace, Macmillan 2003.

Singh, R.P. Professional Communication. OUP. 2004

Judith Leigh. CVs and Job Applications. OUP. 2004

Arthur Waldhorn and Arthur Zeiger, English Made Simple. Upa and Co.

Gunashekar ed. A Foundation English Course for Undergraduates. Book I, CIEFL, Hyderabad.

Quirk and Greenbaum: A University Grammar of English Longman, 1973

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3. COMPULSORY PAPER OF ENVIRONMENTAL STUDIES

B.Sc. Part-I

Scheme of examination

Time	Min Marks	Max. Marks
3 hrs	36	100

This paper will contain 100 multiple choice questions. Each question will carry 1 mark.

Students should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

Unit.1: The Multidisciplinary nature of environmental studies

Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

a. Natural resources and associated problems, Classification of resources: renewable resources,non renewable resources, classes of earth resources, resources regions: Definition and criteria, resource conservation.
b. Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problems.
d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.
f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
g. Land resources: Land as a resource, Land degradation man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

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Unit 3: Ecosystems, Concepts, Structure, Functions and Types

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types characteristics features, structure and function of the following ecosystem:

a. Forest ecosystem, Tropical Temperate and Alpine Ecosystem
b. Grassland ecosystem and Their Types
c. Desert ecosystem with emphasis on Thar Desert
d. Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries) and Wet Lands

Unit 4: Biodiversity and its conservation

- Introduction –Definition, genetic, species and ecosystem diversity
- Biogeographically classification of India
- Value of biodiversity :consumptive use, productive use, social ethical., aesthetic and option values
- Biodiversity at global, National and local level
- India as a mega-diversity nation
- Hot-sport of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered, Threatened and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
- Red Data Book

Unit 5 : Environmental Pollution and Control Measures

Definition

- Causes, effects and control measures of:

a) Air Pollution
b) Water Pollution
c) Soil Pollution
d) Marine Pollution
e) Noise Pollution
f) Thermal Pollution
g) Nuclear Hazards

- Solid waste management" Causes, effects and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution

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- Pollution case studies
- Disaster management: floods earthquake, cyclone and landslides

Unit 6 : Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain ozone layer depletion, nuclear accidents and holocaust. Case studies
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act.
- Air (Prevention and Control of Pollution)Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations
- Population explosion-Family Welfare Programme
- Environment and Human health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case Studies

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Suggested Readings:-

1. Diwan A.P. and Arora D.K.1995. Human Ecology Anmol Publication Pvt.Ltd.,New Delhi.
2. Dubey, R.M.1992. Human Ecology and Environmental Education,Chaugh Publications,Allahabad.
3. Goudie,Andrew.The Human Impact.
4. Husain Maxia.1994 Human Geography,Rawat Publication,Jaipur.
5. Johnston, R.J.Ed.1986 Dictionary of Human geography,National Publication,New Delhi.
6. Malik,S.L.and Bhattacharya D.K.1986. Aspects of Human Ecology,Northern Book Center,New Delhi.
7. Mishra,R.P and Bhooshan,B.S.1979.Human Settlements in Asia.Public,Polices and programmes Haritage publisher,New Delhi.
8. Nathawat, G.S.1985. Human Ecology,An Indian perspective,Indian Human Ecology Council,Jaipur.
9. Russel, Bartrand, 1976.Impact of Science of society Unwin,Publisher,Indian. (paper back).
10. Sinha Rajiv, 1996.Gloobal Biodiversity Ina.,Shri publication,Jaipur.
11. Sinha Rajiv K., 1994. Development without Desertrction 14.Environmentalist,Jaipur. Sinha Rajiv K., 1996.Environmental Crises and Human at Risk,In A Shri Publication,Jaipur.
12. Smith, Dlanne, 1984.Urban Ecology,George Allen,London.
13. Swarnkar, R.C.1985.Indian Tribes.Printwell publisher,Jaipur.
14. Tivy,Joy and O'Hugegreg,1985.Human Impact on the Ecosystem Edinburgh George Allen Boyd.
16. United Nations Development Report, 1996.Human Development Report, 1996.Oxford University Press,Delhi.
17. Vannathony & Rogers Paul, 1974. Human Ecology and World Development,Flehum Press,New York.

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4. Elementary Computer Applications

Maximum Marks- 100 (Main University Examinations)
Theory : Max. Marks -60
Practical : Max. Marks- 40

Each Candidate has to pass in Theory and Practical Examinations separately.

Question paper for Elementary Computer Applications, (Compulsory paper-common for B.A. / B.Sc./ B.Com. Part-I) be so set that it has 120 multiple choice questions (Bilingual) of ½ marks each. The question paper will be of duration of 2 hours. The examinees will have to give their answers on OMR Sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology. Further the practical examination for this paper will be of 40 marks and its duration will be of 2 hours.

Unit – I

Introduction to information technology : Evolution and generation of computers, type of computers, micro , mini , mainframe and super computer. Architecture of a computer system : CPU , ALU, Memory (Ram, Rom families)cache memory, input /output devices, pointing devices.

Concept of Operating system, need types of operating systems, batch, single user, multi – processing , distributed and timeshared operating systems, introduction of Unix, Linux, Windows, Window NT. Programming languages Low level and high level languages, generation of languages , 3 GL and 4 GL languages .Graphic User Interfaces.

Unit – II

Word Processing tool : Introduction , Creating, Saving, Copy, Move and Delete. Checking Spelling and Grammer. Page Layout, interface, toolbars, ruler, menus keyboard shortcut , editing. Text Formatting, insert headers and footers. Bullets and Numbering. Find and Replace etc. Insert Table and Picture , Macro, Mail Merge.

Power Point : Creating and viewing a presentation, managing slide shows navigating through a presentation using hyperlinks, advanced navigation with action setting and action buttons. Organizing formats with Master Slides applying and modifying designs adding graphics , multimedia and special effects.

Unit - III

Electronic Spreadsheet : Worksheet types of create and open a worksheet. Entering data text numbers and formula in a worksheet inserting and deleting cells, cell formatting, inserting rows and columns in a worksheet formatting worksheets. Using various formula and inbuilt function. Update worksheet using special tools like spell check and auto correct setup the page

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margins of worksheets for printing. Format the data in the worksheet globally or selectively. creating charts. Enhance worksheets using charts, multiple worksheets-concepts

Unit - IV

The Internet - History and Functions of the Internet, Working with Internet, Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names, Uses of Internet, Search for Information, Email, Chatting, Instant messenger services, News, Group, Teleconferencing, Video-Conferencing, E-Commierce and M-Commerce.

Manage an E-mail Account, E-mail Address, configure E-mail Account, log to an E-mail, Receive E-mail, Sending mails, sending files an attachments and Address Book, Downloading Files, online form filling, E-Services - E-Banking and E-Learning.

Unit - V

Social, Ethical and Legal Matters - Effects on the way we: Work Socialise, Operate in other areas, Cyber crime, Prevention of crime, Cyber law: Indian IT Act, Intellectual property, Software piracy, Copyright and Patent, Software licensing, Proprietary software, Free and Open source software.

Network Security - Risk assessment and security measures, Assets and types (data, applications, system and network), Security threats and attacks (passive, active); types and effects (e.g. identity theft, denial of services, computer virus etc.), Security issues and security measures (Firewalls, encryption/decryption), Prevention.

Question Paper pattern for Main University Practical Examination ***Max Marks: 40***

Practical

The practical exercises will be designed to help in the understanding of concepts of computer and the utilization in the areas outlined in the theory syllabus. The emphasis should be on practical usage rather than on theoretical concepts only.

The practical examination scheme should be as follows –

- Three Practical Exercise (including Attendance & Record performance) 30 marks
  - Operating system
  - MS Word
  - MS Excel
  - MS Power Point
  - Internet
- Viva-voce 10 marks

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5 बी.ए. प्रथम वर्ष : प्रारम्भिक हिन्दी

पूर्णांक 100 अवधि : 3 घण्टे

अंको का विभाजन

1. पुस्तकों पर आधारित प्रश्न	50 अंक
2. व्याकरण से संबंधित प्रश्न	24 अंक
3. रचना से संबंधित प्रश्न	26 अंक
(क) लोकोक्तियाँ मुहावरे	
(ख) पत्र लेखन अथवा निबंध	

पाठ्यक्रम

1. गद्य संग्रह
2. व्याकरण : शब्द विचार, वाक्य विन्यास, वाक्य खण्ड, पद क्रम का ज्ञान तथा इनमें होने वाली सामान्य त्रुटियों का ज्ञान।
3. (क) मुहावरों एवं लोकोक्तियों का प्रयोग, वाक्यों में रिक्त स्थानों की पूर्ति, समान दिखने वाले शब्दों का अर्थ भेद अथवा वाक्यों में प्रयोग
   (ख) पत्र लेखन अथवा निबंध

पाठ्य पुस्तकें

1. गद्य–संग्रह–राष्ट्रीय गौरव के चिन्ह– डॉ. हरिकृष्ण देवसरे
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली

व्याकरण एवं रचना

1. आधुनिक हिन्दी व्याकरण तथा रचना – लेखक कृष्ण विकल
   प्रकाशक–नेशनल पब्लिशिंग हाउस, नई दिल्ली
2. सुबोध व्याकरण एवं रचना–सम्पादक–व्यथित हृदय–संशोधनकर्ता–डॉ.अम्बा प्रसाद सुमन
   प्रकाशक – श्रीराम मेहरा एण्ड कम्पनी, आगरा

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B.Sc. Part I (Pass Course)

1. PHYSICS

Scheme : Max. Marks: 100

Min. Pass Marks: 36

Paper I	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper II	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper III	3 hrs. duration	Max. Marks: 34	Min. Pass marks 12
Practical	5 hrs. duration	Max. Marks: 50	Min. Pass marks 18

Paper-I : Mechanics & Oscillations

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit – I:

Physical Law and frame of Reference

(a) Inertial and non-inertial frames, Transformation of displacement, velocity, acceleration between different frames of reference involving translation. Galilean transformation and invariance of Newton's laws.

(b) **Coriolis Force:** Transformation of displacement, velocity and acceleration between rotating frame, Pseudo forces, Coriolis force, Motion relative to earth, Focult's pendulum.

(c) **Conservative Forces:** Introduction about conservative and non-conservative forces, Rectilinear motion under conservative forces, Discussion of potential energy curve and motion of a particle.

Unit – II:

Centre of Mass

Introduction about Centre of Mass, Centre of Mass Frame: Collision of two particles in one and two dimensions (elastic and inelastic), Slowing down of neutrons in a moderator, Motion of a system with varying mass, Angular momentum concept, conservation and charge particle scattering by a nucleus.

Rigid body

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Equation of motion of a rotating body, Inertial coefficient, Case of J not parallel to ω. Kinetic energy of rotation and idea of principal axes, Precessional motion of a spinning top

Unit – III:

Motion under Central Forces

Introduction about Central Forces, Motion under central forces, Gravitational interaction, Inertia and gravitational mass, General solution under gravitational interaction, Keplers Laws, Discussion of trajectories, Cases of elliptical and circular orbits, Rutherford scattering.

Damped Harmonic Oscillations

Introduction about oscillations in a potential well, Damped force and motion under damping, Damped Simple Harmonic Oscillator, Power dissipation, Anharmonic oscillator and simple pendulum as an example.

Unit – IV:

Driven Harmonic Oscillations

Driven harmonic oscillator with damping, Frequency response, Phase [illegible] factor, Resonance, Series and parallel of LCR circuit, Electromechanical [illegible] Galvanometer.

Coupled Oscillations

Equation of motion of two coupled Simple Harmonic Oscillators, Normal modes, motion in mixed modes, Transient behavior, Dynamics of a number of oscillators with neighbor interactions

Text books:

- Mechanics (SIE), Charles Kittel
- Introduction to Classical mechanics, TMH
- The Physics of Waves & Oscillations, Bajaj
- H. Goldstein, Classical mechanics.
- L.N. Hand, J.D. Finch, Analytical mechanics (Cambridge, 1998).
- L. Landau, E. Lifshitz, Mechanics.

Paper – II (Electromagnetism)

Work Load: 2 Hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

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Unit I: Scalar and Vector Fields

Concept of Field, Scalar and Vector Fields, Gradient of scalar field. Physical significance and formalism of Gradient , Divergence and Curl of a vector field Cartesian co-ordinates system, Problems based on Gradient, Divergence and curl operators. Concept of Solid angle, Gauss divergence and Stoke's theorem. Gauss law from inverse square law. Differential form of Gauss law.

Electric Field and Potential Energy

Invariance of Charge, Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distribution. Energy required to built a uniformly charged sphere, classical radius of electron, Electric field due to a short electric dipole, Interaction of electric dipole with external uniform and non uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics.

Electric field measured in moving frames, Electric field of a point charge moving with constant velocity.

Unit II: Electric field in matter

Multipole expansion, defination of moments of charge distribution, Dielectrics, Induced dipole moments, polar non polar molecules, Free and bound charges, Polarization, Atomic polarizabilty, electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (i) out side the sphere (ii) at the surface of the sphere (iii) inside the sphere, Electric field due to a dielectric sphere placed in a uniform electric field (a) out side the sphere (b) inside the sphere, Electric field due to a charge placed in dielectric medium and Gauss law. Clausius-Mossotti relation in dielectrics.

Unit III: Magnetostatics and Magnetic field in matter

Lorentz force, properties of magnetic field, Ampere's law, field due to a current carrying solid conducting cylinder (a) out side (b) at the surface and (ii) inside the cylinder. Ampere's law in differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Deduction of Bio-Savart law using Magnetic Vector potentials, Differential form of Ampere's law.

Atomic magnet, Gyromagnetic ratio, Bohr-magneton, Larmor frequency, induced mangnentic moment and dia-magnetism, spin magnetic moment, para and ferro-magnetism, Intensity of Magnetization, Magnetic permeability and Susceptibility, free and bound current dencities, Magnetic field due to a uniformly magnetized material and Non-unifomly magnetized material.

Unit IV: Maxwell's Equations and Electromagnetic waves

Displacement current, Maxwell's Equations, Electromagnetic waves, Electromagnetic waves in an Isotropic medium, Properties of electromagnetic waves, Energy density of Electromagnetic waves, Pointing vector, Radiation pressure of free space, Electromagnetic waves in Dispersive medium, Spectrum of Electromagnetic waves.

References :

1. Electricity & Magnetism ; A.S. Mahajan & Abbas A. Rangwala, Tata McGraw-Hill
2. Introduction to Electrodynamics ;, David J. Griffith, Prentice Hall
3. Berkley Physics Course , Vol. II
4. Fundamental University Physics Vol II : Fields and Waves ; M. Alonso and E.J. Finn: Addison-Wesley Publishing Company.

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2. Introduction to Electrodynamics : David J. Griffith, Prentice Hall

3. Berkley Physics Course , Vol II

4. Fundamental University Physics Vol II : Fields and Waves ; M. Alonso and E.J. Finn; Addison-Wesley Publishing Company.

Paper III
OPTICS

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of these questions shall be compulsory and Part (B) of these questions will have internal choice.

Unit – 1 Interference:

Concept of Spatial and Temporal Coherence, coherence length, coherence time, Definition and propagation of a wave front Huygen's principle of secondary wavelets, Young's Double slit experiment. Types of interference, interference by division of wavefronts: Fresnel's Biprism, Measurement of wavelength λ and thickness of a thin transparent sheet, Interference by division of amplitude: Interference in thin films of constant thickness in transmitted and reflected waves. Interference produced by a wedge shaped film, Newton's rings, Determination of wavelength λ and refractive index μ by Newton's Rings: fringes of equal inclination (Haidinger fringes) and equal thickness (Fizeau fringes), Michelson's Interferometer, shape of fringes, Measurement of wavelength, difference between two spectral lines and thickness of a thin transparent sheet.

Unit – 2 Diffraction:

Fresnel's diffraction, Half period zones, Fresnel's diffraction at a circular aperture, straight edge and a rectangular slit, Zone plate, Multiple foci of zone plate, comparison between zone plate and convex lens, Fraunhofer diffraction by single slit and a circular aperture, Fraunhofer diffraction by N parallel slits with two slits as a special case, Missing order, Plane diffraction grating and its use in determining wavelength, Dispersion by a grating, Rayleigh's criterion of resolution, Resolving power of a Telescope and a Grating.

Unit – 3 Polarization:

Polarization (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically Polarized light, Production of Plane polarized light: (i) by reflection (ii) by refraction (iii) by

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double refraction and (iv) by dichroism (Polaroid), Identification of polarized light, Huygen's theory of double refraction, Production of Circularly and Elliptically Polarized light, Quarter wave and half wave plates, Analysis of polarized light, Optical activity, Laws of optical Activity, Fresnel's explanation of optical activity, Experimental verification of Fresnel's theory, Specific rotation, Polarimeter, Types of Polarimeter: (i) Laurent's half shade polarimeter and (ii) Biquartz polarimeter.

Unit – 4: Quantum Optics & Photonics

(i) **Laser:** Spontaneous and stimulated emission, Einstein's A & B coefficients, Energy density of radiation as a result of stimulated emission and absorption, population inversion, Methods of optical pumping, energy level schemes, He-Ne, Ruby, co_2 lasers.

(ii) **Holography:** Basic concepts of Holography, principle of holography, Theory, construction and reconstruction of image, application of holography.

(iii) **Fiber Optics:** Introduction of Optical Fiber, Necessity of Cladding, Optical fiber system, optical fiber cable, Total internal Reflection, Explanation of Propagation of light through an optical fiber.

Reference:

1. Optics by Brij Lal & Subramanium, S. Chand.
2. Optics by D. P. Khandelwal.
3. Principles of optics by B. K. Mathur.
4. Introduction to Modern Optics by A. K. Ghatak.
5. An introduction to Modern Optics by G. R. Fowels.
6. Essentials of Lasers by Allen.

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Practical

Work Load: Four hours laboratory work per week

Examination Duration: Four hours

Minimum Experiments: Total sixteen taking eight from each section.

The colleges are free to set new experiments of equivalent standard. This should be intimated and approved by the Convener, Board of Studies before the start of academic session. It is binding on the college to have experimental set up of at least sixteen experiments listed below (8 from each section). In case number of experiment performed by the student is less than sixteen, his marks shall be scaled down in final examination on pro rate basis. Laboratory examination paper will be set by the external examiner by making pairs of experiments taking one from each section out of sixteen or more experiments available at the center. Different combinations shall be given for different batch.

Section A

1. To study the variation of power transfer by two different loads by a DC source and to verify maximum power transfer theorem.
2. To study the variation of charge and current in a RC circuit with a different time constant (using a DC source).
3. To study the behavior of a RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
4. To study the rise and decay of current in an LR circuit with a source of constant emf.
5. To study the voltage and current behavior of an LR circuit with an AC power source. Also determine power factor, impedance and phase relations.
6. To study the characteristics of a semi- conductor junction diode and determine forward and reverse resistances.
7. To study the magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find radius of the circular coil.
8. To determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.
9. To convert a galvanometer into a ammeter of a given range
10. To convert a galvanometer into a voltmeter of a given range.

Section B

1. To study the random decay and determine the decay constant using the statistical board.
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.

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4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.
5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.
7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.
8. To find J by Callender and Barne's Method.
9. To determine Young's modulus by bending of beam.
10. To determine Y, σ and η by Searle's method.
11. To ensure Curie temperature of Monel alloy.
12. To determine modulus of rigidity of a wire using Maxwell's needle.
13. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
14. To study variation of surface tension with temperature using Jaegger's method.
15. To study the specific-rotation of sugar solution by polarimeter.

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2. CHEMISTRY

Scheme:
Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	50	18

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-101 Paper I : Inorganic Chemistry
(2 hrs or 3 periods/ week)

Unit-I

Ionic Solids: Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's [illegible]

Metallic bond: free electron, valence bond and band theories.

Weak Interactions: Hydrogen bonding, vander Waals forces.

Unit-II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+ SF_4, ClF_3, ICl_2, H_2O.

Molecular Orbital Theory: homonuclear and heteronuclear (CO and NO) diatomic molecules. Multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Unit-III

s-Block Elements: Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

Periodicity of p-block elements: Periodicity in properties of p-block elements with reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation.

UNIT-IV

Some Important Compounds of p-block Elements: Hydrides of boron, diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

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Chemistry of Noble Gases: Chemical properties of the noble gases, chemistry of Xenon, structure and bonding in Xenon compounds.

Unit- V

Nuclear Chemistry: Fundamental particles of nucleus (nucleons); Concept of nuclides and its representation; Isotopes, Isobars and Isotones (with specific examples); Forces operating between nucleons (n-n, p-p, & n-p); Qualitative idea of stability of nucleus (n/p ratio).

Radiochemistry: Natural and artificial radioactivity; Radioactive disintegration series; Radioactive displacement law; Radioactivity decay rates; Half life and average life; Nuclear binding energy, mass defect and calculation of defect and binding energy; Nuclear reactions, Spallation, Nuclear fission and fusion.

CH-102 Paper II :Organic Chemistry
(2 hrs or 3 periods / week)

Unit-I

Mechanism of Organic Reactions: Homolytic and heterolytic bond cleavage. Types of reagents, electrophiles and nucleophiles. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Types of organic reactions (energy considerations. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit-II

Stereochemistry of Organic Compounds: Concept of isomerism, Types of isomerism, Difference between configuration and conformation, Flying wedge and Fischer projection formulae.

Optical Isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity. Properties of enantiomers, chiral and achiral molecules with two stereogenic centres. Diastereomers, threo and erythro isomers, meso compounds. Resolution of enantiomers. Inversion, retention and racemization (with examples).

Relative and absolute configuration, sequence rules, D / L and R / S systems of nomenclature.

Geometric Isomerism: Determination of configuration of geometric isomers - cis / trans and E / Z systems of nomenclature. Geometric isomerism in oximes and alicyclic compounds.

Conformational Isomerism: Newman projection and Sawhorse formulae, Conformational analysis of ethane, *n*-butane, cyclohexane.

Unit-III

Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkyl groups, classification of carbon atoms in alkanes. Methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation, orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions. Baeyer's strain theory and its limitations. Theory of strainless rings.

Alkenes, Cycloalkenes, Dienes and Alkynes: Methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides. Regioselectivity in alcohol dehydration - the Saytzeff rule, Hoffmann elimination. Physical properties and relative stabilities

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...kenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions. Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$. Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes.
Classification and Nomenclature of isolated, conjugated and cumulated dienes. Structure of allenes and butadiene. Methods of formation, properties, Chemical reactions - 1,2- and 1,4-additions, Diels-Alder reaction and polymerization.
Structure and bonding in alkynes. Methods of formation. Chemical reactions - acidity of alkynes; mechanism of electrophilic and nucleophilic addition reactions; hydroboration-oxidation; metal-ammonia reduction, oxidation and polymerization.

Unit-IV

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram.
Aromaticity: the Huckel rule, aromatic ions – three to eight membered.

Aromatic electrophilic substitution: General pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation, mercuration, Friedel-Crafts reactions and chloromethylation. Energy profile diagrams. Activating and deactivating substituents. Directive influence - orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Unit-V

Alkyl and Aryl Halides: Methods of formation of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides S_N2 and S_N1 reactions with energy profile diagrams.
Polyhalogen compounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.
Relative reactivities of alkyl, allyl, vinyl and aryl halides.

CH-103 Paper III: Physical Chemistry
(2 hrs. or 3 Periods/week)

UNIT-I

Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k_x, e^x, x^n, sinx and log x; maxima and minima, partial differentiation and reciprocity relations, integration of some useful/relevant functions, permutations and combinations, factorials, probability.

Liquid State: Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

UNIT- II

Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of state.

Critical Phenomenon: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect.)

UNIT- III

Solid State: Definition of space lattice, unit cell.

Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals.

Basic concept of X-ray diffraction by crystals. Derivation of Bragg's equation Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method), band theory of solids. Defects in solids

UNIT IV

Colloidal State: Definition of colloids, classification of colloids.

Solids in liquids (sols) properties- kinetic, optical and electrical, stability of colloids, Protective action, Hardy-Schulze law, gold number.

Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier

UNIT V

Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction, concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions - zero order, first order, second order; pseudo order, half-life and mean-life. Determination of the order of reactions - differential method, method of integration, method of half-life period and isolation method.

Radioactive decay as a first order phenomenon.

Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometry. Theories of chemical kinetics. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Simple collision theory based on hard sphere model transition state theory (no mathematical hypothesis). Expression for the rate constant bases on equilibrium constant and thermodynamic aspects.

Practical: CH -104: Laboratory Course -I

(4 hrs or 6 periods / week)

INORGANIC CHEMISTRY

Separation and identification of six radicals (3 cations and 3 anions) in the given inorganic mixture including special combinations.

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ORGANIC CHEMISTRY

Laboratory Techniques

(a) Determination of melting point (naphthalene, benzoic acid, urea, etc.); boiling point (methanol, ethanol, cyclohexane, etc.); mixed melting point (urea-cinnamic acid, etc.).

(b) Crystallization of phthalic acid and benzoic acid from hot water, acetanilide from boiling water, naphthalene from ethanol etc.; Sublimation of naphthalene, camphor, etc.

Qualitative Analysis

Element Detection (N, S and halogens). Functional group determination (unsaturation, phenolic, alcoholic, carboxylic, carbonyl, ester, carbohydrate, amine, amide, nitro) in simple organic solids and liquids.

PHYSICAL CHEMISTRY

(One of the following experiments should be given in the examination)

(i) Chemical Kinetics:

(a) To determine the specific reaction rate of the hydrolysis of methyl acetate/ ethyl acetate catalyzed by hydrogen ions at room temperature.

(b) To study the effect of acid strength on the hydrolysis of an ester.

(c) To compare the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

(d) To study kinetically the reaction rate of decomposition of iodide by H_2O_2.

(ii) Viscosity, Surface Tension:

(a) To determine the viscosity/surface tension of a pure liquid (alcohol etc.) at room temperature. (using the Ostwald viscometer/stalagmometer).

(b) To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).

(c) To determine the percentage composition of a given mixture (non- interacting systems) by viscosity method.

(d) To determine the viscosity of amyl alcohol in water at different concentration and calculate the excess viscosity of these solutions.

(Instructions to the Examiners)

CHY 104: Chemistry Practical (Pass course)

Max. Marks: 50 **Duration of Exam: 5 hrs.** **Minimum Pass Marks: 18**

Inorganic Chemistry		
Ex.1	Separation and identification of 3 cations and 3 anions in the mixture	15
Organic Chemistry		
Ex.2	Laboratory Techniques	8
Ex. 3	Qualitative Analysis	
	Detection of element and detection of functional group	10
Physical Chemistry		
Ex. 4	Perform one of the experiments mentioned in the syllabus.	12
Ex. 5	Viva-voce	5
Ex. 6	Record	5
	Total	50

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University of Rajasthan

Syllabus: B.Sc. Part-I (Pass Course)

Zoology

(2022-2023)

Scheme:

Max. Marks: 100 Min. Pass Marks: 36

Paper I	**: 3 Hrs duration**	**33 Marks**
Paper II	**: 3 Hrs duration**	**33 Marks**
Paper III	**: 3 Hrs duration**	**34 Marks**
Practicals	**: 4 Hrs. duration**	**50 Marks**

NOTE:

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering the entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.,* three from each unit /section out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

PAPER – I: Z-101

DIVERSITY OF ANIMALS

Section – A

Biosystematics and Taxonomy

1. General principles of taxonomy, concept of five kingdom scheme, international code of nomenclature, cladistics, molecular taxonomy.
2. Concept of Protozoa and Metazoa, and levels of organization.
3. Taxonomy and basis of classification of non-chordata and chordata: symmetry, coelom, segmentation and embryogeny.
4. Detailed classification of Non- chordata and Chordata (up to suborders with examples).

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Section – B

Habitat, Habit, Morphology, Structure, *Locomotion, Organs and Systems (Digestive, Excretory, Respiratory,*Osmoregulation, Nervous & Reproductive),Life Cycle,*Affinities and *Adaptations.

Note : * indicates wherever required

1. **Protozoa :** Amoeba, Entamoeba, Paramaecium, Euglena, Plasmodium, Trypanosoma and Leishmania.
2. **Porifera :** Sycon and Leucosolenia.
3. **Coelentrata:** Obelia and Aurelia.

Section –C

Habitat, Habit, Morphology, Structure ,*Locomotion, Organs and Systems (Digestive, Excretory, Respiratory, Nervous & Reproductive),Life Cycle,*Affinities and *Adaptations.

Note : * indicates wherever required

1. **Ctenophora :** Beroe
2. **Platyhelminthes ;** *Fasciola hepatica* and *Taenia solium.*
3. **Aschelminthes :** *Ascaris, Dracunculus* and *Wuchereria.*
4. **Annelida** : Neries and Leech.

PAPER – II: Z-102
CELL BIOLOGY AND GENETICS

Section – A

Cell Biology

1. Introduction to cell: Morphology, size, shape, characteristics and structure of prokaryotic and eukaryotic animal cell; basic idea of virus and cell theory.
2. Cell membrane: Characteristics of cell membrane molecules, fluid–mosaic model of Singer and Nicholson, concept of unit membrane.
3. Cell membrane transport: Passive (diffusion and osmosis, facilitated, mediated) and active transport.
4. Cytoplasmic organelles:

   (i) Structure and biogenesis of mitochondria; electron transport chain and generation of ATP molecules.
   (ii) Structure and functions of endoplasmic reticulum, ribosome (prokaryotic and eukaryotic) and Golgi complex.
   (iii) Structure and functions of lysosome, microbodies and centrioles.
   (iv) Structure and functions of cilia, flagella, microvilli and cytoskeletal elements.

Section – B

1. **Nuclear Organization:**
   (i) Structure and function of nuclear envelope, nuclear matrix and nucleolus.
   (ii) Chromosomes: Morphology, chromonema, chromomeres, telomeres, primary and secondary constrictions, chromatids, prokaryotic chromosome.
   (iii) Giant chromosome types: Polytene and Lampbrush.
   (iv) Chromosomal organization: Euchromatin, heterochromatin and folded fiber model and nucleosome concept.
2. **Nucleic Acids:**
   (i) DNA structure, polymorphism (A, B and Z types) and replication (semi conservative mechanism) experiments of Messelson and Stahl: elementary idea about polymerases, topoisomerases, single strand binding proteins, replicating forks (both unidirectional and bidirectional), leading and lagging strands, RNA primers and Okazaki fragments, elementary idea about DNA repair.
   (ii) RNA structure and types (mRNA, rRNA and tRNA) and transcription.
3. **Genetic code and translation:** Triplet code, characteristics of triplet code, protein synthesis (translation).
4. **Cell in reproduction:**
   (i) Interphase nucleus and cell cycle: S, G-1, G-2 and M phase.
   (ii) Mitosis: Different stages, structure and function of spindle apparatus; anaphasic movement.
   (iii) Meiosis: Different stages, synapses and synaptonemal complex, formation of chiasmata and significance of crossing over.

Section – C

Genetics

1. Mendelism: Brief history of genetics and Mendel's work; Mendelian laws, their significance and current status, chromosomal theory of inheritance.
2. Chromosomal mutations: Classification, translocation, inversion, deletion and duplication; Variations in chromosome numbers; haploidy diploidy, polyploidy, aneuploidy, euploidy and polysomy.
3. Linkage and crossing over, elementary idea of chromosome mapping.
4. Genetic interaction: Supplementary genes, complementary genes, duplicate genes, epistasis, inhibitory and polymorphic genes.
5. Multiple gene inheritance: ABO blood groups and Rh factor and their significance.
6. Cytoplasmic inheritance.
7. Sex determination in *Drosophila* and man, pedigree analysis.
8. Genetic disorders: Down's, Turner's and Klinefelter's syndromes, color blindness, Hemophilia, Phenylketonuria.
9. Concept of gene: Recon, muton and cistron.

PAPER – III: Z-103
GAMETE AND DEVELOPMENTAL BIOLOGY

Section – A

Developmental Biology: Scope and Early Events

1. Historical review, types and scope of embryology.
2. Gametogenesis:

(i) Formation of ova and sperm.
(ii) Vitellogenesis.

3. Fertilization: Activation of ovum, essence of activation: Changes in the organization of the egg cytoplasm.
4. Parthenogenesis.

Section – B

Developmental Biology: Pattern and Processes

1. Cleavage: Definition, planes and patterns of cleavage among non chordates and chordates, significance of cleavage, blastulation and morulation.
2. Fate maps, morphogenetic cell movements, significance of gastrulation.
3. Embryonic induction, primary organizer, differentiation and competence.
4. Development of chick up to 96 hours stage.
5. Embryonic adaptations:
   (i) Extra embryonic membranes in chick, their development and functions.
   (ii) Placentation in Mammals: Definition, types, classification on the basis of morphology and histology, functions of placenta.
   (iii) Paedogenesis and neoteny.

Section – C

Dimensions in Developmental Biology

1. Regeneration.
2. Various types of stem cells and their applications.
3. Cloning of animals:
   (i) Nuclear transfer technique.
   (ii) Embryo transfer technique.
4. Teratogenesis (Genetic and Induced).
5. Biology of aging.
6. Cell death.

University of Rajasthan
Syllabus: B.Sc. Part-I (2022-2023)
Practical – Zoology

Min. Marks: 18 **4 Hrs. / Week** **Max. Marks: 50**

I. Microscopic Techniques:

1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
2. General methods of microscopic slide preparations:Narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting.
3. General idea of composition, preparation and use of:
   (i) Fixatives: Formalin, Bouin's fluid.
   (ii) Stains: Aceto-carmine, Aceto-orcein, Haematoxylin, Eosin.

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(iii) Common reagents: Normal saline, Acid water, Acid alcohol and Mayer's albumin.

4. Collection and Culture Methods:

(i) Collection of animals from their natural habitat during field trips such as *Amoeba, Paramecium, Euglena, Daphnia, Cyclops*, etc.

(ii) Culture of *Paramecium* in the laboratory and study of its structure, life – processes and behavior in live state.

II. Study of Microscopic Slides and Museum Specimens:

Protozoa: *Amoeba, Euglena, Trypanosoma, Giardia, Entamoeba, Elphidium (Polystomella),Foraminiferous shells, Monocystis, Plasmodium, Paramecium,leishmania, Paramecium* showing binary fission and conjugation, *Opalina, Nyctotherus, Balantidium, Vorticella.*

Porifera:*Leucosolenia, Euplectella, Spongilla,* T. S. Sycon, Spicules, Spongin fibers, Gemmules.

Coelenterata:*Millepora, Physalia, Velella, Aurelia, Alcyonium, Gorgonia, Pennatula,* Sea anemone, Stone corals, *Obelia* colony and medusa.

Ctennophora: Any Ctenophore

Platyhelminthes : *Taenia, Planaria,* Fasciola (WM), T. S. body of *Fasciola*,Miracidium, Sporocyst, Redia and CercariaLarvae of *Fasciola*, Scolex, T. S. mature proglottid of Taenia, gravid proglottid, Cysticercus larva.

Aschelminthes : *Ascaris, Wuchereria, Dracunculus*

Annelida : Neries, Heteroneries, Arenicola, Aphrodite, Chaetopterus, Tubifix,Glossiphonia, Pontobdella, Polygordius.

III. Anatomy:

Earthworm: External features, general viscera, alimentary canal, reproductive system and nervous system.

Leech: External features, alimentary canal, reproductive and nervous system.

IV. Study of the Following Through Permanent Slide Preparation: *Paramecium, Euglena,* Foraminiferous shells,Sponge spicules, Spongin fibres, Gemmule, *Hydra, Obelia* colony andMedusa; ParapodiumofNereis andHeteronereis.

V. Exercises in Cell Biology:

1. Squash preparation for the study of mitosis in onion root tip, permanent slides of mitosis (all stages).

2. Squash preparation for the study of meiosis in grasshopper or cockroach testes, permanent slice of meiosis (all stages).

3. Study of giant chromosomes in salivary glands of *Chironomous* or *Drosophila* larva.

4. Study of cell permeability using mammalian R.B.C.

VI. Exercises in Genetics:

A. **Study of *Drosophila*:**

1. Life cycle and an idea about its culture

2. Identification of male and female

3. Identification of wild and mutants (yellow body, ebony, vestigial wing and white eye)

4. Study of permanent prepared slides: Sex comb and salivary gland chromosomes.

B. **Numerical problems based on monohybrid and dihybrid cross.**

C. **Identification of blood groups (A, B, AB, O & Rh factor)**

VII. Developmental Biology:

1. **Study of development of frog/toad with the help of Charts/Slides/Models:**

(i) Eggs, cleavage, blastula, gastrula, neurula, tail-bud, hatching, mature tadpole larvae, metamorphic stages, toadlet / froglet.

(ii) Histological slides: Cleavage, blastula, gastrula, neurula and tail-bud stage.

2. **Study of development of chick with the help of whole mounts/Charts/Slides/Models**

(i) 18 hrs, 21 hrs, 24 hrs, 33 hrs, 48 hrs, 72 hrs and 96 hrs of incubation.

(ii) Primitive streak stage in living embryo, if possible, after removal of the blastoderm from the egg.

(iii) Study of the embryo at various stages of incubation *in vivo* by making a window in the egg-shell may also be demonstrated.

(iv) Study of various foetal membranes in a 10-12 day old chick embryo.

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B.Sc. Part - I

Scheme of Practical Examination and Distribution of Marks

Time: 4 Hrs. **Min Pass Marks: 18** **Max. Marks: 50**

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	6	5
2.	Permanent Preparation	4	7
3.	Cell Biology and Genetics	4+4	6+6
4.	Developmental Biology	6	5
5.	Identification and comments on Spots (1 to 8)	16	16
6.	Viva Voce	5	5
7.	Class Record	5	-
		50	**50**

Notes:

1. Anatomy: Study of systems of the prescribed types with the help of dissection.
2. With reference to microscopic slides, in case of non-availability, the exercise should be **substituted with diagrams / photographs.**
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. **It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.**

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BOTANY
B. Sc. Part I (Pass Course Syllabus)

Scheme

Min. Pass Marks: 36		Max Marks: 100
Paper I	3 hrs. Duration	Max. Marks 33
Paper II	3 hrs. Duration	Max. Marks 33
Paper III	3 hrs. Duration	Max. Marks34
Practical Min.Marks: 18	4 hrs, duration	Max. Marks 50
Duration of examination of each theory paper-		3 hours
Duration of examination of practical's-		4 hours

Note:

1. There will be 5 questions in each paper. Allquestions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. 1 will have 18 very short answer typeQuestions(not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one questionfrom each unit. These Q.No. 2 to 5 will have internal choice.

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Paper-I
Cell Biology, Genetics and Plant Breeding
(2 hrs /week)
Unit-1

Cell organelles and Nuclear material: Ultrastructures and functions of different cell organelles (cell wall, plasmamembrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, Lysosome, Golgi bodies and Endoplasmic Reticulum). Chromatin structure & Chromosome organization: eukaryotic and prokaryotic. Chromosome morphology; specialized types of chromosomes (Sex chromosomes, lampbrush Chromosome, Polytene chromosome); transposons.

Unit-2

Cell divisions: Cell cycle, mitosis: stages, structure and functions of spindle apparatus; anaphasic chromosome movement; Meiosis: its different stages- Meiosis I, Meiosis II, synaptonemal complex, chiasmata formation and crossing over.

Basis of genetic material: Griffith's transformation experiment and The Hershey and Chase blender experiment to demonstrate DNA as the genetic material. **Concept of Gene**: *Neurospora* genetics: one gene one enzyme hypothesis;
An idea about Prokaryotic and eukaryotic structure of gene – operon concept, exons and introns.

Extra nuclear genome: mitochondrial and Chloroplastgenome, plasmids;
Chromosomal aberrations: Deletion, duplication, translocation, inversion, Aneuploidy and polyploidy.

Unit-3

Genetic inheritance: Mendel's laws of inheritance and their exceptions; allelic (incomplete and co-dominance, lethality) and non-allelic interactions (complementary genes, epistasis and duplicate genes). Quantitative inheritance : grain color in wheat, corolla length in *Nicotiana tabacum*.
Cytoplasmic inheritance-maternal influence, shell coiling in snails, Kappa particles in *Paramaecium*, Multiple allelism : ABO blood groups in men

Unit-4

Plant Breeding : Introduction and objectives of plant breeding; general methods of plant breeding- in self-pollinated, cross-pollinated and vegetatively propagated crop plants :Introduction and acclimatization, selections, hybridizations, hybrid vigour and inbreeding depression. Role of mutation and polyploidy in plant breeding. Famous Indian and international plant breeders and their contribution. National and International agricultural research institutes.

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Plant breeding work done on wheat and rice in India, Green revolution

Suggested Laboratory Exercises:

- Study of cell structure from Onion, *Hydrilla* and *Spirogyra*.
- Study of cyclosis in *Tradescantia* spp.
- Study of plastid for pigment distribution in Lycopersicom, Cassia and Capsicum.
- Study of electron microphotographs of eukaryotic cells for various cell organelles.
- Study of electron microphotographs of virus, bacteria and eukaryotic cells for comparative study of cellular organization.
- Study of different stages of mitosis and meiosis in root-tip cells and flower buds respectively of onion.
- To solve genetic problems based upon Mendel's laws of inheritance: Monohybrid, Dihybrid, Back cross and test cross.
- Permanent slides/photographs of different stages of mitosis and meiosis, sex chromosomes, polytene chromosome and salivary gland chromosomes,
- Emasculation, bagging & tagging techniques
- Cross pollination techniques

Suggested Readings:

- Choudhary, H.K. (1989). Elementary Principles of Plant Breeding. Oxford and IBM Publishing Co., New Delhi.
- Gupta, P.K. (2009). Cytology, Genetics, Evolution. and Plant Breeding, Rastogi Publications, Meerut.
- Miglani, GS. (2000). Advanced Genetics, Narosa Publishing House, New Delhi.
- Russel, PI. (1998). Genetics. The Benejamins/Cummings Publishikng Co., Inc. U.S.A.
- Shukla, R.S. and Chandel, P.S. (2000). Cytogenetics, Evolution and Plant Breeding, S. Chand & Co. Ltd., New Delhi.
- Singh, R.B. (1999). Text Book of Plant Breeding, Kalyani Publishers, Ludhiana .
- Dnyansagar, VR. (1986). Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
- Roy, SC. and De, KK. (1999). Cell Biology, New Central Book Agency (P) Ltd. Calcutta.
- Verma, PS. and Agarwal, VK. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd. New Delhi.

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Paper II

Microbiology, Mycology and Plant Pathology

(2 hrs /week)

Unit-1

Microbiology: Meaning and Scope, history and development in the field of microbiology. Concept of quorum sensing and biofilm

Eubacteria: general account, occurrence, morphology (structure, shapes), flagella, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

Mycoplasma: occurrence, morphology, reproduction and importance.

Unit-2

Virus: General characteristics and importance. Structure of TMV and Pox virus, Structure and multiplication of Bacteriophage.

Fungi: General characters, occurrence, thallus organization, reproduction, economic importance. Classification of fungi (Alexopoulos and Ainsworth's).

Plant diseases: Biotic and abiotic diseases, important symptoms caused by fungi, bacteria, viruses and MLOs (blights, mildews- downy and powdery, rusts, smuts, canker, mosaic, little leaf, galls etc.).

Unit-3

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Albugo and white rust; *Sclerospora* and Downy mildew/Green ear disease of Bajra; *Aspergillus*; *Claviceps* and Ergot; *Peziza*.

Unit-4

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Puccinia and Black rust of wheat ; *Ustilago* and loose smut of wheat and covered smut of barley; *Agaricus*; *Alternaria* and early blight of potato.

Suggested Laboratory Exercises:

1. Study of bacteria using curd or any other suitable material, Gram's staining of bacteria.
2. Study of Mycoplasma, TMV, Poxvirus, bacteriophage (photographs/ 3-D models)
3. Study of symptoms of plant diseases—Downy mildew of Bajra, Green ear of bajra, Powdery mildew, mosaic of bhindi.

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4. Study of specimen, permanent slides and by making suitable temporary slides: *Albugo*- white rust; *Sclerospora*- downy mildew, green ear; *Aspergillus*; *Claviceps*- ergot; *Ustilago*- loose smut of wheat, covered smut of barley, *Puccinia- Black rust of wheat*; *Agaricus*; *Peziza* and *Alternaria*- early blight of potato.
5. Media preparation: potato dextrose agar, Nutrient agar
6. Culture techniques of fungi and bacteria.
7. Visit Local Garden /fieldstudy of plants in farmers field/agricultural stations

Suggested Books:

Alexopoulos, C.J. and Mims, C.W.: Introductory Mycology, John Wiley and Sons, New York, 2000

Dube, H.C. :Fungi, Rastogi Publication, Meerut, 1989.

Sarabhai, R.C. and Saxena, R.C.: A text book of Botany, Rastogi Publication, Meerut, 1990.

Sharma, O.P.: Fungi, Today and Tomorrow Printers and Publishers, New Delhi, 2000.

Vashihsta, B.R. Botany for Degree Students -Fungi, S. Chand & Co., New Delhi, 2001.

Bilgrami, K.S. and Dube, H.C.: A text book of Modern Plant Pathology, Vikas Publications, New Delhi 2000.

Biswas, S.B. and Biswas, A.: An Introduction to Viruses, Vikas Publications, New Delhi. 2000.

Clifton, A.: Introduction of Bacteria, McGraw Hill Co. Ltd., New York, 1985.

Madahar, C.L.: Introduction of Plants Virus, S. Chand and Co., New Delhi, 1978.

Palzar M.J Jr. Chan, E.C.S. and Krieg, N.R. : Microbiology, McGraw Hill Edu.. Pvt. ltd., London 2001.

Purohit, S.S.: Microbiology, Agro. Bot. Publication, Jodhpur 2002.

Sharma, P. D.: Microbiology and Pathology, Rastogi Publication. Meerut, 2003.

Singh, V. and Srivastava V. : Introduetion of Bacteria, Vikas Publication, 1998.

Cappuccino, J. and Sherman, N.: Microbiology: A Laboratory Manual (10thEd.), Benjamin Cummings, 2013.

Aneja, K.R.: Experiments in Microbiology, Plant Pathology and Biotechnology New Age International (P) Ltd., Publishers, New Delhi 2003.

Mehrotra, R.S. and Aggarwal, Ashok: Plant pathology, Tata McGraw-Hill Education, 2003.

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Paper III
Algae, Lichens and Bryophyta
(2 hrs/week)

Unit-1

General characters, Classifications (Smith). Diverse Habitat. Range of thallus structure, photosynthetic pigments and Food reserves. Reproduction (Vegetative, Asexual, Sexual). Types of the life cycle: Economic importance.

Unit-2

Type Studies
Cyanophyceae – *Oscillatoria, Nostoc*
Chlorophyceae-*Volvox,Chara.*
Xanthophyceae-*Vaucheria.*
Phaeophyceae-*Ectocarpus.*
Rhodophyceae-*Polysiphonia.*

Unit-3

General characters, Origin, and evolution of Bryophtya. Classification (Eichler); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.

Type Studies: Hepaticopsida - *Riccia,Marchantia*

Unit-4

Type Studies: Anthocerotopsida- *Anthoceros*; Bryopsida- *Funaria*

Lichens- General characters, habitat, Structure, reproduction and economic and Ecological importance of lichens.

Suggested Laboratory Exercises

1. Study of classwork material by making suitable temporary slides and study of permanent slides of; *Oscillatoria, Nostoc, Volvox, Chara, Vaucheria, Ectocarpus, Polysiphonia.*
2. Study of external morphology and preparation of suitable sections of vegetative/reproductive parts of *Riccia, Marchantia, Anthoceros, Funaria.*
3. Study of lichens.

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Suggested Readings

Bold, H.C. Alexopoulous, C.J. and Delevoryas, T.: Morphology of Plant and Fungi (4th Ed.) Harper & Foul Co., New Work, 1980.

Ghemawat, M.S., Kapoor, J.N. and Narayan, H.S.: A text book of Algae, Ramesh Book Depot, Jaipur, 1976.

Gilbart, M.Smith: Crypogamic Botany, Vol. I & II (2nd Ed.) Tata McGraw Hill. Publishing Co., Ltd., New Delhi, 1985.

Kumar, H.D.: Introductory Phycology, Affiliated East—West Press, Ltd. New York, 1988.

Puri. P.: Bryophytes, Atmaram & Sons. Delhi, Lucknow, 1985.

Sarabhai. R.C. and Saxena, R.C.: A text book of Botany. Vol I & II, Ratan Prakashan Mandir, Meerut, 1980.

Singh, V., Pande, P.C. and Jain, D.K.: A text book of Botany, Rastogi, & Co., Meerut, 2001.

Vashista, B.R.: Botany for Degree Students (Algae, Bryophytes) S. Chand & Co., New Delhi, 2002.

BOTANY PRACTICAL EXAMINATION B.Sc PART-I

SKELETON PAPER

M.M. 50 **TIME: 4 Hours**

S.No.	Practical	Regular	ExNC
1(a)	Prepare the acetocarmine stained slide of the material"A"provided to you. Draw a well labelled diagram of anyone stage of nuclear division. Identify it giving reasons.	5	5
1(b)	Comment and solve the problem on Geneticsallotted to you along with reasons.	5	5
2	Make suitably stained glycerine-preparation of any one alga from the given mixture "B". Draw itslabelled diagrams; assign it to its systematic position giving reasons.	5	5
3	Make suitable preparation of the reproductivestructureofmaterial "C"(Fungi). Drawlabelleddiagrams, Identifygivingreasons.	5	5
4	Make suitable stained preparation of material "D" (Bryophyta(vegetative/ reproductive). Draw labelled diagrams.Identifygivingreasons.	5	5
5	One Microbiology experiment for comments. Or Gram's staining.	5	5
6	Comment upon spots (1-5)	10	15
7	Viva-Voce	5	5
8	Practical record	5	-
	TOTAL	50	50

Rj / Jan

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5. GEOLOGY

Scheme:
Theory
Max. Marks 100

Min. Pass Marks: 36

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Paper I : Physical Geology 3 hrs. duration Max. Marks 50
Paper II : Crystallography and Mineralogy 3 hrs. duration Max. Marks 50
Practical (One) 4 hrs. duration Max. Marks 50

Note: Each paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all selecting at least one question from each section.

Paper- I : Physical Geology

Section-A

Earth system science- its sub disciplines, their mutual relationship and relationship with other subjects; scope and relevance to ociety. Earth history and solar system. Shape, size and origin of arth, internal structure, constitution and composition of earth. Earthuake and volcanism.

Section- B

Elements of continental drift, sea floor spreading, plate tectonics, magnetic area, mid oceanic ridges and transform fault. Geosyncline, Mountain building and Isostasy.

Section-C

Geological time scale and time record; Natural water cycle and ground water, weathering and erosion, geological work of river, wind, groundwater, glacier and ocean.

Books Recommended

1. Allen, P. 1997 : Earth Surface Processes. Blackwell Scientific.
2. Scott, W.B. : Introduction to Geology, Vol. I., McMillan.
3. Holmes, A.: Physical Geology. Thomas Nelson & Sons, London.
4. Datta, A.K. : Physical Geology.

Paper II Crystallography and Mineralogy

Section-A

Definition of mineral and crystal-crystaline, cryptocrystalline nd amorphous state. Geometric properties of crystals- Faces, edges, olid angle. Interfacial angle, use of contact goniometer. Elements of symmetry, axial ratio, crystal structures-unit cell, crystal notation and zones.

Tetrahedrite type or hexatetrahedral class; Tetragonal- Zircon ype or ditetragonal bipyramidal class; Hexagonal-Beryll type or

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Hexagonal bipyramidal class, calcite type of ditrigonal scalenohedral class, Tourmaline type of ditrigonal pyramidal (hemimorphic class), Quartz type or trigonal trapezohedral class; Orthorhombic-Barytes types or bipyramidal class; Monoclinic Gypsum type or prismatic class and Triclinic system-Axinite type or pinacoidal class.

Section-B

Definition of mineral: rock forming, ore minerals and gemstones. Physical properties of minerals and their identification. Formation of minerals, elementary idea about experimental work on mineral stability, Isomorphism, polymorphism, pseudomorphism and solid solution.

Optical Mineralogy- Construction of petrological microscope, pleochroism, extinction angle, refractive index, interference colours, Optical properties of Quartz, Biotite, Hornblende, Hypersthene and Feldspars.

Section-C

Classification of silicates. Description of following rock forming mineral groups; Quartz, Feldspar, Felspathoid, Pyroxene, Amphibole, Mica and Garnet.

Physical and optical properties of following minerals: Olivine, Epidote, Beryl, Apatite, Cordierite, Tourmaline, Staurolite, Topaz, Zircon, Sphene, Chlorite. Serpentine, Andalustite, Kyanite, Sillimanite, Talc Kaolin, Fluorite, Magnetite and Rutile.

Concept on twinning in crystals, laws of twinning and important types of twinning.

Practical

Min. Pass Marks 18 4 hrs duration Max. Marks 50

Crystallography and mineralogy:

Crystallography: Determination of symmetry in crystal models and measurement of interfacial angles with contact goniometer.

Drawing of crystals of cubic system by Clinographic Projection.

The study of the symmetry, forms and combination of forms in crystals given below.

Cubic system- Galena, Flourite Magnetite and Garnet, Pyrite Tetrahedrite.

Tetragonal system- Zircon, Rutile, Cassiterite. Hexagonal system- Beryl, Calcite, Tourmaline and Quartz

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Orthorhombic system- Barite, Olivine, Staurolite, Sulphur.

Monoclinic system- Gypsum, Orthoclase, Augite, Hornblende, Epidote.

Triclinic system- Axinite, albite, Study of simple twinning in crystals.

Sp. Gr. determination by Minerals Walkers steel yard balance.

Study of Hardness: Lustre, Fracture, Cleavage and streak of minerals.

Study of the Physical properties and diagnostic features of the following minerals:

Opal, hematite, magnetite, halite, calcite, fluorite, tourmaline, magnetite, orthoclase, microcline, plagioclase, hypersethene, augite, Tourmaline, tremolite, hornblende, asbestos, beryl, nepheline, sodalite, garnet, olivine, zircon, topaz, sillimanite, kyanite, quartz and its varieties, chalcedony, flint and jaspar; epidote, staurolite, muscovite, biotite, natrolite, talc, chlorite, serpentine, kaoline, sphene, apatite, garnet, wollastonite and augite.

Study of petrological microscope and its parts inclusive of polarizer and their function, observation of Becke line and relative refractive index. Study of pleochroism in biotite, hornblende, tourmaline, hypersthene, andalusite and staurolite; study of twinkling in calcite.

Books Recommended:

1. Read, H.H. : Elements of Mineralogy, John Wiley & Co. London.
2. Mason, Berry : Mineralogy : Asian Publication.
3. Font, W.E. : Dana's Text book of Mineralogy. John Wiley and Sons, New York.
4. Sharma, N.L. : Determinative Table, ISM, Dhanbad.

Field Training : Geological Field work for at least 7 days duration and report thereon. The field work would be carried out locally including collection of specimens.

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6. MATHEMATICS

B.Sc. Part-I Examination-

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical
(20 candidates in each batch)

Examination Scheme :		**Min.Pass Marks**	**Max. Marks**
Science –		**54**	**150**
Arts –		**72**	**200**
		Duration	**Max.Marks**
Paper – I	**Discrete Mathematics**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – II	**Calculus**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – III	**Analytic Geometry and Optimization Theory**	**3 hrs.**	**40 (Science)** **54 (Arts)**
Practical	**Optimization Techniques**	**2 hrs.**	**30 (Science)** **40 (Arts)**

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.
4. Each candidate has to pass in Theory and Practical examinations separately.

Paper – I: Discrete Mathematics

Teaching : 3 Hours per Week **Max. Marks: 40 (Science)**

Duration of Examination : 3 Hours **53 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

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Unit 1 : Sets, Cardinality, Principal of inclusion and exclusion, Mathematical induction, Relations and Functions, Binary relations, Equivalence relations and partitions, Partial order relations and Lattices, Chains and Anti-chains. Pigeon hole principle.

Unit 2: Boolean Algebra- Lattices and Algebraic structure, Duality, Distributive and Complemented Lattices, Boolean Lattices, Boolean functions and Boolean expression.

Fundamental theorem of arithmetic, Divisibility in Z, Congruence's, Chinese reminder theorem, Euler's functions, Primitive roots.

Unit 3: Logic and propositional calculus, Simple and compound propositions, Basic logical operations, Truth tables, Tautologies and contradictions, Propositional functions, Quantifiers. Discrete numeric functions, Generating functions, Recurrence relations and Recurrence algorithms, Linear recurrence relation with constant coefficients and their solutions, Total solutions, Solution by the method of generating functions.

Unit 4: Basic concepts of graph theory, Types of graph (Connected Graphs, Regular graphs, Planar graphs), walk, Paths & Circuits, Shortest path problem. Operations on graphs (union, join, products)

Unit 5: Matrix representation of graphs, Adjacency matrices, Incidences matrices,

Tree, Spanning tree, Minimumm spanning tree, Distance between vertices, Center of tree, Binary tree, Rooted tree. Hamiltonian and Eulerian graphs

Reference Books:

1. K.H. Rosen, Discrete Mathematics and it's Applications, McGraw Hill, 1999.
2. N.L. Biggs, Discrete Mathematics, Oxford Science Publication, 1985.
3. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Tata McGraw Hill, 2008.
4. T. Koshy, Discrete Mathematics with Applications, Academic Press, 2005.
5. N. Deo, Graph Theory, Prentice Hall of India, New Delhi, 2004.

Paper- II: Calculus

Teaching : 3 Hours per Week **Max. Marks: 40 (Science)**

Duration of Examination : 3 Hours **53 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Series – Infinite series and Convergent series. Tests for convergence of a series – Comparison test, D'Alembert's ratio test, Cauchy's n-th root test, Raabe's test, De-Morgan-Bertrand's test, Cauchy's condensation test, Gauss's test, (Derivation of tests is not required). Alternating series. Absolute convergence. Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of sinx, cosx, e^x, $\log_e(1+x)$, $(1+x)^n$.

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Unit 2: Derivative of the length of an arc. Pedal equations. Curvature – Various formulae, Centre of curvature and Chord of curvature. Partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Total differentiation, Differentiation of implicit functions.

Unit 3: Envelopes and evolutes, Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curves (Cartesian and Polar curves).

Unit 4: Beta and Gamma functions, Reduction formulae (simple standard formulae), Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Dirichlet's integral.

Unit 5: Areas, Rectification, Volumes and Surfaces of solids of revolution.

Reference Books :

1. M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and sons (Asia), Pt Ltd., Singapore, 2002.
3. G.B. Thomas, R. L. Finney, M. D. Weir, Calculus and Analytic Geometry, Pearson Education Ltd, 2003.

Paper-III: Analytic Geometry and Optimization Theory

Teaching: 3 Hours per Week **Max. Marks: 40 (Science)**
Duration of Examination: 3 Hours **54 (Arts)**

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics

Unit 2: Sphere, Cone.

Unit 3: Cylinder, Central Conicoids – Ellipsoid, Hyperboloid of one and two sheets, tangent lines and tangent planes, Direct sphere, Normals.

Unit 4: Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equation of second degree in three-dimensions to standard forms.

Unit 5: The linear programming problem. Basic solution. Some basic properties and theorems on convex sets.. Fundamental theorem of L.P.P. Theory of simplex method only Duality. Fundamental theorem of duality, properties and elementary theorems on duality only.

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Reference Books :

1. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
2. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.
3. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.

Practical

Teaching: 2 hours per week per batch not more than 20 students

Examination: **Duration: 2 Hours**

Scheme	**Science**	**Arts**
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks	(13 Marks each)	26
Practical Record	=	05 Marks		07
Viva-voce	=	05 Marks		07
Total Marks	=	30 Marks		40

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Group A : Modelling of industrial and engineering problems into Assignment Problems and Transportation Problems and their solutions.

Group B : **List of problems** (with free and open source software tool Scilab)

(i) Plotting the graphs of the following functions : ax, $\sqrt{ax+b}$,$|ax+b|$, $c\pm|ax+b|$, $x^{\pm n}, x^{1/n}$ $(n \in z)$, e^{ax+b}, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $|\sin(ax+b)|$, $|\cos(ax+b)|$. Observe and discuss the effects of change in the real constant a, b and c on the graphs.

(ii) Graphs of hyperbolic functions and inverse trigonometric functions.

(iii) Plotting and analyzing ~~the~~ graphs of polynomials and their derivatives.

(iv) Complex numbers: Operations like addition, subtraction, multiplication, division, Modulus and inbuilt functions conj, imag, imult, isreal, real.

(v) Matrix operations: Addition, Multiplication, Inverse, Transpose, Determinant, Rank and inbuilt functions eye, ones, zeros. Solving the system of linear equations.

(vi) Solution of linear programming problems by using inbuilt functions of Scilab.

Note:

1. For Group A : Problems will be solved by using Scientific Calculators (non-Programmable)
2. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
3. Each Candidate has to pass in Practical and Theory examination separately.

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7. ECONOMICS

B.Sc. Part-I Examination-

Scheme:		Min. Pass Marks	Max. Marks
Arts		72	200
Science		54	150
Paper- I	3 hours duration	Micro Economic Theory	Arts 100 Science 75
Paper-II	3 hours duration	Indian Economy	Arts 100 Science 75

Note: There will be two papers of Economics. Each paper shall consist of three parts.

Part A shall contain question No 1 consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Parts C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Parts A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

PAPER 1- MICRO ECONOMIC THEORY

Section – A

Nature and scope of Economics, Methodology: Micro and Macro Economics, Static and Dynamic analysis, Positive and Normative Economics.

Theory of Consumer Behavior: Utility Analysis, Indifference Curve Analysis: Consumer's Equilibrium, Price, Substitution and Income Effects, Normal, Inferior and Giffen Goods. Law of Demand and the Demand Curve. Elasticity of Demand: Price, Income and Cross Elasticity, Arc and Point Elasticity, Relationship between Elasticity, AR, MR and TR. Factors affecting Price Elasticity of Demand. Substitute and Complementary Goods, Consumer's Surplus.

Section- B

Production Function: Law of Variable Proportions, Three Stages of Production Function, Law of Returns to Scale. Iso-quant and Iso –Cost, Optimum Factor Combination. Theory of Cost: Short-run and Long- Run Cost Curves. Market Structures: Determination of Price and Output in the Short and Long Run Cost Curves. Market Structures: Determination of Price and Output in the Short and Long Run under Perfect Competition, Monopoly, Discriminating Monopoly, Monopolistic Competition, Excess Capacity.

Section – C

Theory of Distribution, Marginal Productivity Theory, Factor Pricing Under Perfect and Imperfect Competition in Labor Market, Ricardian Theory of Rent, Modern Theory of Rent and Quasi-rent. Theory of Interest: Classical and Liquidity Preference, Theory of Profit, Risk and Uncertainty.

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Books Recommended:

1. Lipsey and Crystal : Economics 13ed, Oxford University Press.
2. Karl E. Case, Ray C. Fair and Sharon Oster, Principles of Economics 9th Edition, Pearson Education Inc.
3. Hal R. Varian : Intermediate Microeconomics WW Norton and Co. Fifth Edition.
4. D. Salvatore: Micro Economics, Harper Collins, 1991.
5. H.L. Ahuja: Advanced Economic Theory, S. Chand and Company, New Delhi. (English & Hindi).
6. लक्ष्मीनारायण नाथूरामकाव्यष्टि अर्थशास्त्र,रमेशबुकड़िपो, जयपुर।

Reference Books :

1. R.H. Leftwitch : Price System and Resource Allocation, Holt, Reinhart and Winston; 3rd Edition.
2. Samuelson and Nordhaus: Economics, McGraw Hill/Irwin; Latest Edition.
3. J.P. Gould and C.E Ferguson: Micro Economic Theory revised By , J.P Gould and E.P. Lazer, All India Traveller Book Seller, Delhi.

Paper – II Indian Economy

Section-A

Basic Features and Present Position of Indian Economy, Natural Resources,
Population: Demographic Features and Major trends, Concept of Population Dividend, Population Policy, Human Resource Development. National Income in india: trends and composition. Agriculture: Role and Importance of Agriculture in the Indian Economy, Land Reforms, Growth of Modern Inputs :
Irrigation, HYV, Fertilizers. Institutional Credit, Microfinance, Marketing of Agricultural Goods Support Price, Concept of Crop Insurance, Food Security.

Section- B

Industry: Role. Strategy and Challenges, Growth of MSMEs, Public and Private Sector Industries. Industrial Finance, Industrial Policy of 1991, New Policy Initiatives for Industrial Development. New Economic Policy and Disinvestment, Foreign direct investment, Services Sector in India: IT, Education and Health.

Foreign Trade: Size, Composition and Direction; Recent trends, Foreign Trade Policy.

Section-C

Planning in India: Objectives and Achievements, NITI Aayog, National Development Agenda, Problems Of Poverty; Unemployment, Inflation And Regional Inequalities; Rural Development programmesand Policy; Sectoral Reforms in Infrastructure after 1991.

Books Recommended :

1. Rudra Datt and K.P.MSundaram: Indian Ecomony (Hindi & English), S. Chand, New Delhi.
2. S.K. Mishra and V.K. Pure: Indian Economy, Himalaya Publishing House, New Delhi.
3. A.N. Agarwal: Indian Economy, Vikas Publishing Co., New Delhi.
4. LaxminarayanNathuramka: BhartiyaArthvvyavastha, Ramesh Book Depot, Jaipur.
5. Uma Kapila, Indian Economy since Independence, Academic Foundations.
6. Government of Indian; Economic Survey (Hindi& English.)

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8. GEOGRAPHY

B.Sc. Part-I

Scheme of Examination

Faculty	Min. Pass Marks	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Physical Geography	Arts 75 Science 50
Paper II	Geography of Rajasthan	Arts 75 Science 50
Practical	18	Arts 50 Science

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations. Each theory paper will have a teaching of hours per week.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q. No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidate shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks and candidate shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the Board of Examiners.
7. The Candidate will have to pass in theory and practical separately
8. The non collegiate candidate will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/ Department of Geography and produce the same at the of practical examinations.

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Paper 1: Physical Geography

Section A

Definition, scope and development of physical geography, geological history of the Earth; zoning of Earth's interior rocks, origin of continents and oceans; continental drift theory and plate tectonics; concept of isostasy; view of Airy, Pratt , Joly and Holmes, Earth movements epeirogenic and orogenic; mountain building theories; kober , Jeffreys, Daly, Joly and Homes and plate tectonics; denudation, cycle of erosion; views of W.M. Davis and W. Penck , erosional and depositional topographies; river, underground water, glacier, wind and oceanic waves.

Section B

Composition and structure of the atmosphere, insolation , air temperature, air pressure, pressure belts and planetary winds, monsoon and local winds, humidity, classification of clouds and precipitation, air masses, fronts and cyclones: tropical and temperate, classification, of the word climates: Koppen and Thorthwaite , general climate classification.

Section C

Surface configuration of oceans bottom: Pacific , Atlantic and Indian Ocean deposits, horizontal and vertical temperature of oceans, oceanic salinity, tides, oceanic waves and currents, coral reefs and their origin; views of Darwin and Dana , W.M. Davis, Murray, classification of marine resources, biomes and its components, ecosystems; plant ommunity and animal kingdom, biomes: equatorial rainforest, monsoon, savanna and temperate grasslands.

Recommended Reading:

चौहान, वी. एस.गौत्तम, ए 2005, भौतिक भूगोल (जीवमण्डल सहित) । रस्तोगी पब्लिकेशन्स, मेरठ।

दयाल, पी. 2012, भौतिक भूगोल। राजेश पब्लिकेशन्स, नई दिल्ली।

गौतम, अल्का, 2012 : भौतिक भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।

Husain, M 2001, Fundamentals of Physical Geography. Rawat Publication, Jaipur.

Hess, D . 2012: Physical Geography: A Landscape Appriciation.PHI Learning Private Limited, New Delhi, Mckmight's Pevtt Edition.

KKhullar, D.R. 2012: Physical Geography, Kalyani Publishers, New Delhi

सिंह, सविन्द्र, 2005 : भू–आकृति विज्ञान। तारा पब्लिकेशन्स, वाराणसी।

सिंह, सविन्द्र,2011 : भौतिक भूगोल का स्वरूप। प्रयाग पुस्तक भवन, इलाहाबाद।

शर्मा, एच.एस. शर्मा, एम.एल.एण्ड मिश्रा, आर. एन. 2008 : भौतिक भूगोल। पंचशील प्रकाशन जयपुर।

Sharma, R.C. and Vatal M. 1999. Oceanography for Geographers. Chaitanya Publishing House, Allahbad.

Strahler, A. N. and Strahler, A. H. 1989: Elements of Physical Geography. John wiley & Sons, New York.

Tikkha, R.N. 1999: Physical Geography. Kedar Nath Ram Nath & C., Meerut.

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Paper II : Geography of Rajasthan

Section A

Physical aspects of Rajasthan: Geological structure, relief, climate, drought, drainage, natural vegetation. Environmental pollution causes and types: desertification, soils, soil erosion and conversion: availability, problems and conservation of water resources.

Section B

Mineral resources distribution and production; Power and energy resources : distribution and production (hydro- electricity, coal, petroleum, solar energy and bio-energy) irrigation sources, irrigation intensity, crop wise irrigation, quality of irrigation, water problems, irrigation projects : detailed study of Indira Gandhi canal project , Chambal valley project, Mahi Bajaj Sagar projects on physical and socio- economic aspects, agriculture: development under five year plans, problems of agriculture development, general land use, live – stock and dairy development programme, minerals.

Industries: Textile, sugar cement, marbel and grantile, fertilizer, zinc and copper smelting. Transport & trade. development of tourism, desrt development programme, tribal areas development programme, Aravali hill development programme.

Section C

Cultural and develcpment aspets: population – number, growth, distribution and density, rural and urban, male and female population, literacy status, occupational structure, schedule castes and schedule tribes, population problems, study of bhil, meena, garasia.

Settlement pattern : types of settlements, building materials and house types in Rajasthan with examples, factors affecting settlement.

Recommended Reading:

Bhalla, L.R. 1996-97: Geography of Rajasthan. Kuldeep Publication, Jaipur.

Gujar, R.K. 1992: Geography of Indira Gandhi Canal. Rajasthan Hindi Granth Academiy

Lodha, R.& Maheshwari, D. 2001: Geography of Rajasthan. Shahitya Bhawan Publication, Hospital Road, Agra.

Mishra, V.C. 1967 Geography of Rajasthan, National book trust of India, New Delhi.

नाथुरामका, एल.एन. 2012,13 : राजस्थान की अर्थव्यवस्था । कॉलेज बुक हाउस, जयपुर।

साईवाल, स्नेह 2012 राजस्थान का भूगोल। कॉलेज बुक हाउस, जयपुर।

Singh, R.L. 1971(ed) India A Regional Geography NGSI. Varanasi.

Attar Singh. 1992: Flood Prone Areas of India. A viskar Publisher Jaipur

Sharma H.S. and M.L, Sharma 2014: Geography of Rajasthan. Panchcil Publisher, Jaipur.

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Practicals

Min. Pass Marks: 32 Max. Marks: 80

	Bifurcation of Marks	Time
Written Test	40	3hrs
Field survey and viva voce	15 + 5	$2^{1/2}$ hrs
Record and viva voce	15 + 5	
Total Marks	80	

N.B.1. There shall be 6 questions in written test selecting at least two questions from each section. Candidates are required to attempt 3 questions secting 1 question from each section . All question carry equal marks. Each practical batch of 30 students will be allotted a teaching of 4 hrs per week for practicals.

Section A

The nature and scope of cartography, classification of maps, scales (plain, diagonal, comparative, vernier). Methods of showing relief, hachures, hill shading contours, Profiles- serial, longitudinal, transverse, superimposed, composite, projected and their use in landform study.

Section B

Enlargement and reduction of maps, use of pantograph, representation of temperature, pressure and rainfall data, use of line and bar graphs, isotherms, isobars and isohytes, construction and significance of climograph, hythergraph and climatograph.

Section C

Study and interpretation of weather maps of India (Particularly July and January)

Prismatic Compass survey: equipments, methods of measurement of bearing, correction of bearings record of survey closing error and its corrections.

Recommended Readings:

Monkhouse, F.J. and Wilkinson, F.J. 1985 : Maps and Diagrams. Methuen. London.

Raisz, E. 1962. General Cartography. John Wiley and Sons, New York. 5th edition.

Sarkar, A.K. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata.

Singh, R.L. and Singh Rana P.B. 1991. Elements of Practical Geography. Kalyani Publishers. New Delhi.

Singh L. R. 2006: Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahbad.

शर्मा जे.पी. 2012, प्रायोगिक भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।

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9. STATISTICS

Scheme:	Duration	Max Marks		Min. Pass Marks	
		Sc.	Arts	Sc.	Arts
Paper- I	3 hrs.	50	65	18	24
Paper-II	3 hrs.	50	65	18	24
Practical	3 hrs.	50	70	18	25
	Total	150	200	54	72

Note : In each question paper, 10 (ten) questions will be set having 2 (two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper- I Probability Theory

Unit I. Important concepts of Probability: Random experiment: Trial, Events and their types. Definitions of probability. Sample point and sample space. Axiomatic Approach of Probability and its properties. Addition and Multiplication theorems of probability. Conditional Probability. Bayes Theorem and its Applications (Simple Problems Only). **18 hours**

Unit II. Random Variable: Definition with illustrations, Types of Random Variables. Probability Mass Function, Probability Density Function. Distribution Function and its properties. Joint Probability Distribution, Marginal and Conditional Probability Distributions and density functions (Continuous and Discrete Cases). Chebychev's Inequality and its applications. *18 hours*

Unit III. Mathematical Expectation: Expectation of a random variable and its simple properties. Addition and Multiplication Theorems of Expectation. Conditional Expectation. Definition of Variance and Covariance and properties. Raw and Central Moments, Moment Generating Function and their properties. *18 hours*

Unit IV. Univariate Discrete Distributions and their properties: Bernoulli Distribution, Binomial Distribution, Poisson Distribution, Geometric Distribution, Idea of Hyper-geometric and Negative Binomial Distribution.

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Unit V. Univariate Continuous Distributions and their Properties : Rectangular Distribution, Normal Distribution Idea of Exponential Distribution, Cauchy Distribution, Gamma Distribution, Beta Distribution. **18 hours**

References

1. Bhatt, B. R. Srivenkatramana, T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd., New Delhi.
2. Goon A.N., Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. I & II, World Press, Calcutta.
3. Kapoor V.K. & Gupta S.C. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
4. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistic, McGraw Hill.

Additional References

1. Hoel P.F. (1971) : Introduction to Mathematical Statistics, Asia Publishing House.
2. David, S (1996) : Elementary Probability, Oxford Press.
3. Cooke, Cramer and Clarke : Basic Statistical Computing, Chapman and Hall.
4. Meyer P.L (1970) : Introductory Probability and Statistical Applications. Addison Wesley

Paper II : Descriptive Statistics :

Unit I. Types and Presentation of Data : Concepts of a statistical population and data. Qualitative and Quantitative data; discrete and continuous data; frequency and non-frequency data. Geographical & Chronological Data. Primary Data and Secondary Data. Tabular presentation of data-Construction of tables, Types of tables. Frequency distribution - Discrete, grouped, continuous and cummulative. Graphical preentation of data-Histogram, frequency polygon, frequency curve and ogives. **18 hours**

Unit II. Statistical analysis of Quantitative Data : Different types of scales-nominal, ordinal, intervals and ratio, Univariate Data-Measures of central tendency, dispersion, moments and its connection

from data. Absolute and relative measures of skewness and kurtosis based on quantiles and moments. Sheppard's Correction for moments (without Proof). **18 hours**

Unit III. Curve fitting and Theory of Attributes : Principle of least squares, fitting of straight line, parabola and curves reducible to straight line (exponential and power curve). Class frequency, order of a class frequency, ultimate class frequency, consistency of data, independence and association of attributes. Various measures of association. 18 hours

Unit IV. Statistical Analysis of Bivariate Data : Correlation analysis-scatter diagram, Karl-Pearson's coefficient of correlation and its properties. Correlation of bivariate frequency distribution, Spearman rank correlation. Regression analysis-Fitting of regression lines, regression coefficients and their properties. 18 hours

Unit V. Finite Differences : Operators E, Δ, ∇, their relationship and properties, factorial notation. Difference table and fundamental theorem of finite differences. Estimation of one and two missing terms. meaning of interpolation and extrapolation. Newton's forward and backward formulae for equal intervals, Lagrange's Formula and numerical problems. 18 hours

References

1. Bhatt B.R. Srivenkatramanna T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd., New Delhi.
2. Croxton F.E., Cowden D.J. and Kelin S (1973) : Applied General Statistics, Prentice Hall of India, New Delhi.
3. Goon A.M., Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. I & II, World Press, Calcutta.
4. Kapoor V.K. & Gupta S.C. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, N. Delhi.
5. Gupta S.P. : Statistical Methods, Sultan Chand and Sons, N. Delhi.
6. Elhance D.N. : Fundamentals of Statistics

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7. Nagar K.N. : Sankhyaki Ke Mool Tatva (Hindi), Minakshi Prakashan Mandir, Merrut.
8. Johnson R.A. : Miller and Freund's Probability and Statistics for Engineers. PHI.
9. Saxena H.C. : Finite Differences and Numerical Analysis. S. Chand & Co.

Additional References

1. Anderson T.W. and Sclove S.L. (1978) : An Introduction to the Statistical Analysis of Data. Houghton Miffin Co.
2. Mood A.M. Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
3. Spiegel M.R. (1967) : Theory & Problems of Statistics, Schaum's Publishing Series.

Paper III. Practical Paper :

1. Exercise on mathematical expectations and finding Mean, Variance, Skewness and kurtosis of Univariate probability distributions.
2. Fitting standard univariate discrete and continuous probability distributions.
3. Computation for marginal and Conditional Distributions.
4. Presentation of data through Frequency Table, and Graphs.
5. Calculation of Measures of Central tendency, Dispersion, Moments and Skewness and Kurtosis.
6. Computation of Correlation Coefficient of bivariate data and bivariate frequency distribution table.
7. Regression of two variables.
8. Fitting of curves by the least square method.
9. Computation of Spearman's rank correlation.
10. Construction of Difference table.
11. Interpolation Problems based on Newton and Langrange's Formulae.

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10. APPLIED STATISTICS

Scheme:	Duration	Max Marks		Min. Pass Marks	
		Sc.	Arts	Sc.	Arts
Paper- I	3 hrs.	50	65	18	24
Paper-II	3 hrs.	50	65	18	24
Paper-III (Practical)	3 hrs.	50	70	18	25
Total		150	200	54	72

Note: In each question paper, 10 (Ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all taking not more than one from each unit.

Paper I : Probability Theory

Unit I: Functional relationship between two variables, Polynomials, exponential logrithmic & Binomial functions and their expansions. Infinitesimal quantity. Idea of permutation and combination. Notion of limits. Rules for finding limits. Continuity, Differential Coefficient and its physical interpretation as a rate measure. Standard results for differential coefficients of x^n, e^x, log x etc. (without proof). Rules for differentiation of sum, difference, product and quotient and function of a function (without proof). 18 hours

Unit II. Maxima and Minima. Integral Calculus: Definition and meaning of integration. General laws of integration, Integration of a continuous function. Definite integration. 18 hours

Unit III. Important Concepts of Probability: Random Experiment, Trial, Events and their types. Classical and Statistical definitions of Probability. Sample point and sample space. Axiomatic Approach to Probability and its properties. Addition and Multiplication theorems of probability. Conditional Probability. Baye's Theorem and its Applications (Simple Problems only). Chebychev's Inequality and its applications. 18 hours

Unit IV. Random Variable: Probability Mass Function, Probability Density function, Distribution Functions, Joint Probability Distribution, Marginal and Conditional Probability distribution (Continuous and Discrete case). 18 hours

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Unit V. Mathematical Expectation : Expectation of a random Variable and its properties. Addition and Multiplication Theorems of Expectation. Conditional Expectation. Definition of Variance and Covariance, Moments, Skewness and Kurtosis. Moment Generating Functions and their simple properties. Definitions of Binomial Distribution, Poisson Distribution, Normal Distribution, Gamma Distribution, Beta Distibution & their mean, Variance & mfg. 18 hours

References

1. Bhatt B.R. Srivenkatramanna T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Goon A.M., Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. I & II, World Press, Kolkata.
3. Kapoor V.K. & Gupta S.C. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
4. Mood A.M. Graybill F.A. Boes D.C. (1974) : Introduction to the theory of statistics, McGraw Hill.

Additional References :

1. Hoel P.G. (1971) : An Introduction to Mathematical Statistics, Asia Publishing House.
2. David S. (1996) Elementary Probability., Oxford Press.
3. Cooke, Cramer and Clarke : Basic Statistical Computing, Chapman and Hall.
4. Meyer P.L. (1970) : Introductory Probability and Statistical Applications. Addison Wesley.

Paper II : Descriptive Statistics

(The course contents are same as that of Subject-Statistics)

Paper III . Practical Paper

(The course contents are same as that of Subject-Statistics)

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11. PSYCHOLOGY

B.Sc. Part-I

SCHEME OF EXAMINATION:

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr. 18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Basic Psychological Processes	3 Hrs.	75	50
II	Social Psychology	3 Hrs.	75	50
III	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

   Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

   Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

   Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

For clarification the distribution of marks is tabulated as below:-

ARTS			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (Out of 7)	03	15
C	3 (With internal choice)	15	45
		Total Marks	75

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SCIENCE			
Section	No. of Questions	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	1
C	3 (With internal choice)	10	45
		Total Marks	75

Paper I - Basic Psychological Processes

Section-A

1. Introduction: Definition and Goals of Psychology; History- Structuralism, Functionalism, Behaviorism, Gestalt and Psychoanalysis; Modern Perspectives- Biological, Psychodynamic, Behavioral, Cognitive, Humanistic, Evolutionary and Socio-cultural; Methods- Observation, Case Study, Surveys and Experimental.
2. Biological Basis of Behavior: The Nervous System-Structure and Functions of Neuron. Structure and Functions of Central Nervous System and Peripheral Nervous System
3. Sensation and Perception: Sensation- Meaning, Sensory Receptors, Sensory Thresholds, Habituation and Sensory Adaptation. Perception- Meaning, Constancies- Size, Shape and Brightness, Gestalt Principles, Factors Influencing Perception.

Section-B

4. Learning: Definition and Theories- Classical Conditioning, Operant Conditioning, Cognitive Learning, Observational Learning.
5. Memory: Definition; Encoding, Storage and Retrieval Processes; Models- Level of Processing, Parallel Distributed Processing and Information Processing- Sensory, Short Term and Long Term Memory; Forgetting- Nature and Causes.
6. Motivation and Emotion: Motivation - Meaning and Approaches- Instinct, Drive–reduction,

   Arousal, Incentive and Humanistic. Emotion- Elements: Physiology, Expression and Subjective Experience; Theories- Cannon-Bard, James-Lange, Schachter-Singer, Opponent-Process.

Section-C

7. Cognition: Thinking- Mental Imagery and Concepts; Problem Solving- Trial and Error, Algorithms, Heuristics, Insight; Barriers to Problem Solving.
8. Intelligence: Definition and Theories- Spearman, Guilford, Cattell, Sternberg, Gardner; Meaning of IQ; Intelligence Tests.
9. Personality: Definition; Type Theories and Trait Theories - Allport, Cattell, McCrae and Costa; Personality Assessment- Self-report Inventories, Projective Tests and Behavioural Assessments.

Books Recommended:

- Baron, R.A. & Misra, G. (2015). *Psychology*. New Delhi: Pearson Education India.

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- Gerrig, R.J., Zimbardo, P.G., Svartal, F., Brennen, T., Donaldson, R. & Archer, T. (2013). *Psychology and Life*. New Delhi: Pearson Education India.
- Ciccarelli, S.K., White, J. N. & Misra, G. (2017). *Psychology*. New Delhi: Pearson Education India.
- सिह. अरुणकुमार (2017), आधुनिकसामान्यमनोविज्ञान, नई दिल्ली : मोतीलालबनारसीदास।

Paper II - Social Psychology

Section-A

1. Introduction: Meaning, Nature, Scope and Goals of Social Psychology. Methods of Social Psychology: Experimental and Non-Experimental Methods.
2. Social Perception and Person Perception: Social Perception- Meaning and Nature; Perceptual

   Defense, Perceptual Accentuation and Subliminal Perception. Person Perception: Meaning and Nature, Role of Non-verbal Cues; Perceivers' Characteristics and Role of Ongoing Interaction.
3. Attitudes: Nature, Functions, Formation, Change and Measurement.

Section-B

4. Prejudice and Discrimination: Nature and Origin; Reduction of Prejudice and Discrimination.
5. Interpersonal Attraction: Proximity and Affective basis, Acquaintance and Need to Affiliate; Effects of Observable Characteristics, Similarity and Mutual liking.
6. Leadership: Definition and Functions; Types of Leadership. Trait, Situational and Contingency Approaches.

Section-C

7. Communication: Meaning, Nature and Types: Verbal and Non-verbal; Barriers in Communication.
8. Pro-Social Behavior: Personal, Situational and Socio-Cultural Determinants. Explaining Pro-

   Social Behavior: Empathy, Altruism Hypothesis, Negative-State Relief Model, Emphatic-Joy Hypothesis and Genetic-Determinism Model.
9. Aggression and Social Problems: Aggression- Theories, Determinants, Prevention and Control; Social Problems –Meaning and Nature; Types of Social Problems - Poverty, Deprivation, Population Explosion, Economic Development; Solutions to Social Problems.

Books Recommended :

- Baron, R.A., Branscombe, N.R., Byrne, D. & Bhardwaj, G. (2012). *Fundamentals of Social Psychology,* Noida: Dorling Kindersley South Asia.
- Branscombe, N.R. & Baron, R.A. (2018). *Social Psychology*. Noida :Pearson India Education.
- Myers, D.G. (1994). *Exploring Social Psychology*. New York: McGraw Hill
- अरुणकुमारसिंह, (2002), समाजमनोविज्ञानकीरुपरेखा, मोतीलालबनारसीदास, दिल्ली

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Practical

1. Human Maze Learning
2. Measurement of Intelligence (Performance Test)
3. Experiment of Memory(Meaningful and Non-sense Syllables through Memory Drum)
4. Experiment on Figure Ground Reversal
5. Measurement of Emotions by Facial Expression
6. Measurement of Attitude
7. Measurement of leadership
8. Measurement of Aggression
9. Measurement of Altruism
10. Assessment of Social Support

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12. ELECTRONICS

Scheme :

Min.Pass Marks : 36		**Max.Marks : 100**
Part-I	**3 hrs. duration**	**Max.Marks : 33**
Part-II	**3 hrs. duration**	**Max.Marks : 33**
Part-III	**3 hrs. duration**	**Max.Marks : 34**
Practical		
Min. Pass Marks : 18	**5 hrs. duration**	**Max.Marks : 50**

Paper-I-Circuit Analysis

Note : The paper will be divided into five units. Two questions will be set from each unit. Five questions are to be attempted in all.

The candidates are required to attempt one question from each unit.
Max. Marks : 33 Time : 3 hrs.

Unit-I

Difference between linear and non-linear devices. Resistance and inductance their types and behaviour with D.C. and A.C. sources, colour codes.

Transient growth and decay of current in L-R circuit and time constant. Measurement of inductance by Rayleigh's method.

Unit-II

Capacitance- their types on the basis of size and medium and behaviour with D.C. source, colour codes. Charging and discharging of capacitance through resistance.

Measurement of high-resistance by leakage method. Behaviour of series and parallel L-C-R Circuit with D.C. and A.C. sources. Phaser diagrams and concept of j operator.

Unit-III

Network definitions. Constant voltage and constant current sources. Kirchhof's law's and applications. Mesh and node circuit analysis.

Reduction of a complicated circuit into T and π equivalent, conversion between T and π configurations. Two port analysis, its h, y and z parameters. Actions equivalent of Z-port network, input and output impedances

Unit-IV

Superposition theorem, Reciprocity theorem. Thevenin theorem, Maximum power transfer theorem, coupled cricuits, mutually inductively coupled circuit, reflected impedance Q, impedance Q matching.

Unit-V

Concept of filters, Low, high, band pass and band elimination filters, M derived filters, L and π configuration of filters. Cascading filters, short circuit and open circuit impedances. Design consideration of filters.

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Fourier analysis of periodic wave. Analysis of square, triangular wave forms. Analysis of output wave forms of half and full wave rectifiers. Experimental determination of the Fourier components of a square wave.

Reference :

1. Hand Book of electronics by Gupta & Kumar.
2. Basic Electronics by Bernard Grov.

Paper-II Semiconducting and Opoto electronic devices

Note: The paper will be divided into five units. Two questions will be set from each unit. Five questions are to be attempted in all. The candidates are required to attempt one question from each unit.

Max. Marks: 33 **Time : 3 hrs.**

Unit-I

Metal, insulators and semiconductors, intrinsic semiconductors, mobility and conductivity, extrinsic semiconductor (N-type and P-type), Physical concepts of carrier concentration, carrier life time, diffusion, continuity equation and hall effect.

Dipolar space charge region and potential barrier, voltage and current equation, forward and reverse bias characteristics, DC and AC resistance.

Unit-II

Transistor fabrication, N-P-N and P-N-P transistors, CB, CE and CC configurations α, β and γ gains. Z, Y and h equivalents of transistors in various configurations (both in static and dynamic equivalents), characteristics of transistors in various configurations, AC and DC load line.

Unit-III

Transistor parameters and factors effecting the transistor parameters. Transistor as an amplifier, comparison among three transistor amplifier configurations (single stage). Amplifier and its graphical analysis.

Unit-IV

Field effect transistors (FET), Junction Field Effect Transistor JFET) and MOSFET, Uni-junction transistors (UJT) : construction working and their characteristics.

Unit-V

Varactor diode, tunnel diode and their characteristics, photo

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conductivity cell, P-N photodiodes, PIN photodiodes, avalanche photo diodes, simple applications of photodiodes, photo voltaic effect, solar cell LED, photo-multiplier tubes.

Reference Books :

1. Hand book of electronics by Gupta and Kumar.
2. Applied electronics by G.K. Mithal.
3. Engineering electronics by Ryder.

Paper-III Digital Computer Electronics

Note : The paper will be divided into five units. Two question will be set from each unit. Five questions are to be attempted in all. The candidates are required to attempt one question from each unit.

Max. Marks : 34 Time : 3 hrs.

Unit-I

Number system,—Introduction to digital computer. Number systems-decimal, binary, octal, hexa-decimal and their inter conversion, signed binary numbers, binary arithmatic addition, subtraction, multiplication and division. Meaning of bit, nibble, byte, BCD code, Excess three code, other four bit codes, five bit code, gray code alfa numeric displays (ASCII code).

Unit-II

Logic Gates & Boolean Algebra— Meaning of gate, OR, AND NOT NOR NAND Gates and their truth table. Diode and TTL Logic. Laws of Boolean Algebra, DeMorgan's theorem, simplification of boolean expressions-sum of product method. Algebraic simplification. Exclusive or gate.

Unit-III

Arithmetic and Sequential logic—Introduction to ALU (Arithmetic Logic Unit), exclusive OR gate, half adder, excess-3 adder, half and full subtractor, signed binary numbers, 2's compliment adder-subtractor. Simple conventional circuit designs.

RS flip-flop, flip flop, RST flip flop, D flip flop, J.K. flip flop, Schimett trigger.

Unit-IV

Shift Register/Bistable multivibrator as binary counter (Elementary) shift counter, Four bit binary counter, decade counter, gating a counter, BCD counter, ring counter, up down counter

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Unit-V

SSI & MSI integrated circuits, magnetic core, Magnetic core logic, Magnetic memory, Addressing Semi conductor memories, bi polar, MOS, magnetic drum storage, ROM, PROM, EPROM, RAMS.

Digital clock, Decimal decoder, Seven segment decoder, dot matrix decoder.

Experiments for Practical work

Note : A candidate has to perform at least sixteen experiments in all taking eight experiments from each section 'A' and 'B'. In practical examination, the candidate will be required to perform two experiments one from section 'A' and other from section 'B'.

The distribution of marks will be as follows :

Time duration : 5.00 hrs.

Expts (two)-30
(15 for each expt) marks
Viva Voce 10 marks
Practical record 10 marks
Total 50 marks

Section-A

1. To draw the characteristic curves of transistors (common base).
2. To study the characteristic of various diodes.
3. To study the characteristic of Solar cell.
4. To study the characteristic of photodiodes and LED's.
5. To study the phase relationship between voltage and current in LR circuit.
6. To study the phase relationship between voltage and current in CR circuit.
7. To study the phase relationship between voltage and current LCR circuit.
8. To study the LCR series resonance circuits and find the quality factor.
9. To study the LCR parallel resonance circuit.
10. To study the Fourier analysis of square wave voltage.

Section-B

1. To study the RS flip-flop circuit and verify its truth table.
2. To study the half adder and substractor.
3. Verification of superposition theorem.
4. Verification of Norton's theorem.

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5. Verification of Thevenin theorem.
6. Verification of DeMorgan's theorem.
7. To study the arithmetic logical unit (ALU).
8. To design AND, OR and NOT logic gates and verify their truth tables.
9. To design and study 4-bit up-down counter.
10. To study decoders and encoder.

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ADDITIONAL OPTIONAL SUBJECTS

1. Textile Craft

Scheme:

			DURATION	MAX.MARK	MIN.MARK
(i)	**Theory:**	One paper	3Hrs	60	22
(ii)	**Practical:**	One	3Hrs	80	28
(iii)	**Submission:**	Two		60	22

(Theory): Introduction to Textile Craft

UNIT-I

1. Introduction to Textiles
2. Definition of fibre, Properties of textile fibres, Primary & Secondary properties.
3. Classification of fibres
4. Production, manufacturing, properties and uses of Natural vegetable fibres- cotton, linen and jute
5. Yarn manufacture by Takli and Charkha

UNIT-II

1. Warp and Weft, Difference between warp and weft
2. Handloom, Parts of Handloom
3. Warp path on Handloom
4. Motion of Handloom(primary & secondary)
5. Elementary Weaves(Basic weaves): Plain, Twill, Satin & Sateen

UNIT-III

1. Concept of colours, Colour Wheel, Colour schemes, Achromatic & Monochromatic colours
2. Dyes and Pigments (colourless dyes)
3. Classification of Dyes
4. Dyeing of cotton fabric by Tie and Dye process
5. Fabric finishes- Introduction and Importance, basic finishes- bleaching, scouring, singeing, mercerising

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(Practical):

Samples preparation

(i) Tie and Dye (Marbling, pleating & folding, laheria and bandhej)
(ii) Elementary weaves (plain, twill, satin and sateen) on graph paper
(iii) Primary colour, secondary colour, colour scheme, achromatic & monochromatic colour
(iv) Hand painting
(v) Stencil Preparation and Painting

Submission:

Develop any two products

(i) Dupatta / scarf/table cover using tie and dye
(ii) Cushion cover or table mats using hand painting or stencil painting

Examination Scheme:

Major Problem: 50 Marks

Tie and dye/ stencil printing / hand painting on a product

Minor Problem: 30 Marks

Preparation of any weave or colour scheme

Reference books :

Dantyagi, S. (2012) Fundamental of Textiles, Orient Blackswan private limited.

Gohl, E. P. G. & Vilensky, L.D. (2005) Textile Science, CBS publishers & distributors PVT.Ltd. New Delhi

Taggart, W. (1920) Cotton Spinning, London; New York: Macmillen. London

Bannergee, N.N. (1986) Weaving Technology, 9th edition, Textile book house

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2. GARMENT PRODUCTION & EXPORT MANAGEMENT

B.Sc. PART – I

PAPER- I: UNDERSTANDING TEXTLES

B.A/B.Com. -M.M. 60 **Hrs.3**

B.Sc. M.M. 50

OBJECTIVES: -

1. To know different textile fibers & their performances.
2. To gain knowledge on different textiles fiber processes and finishes.
3. To become familiar with traditional textiles & embroideries of India.
4. To understand the selection criteria's of clothes

SECTION A: Textile Technology

1. Textile fibers: : General properties of Natural Fibers – Cotton, Wool. Silk, Regenerated – Rayon, Acetate Synthetic Fibers – Nylon, Acrylic
2. Fibers to yarn : The basic process involved in making yarns including blending, carding, combing, mechanical and chemical spinning
3. Fabric construction : Weaving: plain, twill, & satin weave
4. Fabric Finishes : Calendering, mercerization and tentering

SECTION B : Traditional Textile

5. Woven fabrics : Dacca muslin jamdani, chanderi, brocade baluchari, kashmiri shawls, doria, kanjivaram
6. Dyed Fabrics : Bandhej, ikat, patola.
7. Printed Fabrics : kalamkari, madhubani
8. Traditional embroideries of India :
   a) Kashida of Kashmir
   b) Kasuti of Karnataka
   c) Manipuri
   d) Chamba rumal of Himachal Pradesh
   e) Kantha of Bengal
   f) Phulkari of Punjab
   g) Chikankari of Uttar Pradesh

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SECTION – C

SELECTION CRITERIA

9. Selection of suitable fabrics for infants, toddlers, pre- school children, school going children, adolescents, adults and special needs
10. Buying criteria for readymade garments, definition, origin & evolution of ready to wear garments

References:

1. Corbman, B. P. (1983). Textiles fibre to fabric. Mc Graw Hill education.
2. Phyllis, G. T., & Billie J. C. (2009). Understanding textile. Pearson publication.
3. Naik, S.D. (1996). Traditional Embroideries of India. APH publishing.
4. Bhatnagar, P. (2009). Traditional Indian costumes and textiles. Abhishek publication.
5. Dhantyagi, S. (2012). Fundamentals of textile and their care. Orient Black swan.
6. Singh, B. Vastra vigyan avam paridhan.
7. Marjory, J. L. (1966). Introductory textile science. Holt McDougal.
8. Marjory, J. L. (1976). Essentials of textiles. Holt McDougal.
9. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER – II
BUSINESS AND GARMENTS INDUSTRIES

B.A/B.Com.-M.M.60 **Hrs.- 3**

B.Sc.- M.M.50

OBJECTIVES: - To enable students to:-

1. Acquaint with different types of Business ownership.
2. Understand merchandising in Apparel Industries.
3. Understand the garment industry and project planning.

SECTION A
BASICS OF BUSINESS

1. Meaning and scope of business with special reference to garment export trade in India
2. The important factors to be considered at the same time of commencement of business - legal, economical, and social
3. Different types of business-
   a) individual organization

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b) partnership
c) co-operative
d) public sector
e) company

4. Objectives, importance and utility of book keeping.

SECTION – B
MERCHANDISING THEORY

5. Introduction to fashion merchandising. merchandising planning, scheduling, buying and evaluation
6. Visual merchandising.
7. Careers in Apparel industries.

SECTION –C
GARMENT INDUSTRY

8. Project planning for garment production unit.
9. Production and storage space, laundry area of garment industry.
10. Site selection for unit
11. Budgeting for garment production unit.

References :

1. Kaplan, S. R. & Anthen A. A. (2014). Management. Darling kindesley Pearson education.
2. Frings, G.S. (2007). Fashion from concept to consumer. Pearson G edition.
3. Jindal, R. (1998). Handbook of fashion; best drafting techniques. Mittal publications.
4. A.K. Sharma , S. Sharma, R. Nagar, A. Jain, S. A. Bakshi, 2016, Entrepreneurship and small business management (Hindi) 1st ed. Ajmera Book Company, Jaipur

PRACTICAL – 1
BASICS OF GARMENT CONSTRUCTION

B.A./B.Com.- M.M. 80 **Hrs. 4**

B.Sc. - M.M. 50

OBJECTIVES: - To enable students to:-

Develop skill in understanding all stitching technique.

Develop expertise in basic and traditional embroidery which gives creative, decorative and ornamental effect on dress.

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Contents

1. **Sample making :**

   Basic seams - Basting (even, uneven) back stitch, blanket)

   Hems – visible, invisible

   Lace edging – (machine)

   Gathers - (machine), darts

   Pleats – knife, box, inverted box

   Frills one side, two sided

   Tucks – pin, cross, shell

   Fasteners – hook , press button, shirt button, button hole, loop with button, zip

   Plackets – continuous, two piece

   Pockets – patch, bound, inseam, kurta

   Edge finishing - piping and facings

2. **Basic Embroidery stitches :**

   Chain, stem, running, lazy-dazy, satin, herring- bone, buttonhole, bullion, feather patch and appliqué work.

3. **Make samples of following traditional embroideries** :

   kashida, kantha, kasuti, phulkari, chamba

   Taking body measurements and knowledge of standard measurements from child to adults

Examination Scheme:

B.A.\B.COM:-Max Marks:-80
1. Major Problems:-40
2. Minor Problems:-25

Internal:-15

B.Sc:-Max Marks:-50
1. Major Problems:-20
2. Minor Problems:-20

Internal:-10

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3 Geology and Mining

Scheme:

Theory: Max Marks 100 Minimum Pass Marks 36

Paper I: Physical Geology and Paleontology 3 hrs duration Max Marks 50

Paper II: Mineralogy and Structural Geology 3 hrs duration Max Marks 50

Practical (one) 4 hrs duration Max Marks 50

Paper I: Physical Geology and Palaeontology

Section - A

Geology: its definition and scope, sub-disciplines and concept of Earth System Science

Earth: As a part of the Solar System, its origin, composition and structure. Internal and external forces.

Concept of Plate Tectonics and its application in understanding Earthquakes and volcanoes, Mid Oceanic Ridges and Sea Floor Spreading.

Mountain Building and Isostasy

Section - B

Weathering and Erosion. Geological work of natural agencies like running water (rivers), wind glaciers, groundwater and oceans, and development of related landforms.

Fossils: Conditions necessary for fossilization, mode of preservation, their significance in understanding the origin and evolution of life. Outline of Geological Time Scale

Microfossils: definition and significance in geological studies. Skeletal morphology and geological distribution of Foraminifers.

Section - C

Skeletal morphology and geological distribution of the following groups

Brachiopods, Molluscs, Trilobites and Echinoids.

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Echinoids, Molluscs, Trilobites and Echinoids

Paper II: Mineralogy and Structural Geology

Section A

Crystal: crystalline, cryptocrystalline and amorphous states. Crystals faces, edges, solid angle and elements of crystal symmetry, unit cell, crystal notation and zones

Mineral: Definition, rock forming minerals and ore minerals. Physical properties of Minerals. Concept of Isomorphism, Polymorphism, Pseudomorphism and Solid Solution

Optical Mineralogy: Construction and use of petrological microscope. Double refraction, Pleochroism, Extinction angle, Interference colours.

Section B

Classification of Silicate Minerals. Physical, optical and chemical properties of the following mineral groups. Feldspar, pyroxene, amphibole, mica and garnet

Deformation: Elastic, plastic and brittle deformation. Attitude of planar and linear structures, dip, strike, pitch and plunge. Concept and use of clinometer compass. Unconformity and its types, criteria for determination of tops and bottom of sequences.

Section C

Folds and Faults: Definition, [illegible]ry, geometric and genetic classification and recognition in the field

Elementary idea about Cleavages, joints, salt domes, inliers and outliers

Practicals

Study of physiographic features on topographical maps. Drawing of profiles and geological sections along given direction

Identification, description and [illegible] of important fossils representing the following groups: Brachiopods, Molluscs, Trilobites, Echinoids

Identification and description of common rock forming minerals on the basis of physical properties: [illegible] plagioclase, microcline orthoclase, biotite hornblende, muscovite, olivine, [illegible]

Geological [illegible] samples

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4. ENVIRONMENTAL SCIENCE

B.Sc. Part-I

Scheme:

Theory

Max Marks: 100			Min. Marks:36
Paper I	3 hours duration		Max Marks:50
Paper 2	3 hours duration		Max Marks:50
Practical	4 hours duration	Min. Marks:18	Max Marks:50

Note:

1. Two types of Question papers for each theory paper will be applicable. Total duration of 3 hours for each paper. One question paper will comprise of the objective questions and the other will be of descriptive type question.
2. Descriptive type question paper (to be given during 1st 2 hours of examination) will have 9 questions,3 from each section out of which a student is supposed to attempt 4 questions selecting at least 1 from each section. This portion of the paper will carry maximum 30 marks. Each descriptive question will be of 7.5 marks.
3. The objective question paper will be given after 2 hours of commencement of descriptive type paper and will have 35 questions of the objective type. This portion of the paper will carry 20 marks. The objective type questions will be of the following types:
   - Multiple choice type questions: 20 questions of ½ marks each.
   - Fill in the blanks/one word/true or false type questions:10 questions of ½ mark each.
   - Very short answer type questions: 5 questions of 1 mark each

Paper I: Fundamentals of Environmental Science

Section-A

1. Ecosystem Concept, Ecosystem structures and function, Components of Ecosystem (Biotic and Abiotic Components).
2. Pyramids of Energy, Biomass and number.
3. Biogeochemical cycling(Nitrogen cycle, Phosphorous cycle, Carbon cycle, oxygen cycle, Sulphur cycle, Water cycle etc.).
4. Concept of energy flow in Ecosystem, Production, Biomass and productivity.
5. Human Ecosystem, Agro- Ecosystem, Rural and Urban Ecosystem.

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Section-B

1. Geographical and Geological aspects of forests, types and distribution of forest, structure and composition of forest, productivity of forest and biodiversity in forest.
2. Geographical and Geological aspects of Grassland Ecosystem, types and Distribution of Grasslands, structures and compositions of Grasslands, Productivity of Grasslands and biodiversity in Grasslands.
3. Geographical and Geological aspects of Desert Ecosystem, types and distribution of Desert Ecosystem at global level.
4. Aquatic Ecosystems; ponds, lakes and marine ecosystems.

Section-C

1. Ecology of Rajasthan with respect to Indira Gandhi Canal.
2. Aravalli's and Thar Desert Ecosystem.
3. Land forms in Rajasthan desert.
4. Adaptation in plants and animals of Rajasthan desert.
5. Types of vegetation's and animals in Rajasthan Desert.
6. Mineral wealth of Rajasthan.

Suggested Readings:

- Allaby, M, 1986 Ecology Facts. Bridge House London, Kd.
- Beez, A.V. Knamitter, G.W. and Smith, J.C. 1987. The Environmental Science and Technology Education. Pergmon Press, Oxford.
- Betaking, D.B. and Killer E.A.F. 1982. Environmental Studies. Charles E. Merril Publishing Co. London.
- Cassedy, E.S. and Grossman, P.Z. 1990. Introduction to Energy. Cambridge University Press, New York.
- Colinvanx, P. 1986, Ecology. Jolm Wiley and Sans. New York.
- Cunnigham, W.P. and Cunnigham M.A. 2003. Principles of Environmental Science. Tata Mc Graw-Hill Publishing Company Ltd. New Delhi.
- Dicastri, F. Baker, FWG and Hadley M. 1984, Ecology in Practice, Tycooly International Publishing Ltd. Dublin.
- DiCastri, F. Banker, FWG and Had buy. M. 1984. Ecology in Practice, Tycooly International Publishing Ltd. Dublin.
- Krebs. C.J. 1985 Ecology. Harper and Row Publishers, New York.
- Majupuria T.C. 1986. Wildlife Wealth of India. Teq Press service, Bangkok.
- Odmn, E.P. 1933, Basic Ecology, Harper and Row Publishers, New York.
- Prakash I. 1988. Desert Ecology, Scientific Publishers.
- Rana, S.V.S. 2005. Essentials of Ecology and Environmental Science. Prentice Hall of India, Pvt. Ltd. New Delhi.

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- Santra, S.C. 2001. Environmental Science. New Central Book Agency Pvt. Ltd. Calcutta.
- Shadri, B. 1986, India Wildlife and Wildlife Resources, Sterling Publishers Pvt. Ltd. New Delhi.
- Smith, R.L. Elements of Ecology, Harper and Row Publishers, New York.
- Tegue, D.D. 1985, A manual of Wildlife Conservation, NatrajPublshers, Dehradun.
- Tietenberg, T. 1968. Environmental and National Resources Economics, Scott, Foresmsn, London.

Paper II: Water Resources and Management

Section-A

1. Water Resources; precipitation, infiltration, evaporation, transpiration, runoff and Storm Water.
2. Hydrological cycles mechanism, significance.
3. Surface water resource availability at global, national and regional level.
4. Ground water Resources; Aquifers, ground water collection system, ground water hydraulics.
5. Ground water availability at global, national and regional level.
6. Rain water harvesting its necessity and various methods of collection system and its importance.
7. Water uses; drinking water, use as cooling water in power plants, Irrigation recreational activities. Industrial use with respect to quantum of water use.

Section-B

1. Water quality monitoring; Sampling, Methods of analysis, determination of organic matter, determination of inorganic substances, physical characteristics, Bacteriological measurements.
2. Water processing; Mixing and flocculation, Sedimentation, Filtration, Turbidity removal, Taste and Odour removal, Organic Chemicals removal, Iron and Manganese removal, Water Stabilization, Chlorination, Disinfection, Removal of dissolved salts.

Section-C

1. Secondary (Biological) Treatment; Activated Sludge Process, Trickling Filters, Sludge Treatment and Disposal.
2. Lagoons, Anaerobic digestion, Aerobic Digestion.
3. Advance Waste water treatment, Removal of Suspended Solids, Nitrogen Removal, Advanced Biological System.
4. Recovery of material from process effluent.
5. Removal of Pesticide residues from water.

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Suggested Readings:

- Alvares, C. and Billorey, R. 1988. Damming the Narmada, Natraj Publishers, Dehradun.
- Arden, T.V. 1968. Water Purification by Ion Exchange. Butterworths, London, U.K.
- Botkin, K. 2000. Environmental Science. John Wiley and Sons. New York.
- Bourne, P.G. 1984. Waste and Sanitation. Academic Press. Inc. New York.
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- Pillai, K.M. 1987. Water Management and Planning. Himalaya Publishing, New Delhi.
- Schroeder, E.D. 1977. Water and Waste water treatment. Mc Graw-Hill, New York.
- Sincero, G.A. and Sincero, A.P. 1999. Environmental Engineering – A Design Approach. Prentice-Hall of India, (P) Ltd. New Delhi.
- Sinha, U.K. 1986. Ganga: Pollution and Health Hazards, Alka Enterprises, New Delhi.

Suggested Laboratory Exercises (Practicals)

Frequency Determination

Density Determination.

IVI Determination

Study of vegetation types in different forests.

Study of vegetation types in different landforms of Desert.

Study of animals types in different forests. (Knowledge about wildlife)

Study of animals types in different landforms of Desert. (Knowledge about wildlife)

Study of different types of adaptations in plants of Deserts.

Study of different types of adaptations in animals of Deserts.

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Add-on Subjects

1. BIOTECHNOLOGY

Scheme:

Theory

Max. Marks : 100 **Min. Pass Marks : 36**

Paper I	: Biochemistry & Microbiology	(50 Marks)
Paper II	: Cell Biology & Genetics	(50 Marks)
Paper III	: Bophysics, Bio-Maths & Computer Application	(50 Marks)
Practical		(75 Marks)

Paper-I : Biotechnology and Microbiology

The first question in each paper shall be compulsory and it would be based on the entire syllabus. It will cover 20 per cent marks. It will be of the objective type one word, short answers etc. which can be done in the same answer book.

Section-A

Nature of biological material. General properties : organic and inorganic compounds. Suitability of organic compounds for generation of structure, storage of energy and information. Hydrophilic and hydrophobic groups in biological molecules.

Classification of biomolecules based on their role in bioprocesses. Molecules involved in generation of mechanical stability—peptidoglycans : polysaccharides and membrane lipids. Analysis of carbohydrates, lipids, proteins and nucleic acid, biosensors and diagnostics

Section-B

Molecules involved in information storage and retireval—the nucleic acids.

Molecules exeecuting mediator and catalytic functions—the proteins.

The sign molecules. Biochemical composition of cell Protein, Lipids, Carbohydrates, Nuclear acids and metabolic pool. Nature of the material DNA, replication

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interacteic acid and proteins. Helicity, bending, looping, pleats, salt bridges etc. and their determinants. The basis for intermolecular interaction *e.g.*, enzyme-substrate and antigen—antibody recognition.

Section-C

Nature of biochemical reactions underlying biosynthesis and degradation. Role of enzymes in such reactions. Protein and non-protein enzymes. Kinetics of enzyme catalyzed reactions. *In vitro* activity of purified enzymes and their applications in industry. Various uses of enzymes—enzymes on food processing, medicine, diagnostics and production of new compounds., Enzymes as research tool—ELISA methods, modification of biological compounds with the help of enzymes

Development of microscopy (optical, TEm and SEM).

Pasteur's experiments disproving spontaneous generation.

The concept of sterilization. Methods of sterilization (Dry heat wet heat, radiation, chemical and filtration etc.)

Section-D

Concept of microbial species and strains.

The various forms of microorganisms—PPLOS, cocci, bacilli and sprilla.

Genetic homogeneity in clonal populations.

Spontaneous and induced variation arising in microbial population.

Gene transfer in microorganisms.

Nature of the microbial sell surface. Gram positive and gram negative bacteria. Kinds of flagella. Stereotypes.

Prokaryotic and eukaryotic microbial cells.

Nutritional classification of microorganisms.

Microbes in extreme environments--the thermopiles and Ikalophiles.

Pathogenic microorganisms Defense mechanism against microorganisms

Symbiosis and antibiosis among microbial populations.

N_2 fixing microbes in agriculture

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Microbial metabolism fermentation products. A survey of products from microorganisms.

Strains improvement by enrichment, selection and recombinant DNA methods.

Production of heterologous protein in interest in microorganisms.

Paper II : Cell Biology & Genetics

The first question in each paper shall be compulsory and it would be based on the entire syllabus. It will cover 20 per cent marks. It will be of the objective type-one word; short answers etc. which can be done in the same answer book.

Section-A

Cell as a basic unit of living systems. The cell theory. Precellular evolution : artificial creation of "cells". Broad classification of cell types : PPLOS, bacteria, eukaryotic microbes, plant and animal cells. A detailed classification of cell types within an organism. Cell, tissue, organ and organism as different levels of organization of otherwise genetically similar cells. Ecological amplitude of cells in high, altitude, sediments, arctic, hotspring, and brackish and freshwater environments. Ultrastructure of the cell membrane.

Section-B

Structure and function of cell organelles : ultrastructure of cell membrane, cytosol, Golgibodies, endoplasmic reticulum (rough and smooth), ribosomes cytosketal structures (action, microtubles etc.) mitochondria, chloroplasts, lysomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus chromatin,). Cell division and cell cycle (include cell synchrony and its application). Cell-cell interaction.

Cell locomotion (ambeoid, flagellar and ciliary). Muscle and nerve cells.

Cell senescence and depth. Cell differentiation of plants and animals

Section-C

Mendelian laws of inheritance, gene interaction.

Sex determination in plants and animals; sex-linkage; non-disjunction as a proof of chromosomal theory of inheritance. Linkage; mapping genes; interference; coincidence in pro- and eukaryotes. Chromosomes; chemcial composition; structural organization of chromatids, centromeres, telomeres, chromatin, nucleosome organization; eu- and heterochromatin; special chromosomes (e.g. polytene and lampbrush, chromosomes); banding patterns in human chromosomes.

Structural and numerical at aberrations involving chromosomes; evolution of wheat, cotton and rice;

Hereditary effects—Kleinefelter, Turner, Cri-duChat and Down syndromes.

Section—D

Mutations—spontaneous and induced; chemical and physical mutagens; induced mutations in plants, animals and microbes for economics benefit of man.

Basic-microbial genetics conjugation, transduction, transformations; isolation of auxotrophs, replica plating techniques, analysis of mutations in biochemical pathways, one gene- one enzyme hypothesis.

Extra chromosomal inheritance, mitochondrial and chloroplast genetic systems.

Population genetics : Hardy-Weinberg equilibrium, gene and genotypic frequencies.

B.Sc. Part I

Paper-III Biophysics, Biomaths & Instrumentations and Computer Application

The first question in each paper shall be compulsory and it would be based on the entire syllabus. It will cover 20 per cent marks. It will be of the objective type one word, short answer etc which can be done in the same answer book.

Section - A

Energetics of living body sources of heat limits to temperature heat dissipation and conservation Lambert Beer law spectrophotometry and colorimetry Primary events in photosynthe

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sis. Strategies of light reception in microbes, plants and animals.

Correction of vision faults. Electrical properties of biological compartments. Electricity as a potential signal

Section—B

The set theory properties of subsets, Linear and geometric functions, Limits of functions, derivatives of functions. The binomial theorem, Logarithm, Differentiation, Integration, Probability calculations, Biostatistics : Methods of sampling, confidence level, Measurements of central tendencies, Measurements of deviations.

Section—C

Computers : General introduction to computers, organization of computer digital and analogue computers: algorithm. Use of computers : Common languages of computer, word, excel, power point. Bioinformatics and use of computer in bioinformatics. Computers for online monitoring, computers in co-ordination of solute concentration, pH and temperature etc. of a fermenter in operation.

Section—D

General principles; buffers; electroanalytical methods: potentiometric and conductometric; photometry; chromatographic methods of separation : gel permeation, ion exchange, reverse phase and affinity chromatography, HPLC and

FPLC : centrifugation; radiotracer technique: gel electrophoresis techniques : electro blotting and electroelution. capillary electrophoresis. API-electrosprary and MALDI-TOP mass spectrometry.

Practical-Based on Theory syllabus -Max marks 50

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2. INDUSTRIAL MICROBIOLOGY

Scheme :

Max. Marks 100 Min. Pass Marks : 36

Paper I	3 hrs. duration	Marks : 50
Paper II	3 hrs duration	Marks : 50
Practical	Min. Pass Marks : 18	Max. Marks : 50

Note : Each theory paper will contain nine questions, three questions form each section. Candidates are required to attempt five questions in all taking atleast one question from each section.

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Paper-I : Fundamentals of Industrial Microbiology, Biostatistics, Tools and Techniques

Section-A

1. **General Introduction history and development of Industrial Microbiology Scope of Industrial Microbiology :**
   - Introduction
   - Discovery of Microbial World
   - The experiments of Pasteur
   - The era of the diseovery of antibiotic
   - The discovery of the anaerobic life
   - The Physiological significance of Fermentation.
2. **Classification isolation, characteristics and ultrastructure of microbes.**
   - Bacteria
   - Algae
   - Fungi
   - Actinomycetes
   - Mycoplasma
   - Viruses
   - Procedure of isolation, preservation and identification of micro organisms
   - Methods of staining of different microbes.
3. **Biological and Biochemical fundamentals.**
   - Introduction
   - The microorganisms and biotechnology
   - Isolation methods for microorganisms
   - Culture preservation and stability
   - Preservation of microbes, serial subculture preservation by over laying culture with mineral oil lyophilisation of freeze drying.
   - Other methods for storage of fungi
   - Over production of microbial metabolizes
   - Preparation of inoculum

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Section-B

4. **Fundamental of Genetics**
   - Introduction
   - Methods for the selection of mutants, direct selection methods for resistant mutants, penillin selection, technique for mutant selection, conditional lethality and use in mutant section.
   - General account about the transfer of genetic information in prokaryotes.
   - Scope of genetic engineering.
5. **Biostatistics**
   - Basic idea of probability distribution patterns, normal binomial and poison distribution, sampling methods, means, mode and median, chi-square statistics. Analysis of variance, transformation.
6. **Microscopy**
   - Simple microscopy; phase contrast microscope, fluorescence and electron microscopy.

Section-C

7. **Chromatography**
   - Paper chromatography, thin layer chromatography, column chromatography, gas chromatography, affinity chromatography, gel filtration, Electrophoresis, moving boundary zone (paper gel etc.)

8. **Instruments : basic principles and usage**
   - pH meter Absorption and Emission spectroscopes. Principle and law of absorption and radiation use densitometry, fluorimetry, calorimetry spectrophotometry (Visible, UV infrared) manometry, polarography, Centrifugalization : principles and application.

Principle types of Fermentation
Introduction

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- Factors involved in fermenter design, difference between bio-chemical and chemical processes, classification of bio-chemical reactions, rate process, operational consideration, local conditions within a fermenter.
- Fermenter configurations, the batch fermenter, continuous stirred tank fermenter the tubular fermenter, the fludidised bed fermenter, solid state fermenters.
- Principal operating characteristics of fermenters.
- Computer control of fermentation process.
- Introduction
- Computer hardware and software, Hardware Graphics, LOTus and DOS, Computer applications in fermentation.
- Justification and planning.

Paper-II : Microbial Genetics, Molecular Biology, Microbial Biochemistry

Section-A

1. **Nucleic Acids.**
   DNA as genetic material structure of DNA, RNA, DNA replication (conservative and semiconservative replication, confirmational flexibility of DNA), replication of Eukaryotes. The genetic code, central dogma, reverse transcriptase, gene transcription, polymerases, transcription, production of DNA, tRNA, mRAN and rRNA, synthesis of RNA in eukaryotes and prokaryotes, catabolite effect operators and repression post transcriptional of RNA.
2. **Molecular Biology of Protein Synthesis.**
   Translation and protein synthesis in eukaryotes and prokaryotes, tRNA synthetase activation of amino acid. Inhibitors of protein synthesis. Gene expression catabolite repression regulation of gene expression, peron concept, cAMP. Catabolite Activator Protein (CAP) Positive and negative control and gene expression in prokaryotes lac operon Brittori Davidson model of gene regulation in eukaryotes.
3. **Mutation**
   Molecular mechanism of mutation forward and reveres muta-

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transition, transversion, chemical induced mutations, radiations and base analogies, induced mutations, mutation frequency applications of mutations, Mechanism of repair, of radiation induced damage, SOS repair, Post transcriptional repair.

Section-B

4. **Genetic recombinant in bacteria.**
   Transformation, transduction and conjugation. Use of transformation, transduction and conjugative in genetic mapping, preparation of genetic maps.
5. **Extra Chromosome genetic material.**
   Plasmids, cosmids, transposons insertion sequence. Overlapping genes, silent genes, exon and intron evolutionary significance of silent gene, ribonucleo protein. Genetic recombination and it prospects, basics of recombinant RNA, recombinant DNA technology.
6. Carbohydrates.
   Classification of carbohydrates, optical property chemical properties of carbohydrates, chemical structure and property of starch, cellulose, glcogen, synthesis of pureness and pyrimidines.
7. **Lipids**
   Saturated and unsaturated fatty acids, biosynthesis of fatty acids, distribution and function of lipids and microorganism. Degradation of lipids by alpha, beta and omega oxidation, lipid peroxidation.

Section-C

8. **Enzymes**
   Classification, coenzyme, cofactor, thermodynamic explanation of enzyme, catalysis reaction orders derivation of Michaelis Menten equation. Transformation of Michaelis menten Kinetics tot Lineweaver Burke and Eadie Hoffstee polite Competitive, uncompetitive and non competitive inhibition kinetics of allosteric regulation of enzyme Isozymes factors contributing to catalytic efficiency of enzymes (Mode of catalysis)
9. Amino Acids

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Structure of amino acids, classification of essential aminto acids based on polarity. Hendersen and Hesselbalch equation for ionization of amino acids and Z winter ioni, property. Synthesis of peptizes, properties of proteins (acids base, property and solubility). Amino acid sequencing of proteins—primary secondary and tertiary structures, probes for protein conformation.

10. **Oxidation and Reduction Reactions :**
Standard redox, potentional law of thermodynamics, entropy, enthalpy and free energy of reaction; hydrolysis of energy rich intermediates and ATP. Respiratory electron transport and proton pump. Exudative phosphorylation (ATP synthesis), chemical coupling, confirmational change and chemismotic, Central dogma of energy transduction role coupling factors and dissipation of proton pump.

Practical on Paper-I

1. Preparation of media, autoculaving and sterilization of glassware, maintenance of culture room.
2. Isolation and minatenance of microbes of different groups.
(a) Bacteria, (b) Algae, (c) Bacteriophage, (d) Fungi.
3. Single spore drawing.
4. Camera lucida drawing.
5. Standard plate court.
6. Haemocytometer
7. Isolation of Phytoathogens
8. Biostatistics : manual and by computer
Problem of Chi-square test
Problem of mean, mode and median
Protein estimation by calorimeter.
Carbohydrate estimation by calorimeter.
Paper Chromatographic separation of amino acid and pigments by one way descending.
Paper Chromatographic separation by two dimensional Cromatograph.
Paper Chromatographic separation of carbohydrate.

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14. Paper Chromatographic separation of organic acid.
15. Measurement of pH fruit juice.
16. Electrophoretic separation of protein.
17. Centrifugal separation of protein.
18. Absorption spectra of protein nucleic acid and pigments.

Practical On Paper-II

1. Isolation of antibiotic resistant bacteria.
2. Replica plate technique for isolation of mutants.
3. Measurement of mutation frequency in bacteria.
4. Demonstration of lysogeny in Exeherichia coli.
5. Mutant isolation by gradient plate technique.
6. Location of site of mutation by using plasmid curing agent acrydine orange.
7. Isolation and purification of DNA.
8. Isolation and purification of RNA.
9. Effect of UV light on mutation frequency in bacteria.
10. Demonstration of photorepair mechanism.
11. Extraction and identification of lipids by thin layer chromatography.
12. Estimation of glycogen in a bacterial cell.
13. Estimation of alkaline phosphates activity.
14. Derivation of Michaelis-Menten constant Vmax of alkaline phosphate.
15. Measurement of competitive inhibition of ammonium uptake using structural analogy methyl I spectra.
16. Change in protein conformation due to pH, Heat, ionic concentration by observing UV spectra.
17. Separation of isozyme by polyacrylamide electrophoresis.
18. Measurement of relative enzyme activity of cellulose.
19. Measurement of cellulose by reducing sugar assay test.

Reference Books :

1 Principles of Biochemistry by Lehnigeer
2 Microbial Biochemistry by Moat.
3 Outlines of Biochemistry by Cohn and Stumpf.

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4. Microbiology : Fundamentals and Application by R A. Atlas, macmilan.
5. Microbiology : Fundamentals by A.H. Patel, Macmillan India.
6. Industrial Microbiology by Power and Daginawala, Himalaya Publishing House, Mumbai.
7. General Microbiology by Power and Daginawala, Himalaya Publishing House, Mumbai.
8. Statistics by D.N. Elhance.
9. Statistics by Mishra and Mishra.
10. General Microbiology by R.Y. Stainer.
11. Tools and techniques in biology, by Welson and Gouldin.
12. Laboratory Techniques in Biology by Swaroop, Pathak and Arora.
13. Fermentation Technology by Wiltitaker.
14. Principles of Genetics by E.J. Gardner.

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3. COMPUTER APPLICATIONS

Scheme :		Min. Pass Marks	Max. Marks
Arts/Commerce		72 (Th. 47 Pr. 25)	200
Science		54 (Th. 36 Pr. 18)	150
Paper-I	3 hours duration	Computer Fundamentals and introduction to IBM PC	Arts/Com. 65 Science 50
Paper-II	3 hours duration	Operating Systems and Business Data Processing	Arts/Com. 65 Science 50
Paper-III		Practical	Arts/Com. 70 Science 50

Paper I : Computer Fundamentals and Introduction to IBM PC

What is Computer? An introduction. Uses of computers in modern society *e.g.* weather forecasting, census, oil exploration, speech recognition, banking, publishing, accounting, research etc.

Information concept and processing-hardware, software computer capabilities and limitations. Concept of files and directories

Hardware features and use-CPU, I/O devices, Storage devices

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Introduction to networking, multiprocessing, time sharing, multitasking and real time computing.

Variety of hardware systems and features. Various types of comptuers vaailable in market. Micro, Mini and Main Supercomputers.

Evolution of personnel computers, Commodore, Atari, Apple, IBM, PC. Asic block diagram of computer. Difference between personal and main frames-Simple operating system, Easy to use, Less Memory, Dedicated, Normally single user.

Introduction to micro processors and associated computers. Timers, display controllers, DMA controllers.

Block diagram of IBM PC. Introduction to 8086 and 8088. Functional description of various modules and cards.

Boot process in IBM PC. System files. Self-test.

Various types of displays & other peripherals used in IBM PCs.

Disk Operating System—Introduction, Batch files.

Configuration files. COM, EXE, SYS, BIN and TXT files. Introduction to programming in BASIC. Development of programs in Q BASIC. Use of graphics facilitities using Basic.

Diagnostics for IBM PC. Use of Norton Utilities and other packages for undeleting files and other system maintenance jobs.

Advance version of IBM and compatibles.

Paper II : Operating Systems and Business Data Processing

Introduction to various categories of softwares. Operating system and its functions. Interaction of opearting system with hardware and user programs.

Various components of operating system with reference to DOS. Single user operating system. Task loader. Memory management.

File management, Directory structure in DOS. Moving renaming, copying, deleting and undeleting files under DOS.

Practical

Visit to computer Lab. Introduction to various components of a compater. A simple documentation preparation and printing. Usage f printer and other components

Physical inspection of IBM PC and internal ... Introduction

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nclature (COM1 COM2, etc.) Writing batch files for various purposes. Modifying config-sys files. Creating RAM Disk. Diagnostics on IBM PC. Controlling PC hardware using BASIC programs.

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SYLLABUS

B.Sc. PART-II

Examination-2025

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60%
Second Division 48% } of the aggregate marks prescribed in (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination, if they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations.

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Syllabus B.Sc. Part-I

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

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Syllabus B.Sc. Part-I

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

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All the rest will be declared to have passed the Examination, if they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations.

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Syllabus B.Sc. Part-I

Scheme of Examination
B.Sc. (Pass Course) Part-II

The number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown in the scheme of examination against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows:

First Division 60%
Second Division 48% } of the aggregate marks prescribed in (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination, if they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations.

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6.	Mathematics	40 - 44
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8.	Geography	49 - 52
9.	Statistics	53 - 57
10.	Applied Statistics	58 - 62
11.	Psychology	63 - 67
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13.	Textile Craft	76 - 77
14.	Garment Production and Export Management	78 - 82
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B.Sc. Pt.-II

1. PHYSICS

Scheme :			Max. Marks: 100
Min. Pass Marks: 36			
Paper I	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper II	3 hrs. duration	Max. Marks: 33	Min. Pass marks 12
Paper III	3 hrs. duration	Max. Marks: 34	Min. Pass marks 12
Practical	5 hrs. duration	Max. Marks: 50	Min. Pass marks 18

Paper-I : Thermodynamics and Statistical Physics

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit-1

Thermal and adiabatic interactions: Thermal interaction; Zeroth law of thermodynamics; System in thermal contact with a heat reservoir (canonical distribution); Energy fluctuations; Entropy of a system in a heat bath; Helmholtz free energy; Adiabatic interaction and enthalpy; General interaction and first law of thermodynamics; Infinitesimal general interaction; Gibb's free energy; Phase transitions, Clausius Clapeyron equation; Vapour pressure curve; Heat engine and efficiency of engine, Carnot's Cycle; Thermodynamic scale as an absolute scale; Maxwell relations and their applications.

Unit-2

Production of law temperatures and applications: Joule Thomson expansion and J T coefficients for ideal as well as Vander Waal's gas, porous plug experiment, temperature inversion, Regenerative cooling, Cooling by adiabatic expansion and demagnetization; Liquid Helium, He I and He II superfludity, Refrigeration through Helium dilution, Quest for absolute zero, Nernst heat theorem

The distribution of molecular velocities: Distribution law of molecular velocities, most probable, average and r.m.s. velocities; Energy distribution function; effusion and molecular beam, Experimental verification of the Maxwell velocity distribution; The principle of equi-partition of energy

Transport phenomena: Mean free path, distribution of free paths, coefficients of viscosity, thermal conductivity, diffusion and their interaction.

Unit-3

Classical Statistics: Validity of Classical approximation; Phase space micro and macro states; Thermodynamic probability, relation between entropy and thermodynamic probability, Monoatomic ideal gas, Barometric equation; Specific heat capacity of diatomic gas, Heat capacity of solids

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Unit-4

Quantum Statistics: Black body radiation and failure of classical statistics. Postulates of quantum statistics, undistinguishibility wave function and exchange degeneracy, a priori-probability, Bose-Einstein statistics and its distribution function; Planck distribution function and radiation formula, Fermi-Dirac statistics and its distribution function, contact potential, thermionic emission. Specific heat anomaly of metals; Nuclear spin statistics (para- and ortho-hydrogen).

Paper- II: Mathematical Physics and Special Theory of Relativity

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of nine marks comprising of six parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

UNIT-1

Orthogonal curvilinear coordinate system, scale factors, expression for gradient, divergence, curl and their application to Cartesian, circular cylindrical and spherical polar coordinate.
Coordinate transformation and Jacobian, transformation of covariant, contra-variant and mixed tensor; Addition, multiplication and contraction of tensors; Metric tensor and its use in transformation of tensors.
Dirac delta function and its properties.

UNIT-2

Lorentz transformation, Length Contraction, Time Dilation, Mass variation, rotation in space-time like and space like vector, world line, macro-causality.
Four vector formulation, energy momentum four vector, relativistic equation of motion, invariance of rest mass, orthogonality of four force and four velocity, Lorentz force as an example of four force, transformation of four frequency vector, longitudinal and transverse Doppler's effect.
Transformation between laboratory and center of mass system, four momentum conservation, kinematics of decay products of unstable particles and reaction thresholds; Pair production, inelastic collision of two particles, Compton effect.

UNIT-3

(a) Transformation of electric and magnetic fields between two inertial frames. Electric field measured in moving frames. Electric field of a point charge moving with constant velocity.

(b) The second order linear differential equation with variable coefficient and singular points, series solution method and its application to the Hermite's, Legendre's and Laguerre's differential equations. Basic properties like orthogonality, recurrence relation, graphical representation and generating function of Hermite, Lagendre and Leguerre functions (simple applications).

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UNIT-4

Techniques of separation of variables and its application to following boundary value problems (i) Laplace equation in three dimensional Cartesian coordinate system-line charge between two earthed parallel plates (ii) Helmholtz equation in circular cylindrical coordinates-cylindrical resonant cavity. (iii) Wave equation in spherical polar coordinates the vibrations of a circular membrane. (iv) Diffusion equation in two dimensional Cartesian coordinate system heat conduction in a thin rectangular plate. (v) Laplace equation in spherical coordinate system-electric potential around a spherical surface.

Paper III: Electronics and Solid State Devices

Work Load: 2 hrs. Lecture /week

Examination Duration: 3 Hrs.

Scheme of Examination: First question will be of ten marks comprising of five parts of short answer type with answer not exceeding half a page. Remaining four questions will be set with one from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying 3 marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit 1: Circuit analysis and PN junctions

Circuit analysis: Networks- some important definitions, loop and nodal equation based on D.C. and A.C. circuits (Kirchhoffs Laws). Four terminal network: Ampere volt conventions, open, close and hybrid parameters of any four terminal network, Input, output and mutual impendence for an active four terminal network. Various circuit theorems: Superposition, Thevenin, Norton, reciprocity, compensation, maximum power transfer and Miller theorems.
PN junction: Charge densities in N and P materials; Conduction by drift and diffusion of charge carriers, PN diode equation; capacitance effects.

Unit 2: Rectifiers and transistors

Rectifiers: Basic idea of Half-wave, full wave and bridge rectifier: calculation of ripple factor, efficiency and regulation; Filters: series inductor, shunt capacitor, L section and π-section filters. Voltage regulation: Voltage regulation and voltage stabilization by Zener diode, voltage multiplier
Transistors: Notations and volt-ampere characteristics for bipolar Junctions transistor. Concept of load line and operating point Hybrid parameters, CB, CE, CC configurations Junction field effect transistor (JFET) and metal oxide semiconductor filed effect transistor (MOSFET). Circuit symbols, biasing and volt-ampere characteristics, source follower operation of FET as variable voltage resistor

Unit 3: Transistor biasing and amplifiers

Transistor biasing: Need of bias and stability of Q point, stability factors, and various types of bias circuits for thermal bias stability: fixed bias, collector to base feedback bias and four resistor bias.

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Amplifiers: Analysis of transistor amplifiers using hybrid parameters and its gain-frequency response. Basic idea of Cascade amplifiers, direct coupled and R C coupled amplifiers. Amplifier with feedback. Concept of feedback, positive and negative feedback, voltage and current feedback circuits. Advantage of negative feedback. Stabilization of gain; effect of negative feedback on output and input resistance, reduction of nonlinear distortion, effect on gain - frequency response

Unit 4: Oscillators and Logic Circuits

Oscillators: criteria for self-excited and self-sustained oscillation, circuit requirement for build-up of oscillation, Basic transistor oscillator circuit and its analysis, Colpitt's and Hartely oscillators, R C Oscillators

Logic circuits: Logic fundamentals: AND, OR, NOT, NOR, NAND, XOR gates, Boolean algebra, De Morgan's theorem, positive and negative logic, logic gates circuit realization using DTL and TTL logic, simplification of Boolean expressions.

Reference Books:-

1. John D. Ryder, Electronic Fundamentals and Application, Prentice Hall of India Pvt. Ltd., New Delhi.
2. John D. Ryder, Engineering Electronics, McGraw Hill Book Company, New Delhi
3. Jacob Millman and Christose Haikias, Integrated Electronics, Analog and Digital Circuits and systems, McGraw- Hill Ltd. (1972).
4. Albert Paul Malvino, Digital Computer Electronics, Tata McGraw- Hill Pub. Co. Ltd., New Delhi (1983).
5. Kumar & Gupta, Hand book of Electronics.
6. G.K. Mithal, Hand Book of Electronics.
7. G.K. Mithal, Electronics Devices and Applications.
8. R.P. Jain, Digital Electronics.

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7. G.K. Mithal, Electronics Devices and Applications.
8. R.P. Jain, Digital Electronics.

PRACTICAL

Teaching : 4 hrs/week
Practical One-Paper
Min Pass Marks : 18

5 hrs. duration
Max. Marks : 50

Note : Total number of experiments to be performed by the students during the session should be 16 selecting any 8 from each section.

Section-A

1. Study of dependence of velocity of wave propagation on line parameter using torsional wave apparatus.
2. Study of variation of reflection coefficient of nature of termination using torsional wave apparatus.
3. Using platinum resistance thermometer find the melting point of agiven substance.
4. Using Newton's rings method find out the wave length of a monochromatic source and find the refractive index of liquid.
5. Using Micheloson's interferometer find out the wavelength of given monochromatic source (Sodium Light)
6. To determine dispersive power of prism.
7. To determine wave length of sodium light using grating.
8. To determine wave length of sodium light using Biprism.
9. Determine the thermodynamic constant $\gamma = \frac{C_p}{C_v}$ using Clement's & Desorme's method.
10. To determine thermal conductivity of a bad conductor by Lee's method.
11. Determination of ballistic constant of a ballistic galvanometer.
12. Study of variation of total thermal radiation with temperature.

Section-B

1. Plot thermo emf versus temperature graph and find the neutral temperature (Use sand bath).
2. Study of power supply using two diodes/bridge rectifier with various filter circuits.

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3. Study of half wave rectifier using single diode and application of L and π section filters.
4. To study characteristics of a given transistor PNP/NPN (common emitter, common base and common collector configurtainos).
5. Determination of band gap using a junction diode.
6. Determination of power factor ($\cos\theta$) of a given coil using CRO.
7. Study of single stage transistor audio amplifier (variation of gain with frequency).
8. To determine e/m by Thomson's method.
9. Determination of velocity of sound in air by standing wave method using speaker, microphone and CRO.
10. Measurement of inductance of a coil by Anderson's bridge.
11. Measurement of capacitance and dielectric constant of a liquid and gang condensor by de-Sauty bridge.

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2. CHEMISTRY

Scheme:
Max Marks: 150

	Duration (hrs.)	Max. Marks	Min. Pass Marks
Paper-I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	50	18

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-201 Paper-I: Inorganic Chemistry
(2 hrs or 3 periods/week)

Unit-I

Chemistry of Elements of First Transition Series:
Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation-states, coordination number and geometry.

Chemistry of Elements of Second and Third Transition Series:
General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

Unit-II

Coordination Compounds:
Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

Unit-III

Chemistry of Lanthanide and Actinide Elements:
Electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.
General features of chemistry of separation of Np, Pu and Am from U, electronic configuration, oxidation states, magnetic properties, complexation behavior, comparison of Lanthanides and Actinides with d-block elements.

Unit IV

Oxidation and Reduction:
Redox Potential, data, analyses of stability of redox stability in water, Frost, Latimer and Pourbaix diagrams. Application of redox principles in extraction of elements.

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Unit-V

Acids and Bases:
Theories - Arrhenius, Bronsted-Lowry, Lux-Flood, Solvent system concept and Lewis concept of acids and bases.

Non-aqueous Solvents:
Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2

CH-202 Paper-II: Organic Chemistry
(2 Hrs. or 3 periods/week)

Unit-I

Electromagnetic Spectrum: An Introduction

Absorption Spectroscopy
Ultraviolet (UV) spectroscopy - Absorption laws (Beer-Lambert Law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of solvents on transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones.

Infrared (IR) spectroscopy - Molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristics absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Unit-II

Alcohols - Classification and nomenclature.
Monohydric alcohols - Methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohol with mechanism.
Dihydric alcohols - methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement
Trihydric alcohols - methods of formation, chemical reactions of glycerol.

Phenols
Nomenclature, structure and bonding. Preparation of Phenols. Physical properties and acidic character. Comparative acidic strength of alcohols and phenols. Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gattermann synthesis, Hauben-Hoesch reaction, Lederer Manasse reaction and Reimer-Tiemann reaction.

Ethers and Epoxides
Methods of formation, physical properties, Chemical reactions - cleavage and autooxidation, Zeisel's method.
Synthesis of epoxides, Acid and base catalysed ring opening of epoxides, orientation of epoxide

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reactions of Grignard and organolithium reagents with epoxides

Unit-III

Aldehydes and Ketones

Structure of the carbonyl group. Syntheses of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, syntheses of ketones from nitriles and from carboxylic acids. Physical properties.

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones. Cannizzaro reaction, MPV (Meervein-Pondrof-Verley), Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. Use of acetals and 1,3-dithiane as protecting group.

Unit-IV

Carboxylic Acids

Structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids, mechanism of decarboxylation.

Methods of formation and chemical reactions of halo acids. Hydroxy acids - malic, tartaric and citric acids.

Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents (succinic, glutaric and adipic acids).

Carboxylic Acid Derivatives

Structure, nomenclature and synthesis of acid chlorides, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Preparation of carboxylic acid derivatives, chemical reactions, mechanisms of esterification and hydrolysis (acidic and basic).

Unit-V

Organic Compounds of Nitrogen

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.

Amines: Structure, nomenclature and preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Physical properties, stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts. Gabriel phthalimide reaction and Hoffmann bromamide reaction with mechanism.

Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Diazotisation and mechanism. Synthetic transformations of aryl diazonium salts, azo coupling and its applications.

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CH-203 Paper III : Physical Chemistry

(2 Hrs. or 3 periods/week)

UNIT-I

Thermodynamics - I

Definition of Thermodynamic Terms: System, surroundings, etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process, concept of heat and work.

First Law of Thermodynamics : Statement, definition of internal energy and enthalpy, heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law. Joule-Thomson coefficient and inversion temperature. Calculation of w, q, dU & dH for the expansion of Ideal gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry : Standard state, standard enthalpy of formation, Hess's law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.

UNIT-II

Thermodynamics –II

Second Law of Thermodynamics : Need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot-Theorem. Thermodynamic scale of temperature.

Concept of Entropy : Entropy as a state function, entropy as a function of V&T, entropy as a function of P&T, entropy change in physical change. Clausius inequality and entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Third Law of Thermodynamics : Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities. A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

Chemical Equilibrium:

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction Isotherm and reaction isochore. Clapeyron equation and Clausius-Clapeyron equation, applications.

UNIT-III

Phase Equilibrium: Statement and meaning of the terms' phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system - water, CO_2 and sulphur systems.

Phase equilibria of two component system - solid-liquid equilibria simple eutectic Bi-Cd, Pb-Ag systems, desilverization of lead.

Solid solutions - compound formation with congruent melting point (Mg-Zn) and incongruent melting point ($FeCl_3$-H_2O) System. Freezing mixtures, acetone-dry ice.

Liquid-Liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law. Non ideal systems, azeotropes - HCl-H_2O and ethanol-water systems. Partially miscible liquids, phenol-water, lower and upper consolute temperature, effect of impurity on consolute temperature. Nernst distribution law, thermodynamic derivation, applications.

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UNIT-IV

Electrochemistry – I

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution.

Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes. Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf 's method and moving boundary method.

Applications of conductivity measurements:

Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

UNIT-V

Electrochemistry –II

Types of reversible electrodes : Gas–metal- ion, metal-metal ion, metal-insoluble salt anion and redox electrodes, electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements, Computation of cells EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells. Valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pK_a, determination of pH using hydrogen quinhydrone and glass electrodes, by potentiometric methods.

Suggested Books:

1. Principles of Physical Chemistry, B. R. Puri, Sharma and M. S. Pathania.
2. A Text Book of Physical Chemistry, A. S. Negi and S. C. Anand.
3. A Text Book of Physical Chemistry, Kundu and Jain.
4. The elements of Physical Chemistry, P. W. Atkins, Oxford.
5. University General Chemistry, C. N. R. Rao, Mac Millan.

CH- 204 Chemistry Practical (Pass course), Laboratory Course-II

(4 hrs or 6 periods / week)

Inorganic Chemistry

(i) Preparation of Standard Solutions

Dilution 0.1 M to 0.001 M solutions

(ii) Volumetric Analysis

(a) Determination of acetic acid in commercial vinegar using NaOH

(b) Determination of alkali content in antacid tablet using HCl

(c) Estimation of calcium content in milk as calcium oxalate by permanganometry

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(d) Estimation of hardness of water by EDTA
(e) Estimation of ferrous and ferric by dichromate method
(f) Estimation of copper using thiosulphate

(iii) Gravimetric Analysis
(a) Cu as CuSCN
(b) Ni as Ni-dimethylglyoxime)

Organic Chemistry

(i) Laboratory Techniques

A. Thin Layer Chromatography

Determination of R_f values and identification of organic compounds.

(a) Separation of green leaf pigments (spinach leaves may be used).

(b) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexan-2-one and hexan-3-one using toluene and light petroleum (40-60) solvent system.

(c) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5 : 1.5)

B. Paper Chromatography: Ascending and Circular

Determination of R_f values and identification of organic compounds.

(a) Separation of mixture of phenylalanine and glycine, Alanine and aspartic acid, leucine and glutamic acid. Spray reagent – ninhydrin.

(b) Separation of a mixture of DL – alanine, glycine and L -Leucine using n-butanol: acetic acid: water (4:1:5). Spray reagent-ninhydrin.

(c) Separation of monosaccharides a mixture of D- galactose and D-Fructose Using n- butanol : acetone : water (4:5:1) Spray reagent -aniline hydrogen phthalate.

(ii) Qualitative Analysis

Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivatives.

Physical Chemistry

(i) Transition Temperature

a) Determination of the transition temperature of the given substance by thermometric dialometric method (e.g. $MnCl_2.4H_2O$ / $SrBr_2.2H_2O$).

(ii) Thermochemistry

a) To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process.

b) To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid / weak base.

c) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born-Haber cycle.

(iii)Phase Equilibrium

a) To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system.

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a) To construct the phase diagram of two components (e.g. diphenylamine-benzophenone) system by cooling curve method.

(iv) Distribution law

a) To study the distribution of iodine between water and CCl_4.

b) To study the distribution of benzoic acid between benzene and water.

(Instructions to the Examiner)
B.Sc. Part II
CH- 204 Chemistry Practical (Pass course)

Max. Marks: 50 Duration of Exam:5 hrs. Minimum Pass Marks:18

Inorganic Chemistry

Ex. 1 Volumetric Analysis
or
Gravimetric Analysis as mentioned in the syllabus 16

Organic Chemistry

Ex. 2 Identification of two organic compounds (one solid and one liquid) through the functional group analysis, determination of melting point, boiling point and preparation of suitable derivatives
or
Perform one experiment out of the experiments on thin layer and paper chromatography given in syllabus 12

Physical Chemistry

Ex. 3 Perform one of the physical chemistry experiments as mentioned in the syllabus. 12

Ex. 4 Viva-voce 5
Ex. 5 Record 5
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Books Suggested (Theory Course)

1. Basic Inorganic Chemistry F.A. Cotton, G. Wilkinson and P.L. Caus, Wiley
2. Concise Inorganic Chemistry, J.D. Lee, ELBS
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. McDaniel and J. Alexander, John Wiley
4. Inorganic Chemistry, D.F. Shriver, P.W. Atkins and C. H. Langford, Oxford
5. Inorganic Chemistry, W.W. Porterfield, Addison Wesley
6. Inorganic Chemistry, A.G. Sharpe, ELBS
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall
8. Organic Chemistry, Morrison and Boyd, Prentice Hall
9. Organic Chemistry, L.G. Wade Jr, Prentice Hall
10. Fundamentals of Organic Chemistry, Solomons, John Wiley

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11. Organic Chemistry Vol. I, II, III S.M. Mukherji, S.P. Singh and R.P. Kapoor. Wiley Eastern Ltd. (New Age International)
12. Organic Chemistry, F.A. Carey, McGraw Hill Inc.
13. Introduction to Organic Chemistry, Streitwieser Heathcock and Kosover, Macmillan
14. Physical Chemistry, G.M. Barrow, International Student Edition, McGraw Hill.
15. Basic Programming with Application, V.K. Jain, Tata McGraw Hill.
16. Computers and Common Sense, R. Hunt and Shelly, Prentice Hall.
17. University General Chemistry, C.N.R. Rao, Macmillan.
18. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
19. The Elements of Physical Chemistry, P.W. Atkins, Oxford.
20. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern Ltd.

Books Suggested (Laboratory Courses)

1. Vogel's Qualitative inorganic Analysis, revised, Svehla, Orient Longman.
2. Vogel's Textbook of Quantitative Inorganic Analysis (revised), J. Bassett, R.C. Deney, G.H. Jeffery and J. Mendham, ELBS.
3. Standard Methods of Chemical Analysis, W.W. Scott, The Technical Press.
4. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
5. Handbook of preparative Inorganic Chemistry, Vol I & II, Braver, Academic Press.
6. Inorganic Synthesis, McGraw Hill.
7. Experimental Organic Vol I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill
8. Laboratory manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
9. Voge's Textbook of Practical Organic Chemistry, RS. Furniss, Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
10. Experiments in General Chemistry, C.N.R. Rao and U.C. Agarwal, East-West Press.
11. Experiments in Physical Chemistry, R.C.Das and B. Behra, Tata McGraw Hill
12. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
13. Advanced Experimental Chemistry, Vol. 1-Physical, J.N. Gurtu and R. Kapoor, S. Chand & Co.
14. Selected Experiments in Physical Chemistry, N.G. Mukerjee, J.N. Ghjose& Sons.
15. Experiments in Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

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Syllabus B. Sc. Part II (Pass Course)

Zoology

(2022-2023)

Scheme:
Max. Marks: 100 Min. Marks: 36

Paper I	**: 3 Hrs duration**	**33 Marks**
Paper II	**: 3 Hrs duration**	**33 Marks**
Paper III	**: 3 Hrs duration**	**34 Marks**
Practical	**: 4 Hrs duration**	**50 Marks**

NOTE:

1. There will be two parts of every theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.,* three from each unit /section out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

PAPER – I: Z-201
STRUCTURE AND FUNCTION OF INVERTEBRATE TYPES

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

Section – A

Habit, Habitat,Morphology,Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle,*Affinities and *Adaptations.

Note :* indicates whenever required.

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Arthropoda:Palaemon (Indian Fresh water Prawn), Scorpion, Periplaneta, Grasshopper, Apis.

Onychophora :Peripatus.

Section – B

Habit, Habitat, Morphology, Structure, Organs and Systems (Locomotion, Digestive, Circulatory, Respiratory, Excretory, Nervous &Reproductive), Life Cycle,*Affinities and *Adaptations.

Note :* indicates whenever required.

Mollusca: Pila, Unio, Sepia
Echinodermata: Asterias, Echinus, Cucumaria.
Hemichordata: Balanglossus and its phylogenetic significance

Section - C

Invertebrate Adaptations

1. Salient features of Hemichordata.
2. Evolution of canal system of sponges.
3. Parasitic adaptations in Helminthes.
4. Social organization in termites and honey bees.
5. Direct and indirect development in insects.
6. Water vascular system of starfish.
7. Crustacean larvae & mouth parts of insects.
8. Parasitism in Crustacea.

PAPER – II: Z-202
ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

Section - A

Animal Physiology with special reference to mammals

1. Physiology of digestion: Various types of digestive enzymes and their digestive action in the alimentary canal.
2. Physiology of blood circulation: Composition and functions of blood; mechanism of blood clotting; heart beat; cardiac cycle; blood pressure; body temperature regulation.
3. Physiology of respiration: Mechanism of breathing; exchange of gases: transportation of oxygen and carbon dioxide in blood; regulation of respiration.

4. Physiology of excretion: Kinds of nitrogenous excretory end products (ammonotelic, uricotelic and ureotelic); role of liver in the formation of these end products. Functional architecture of mammalian kidney tubule and formation of urine; hormonal regulation of water and electrolyte balance (Homeostasis).

Section-B

Regulatory aspects of Animal Physiology

1. Physiology of nerve impulse and reflex action: Functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission, reflex arc.
2. Physiology of muscle contraction: Functional architecture of skeletal muscles; chemical and biophysical events during contraction and relaxation of muscle fibers.
3. Types of endocrine glands, their secretions and functions: Pituitary, adrenal, thyroid, pancreas, testis and ovary.
4. Physiology of Reproduction: Hormonal control of male and female reproduction, implantation, parturition and lactation in mammals.
5. Preliminary idea of neurosecretion, hypothalamic control of pituitary function.

Section-C

Biochemistry

1. Carbohydrates: Structure, function and significance; oxidation of glucose through glycolysis, Kreb's cycle and oxidative phosphorylation; interconversion of glycogen and glucose in liver; role of insulin and glucagon.
2. Proteins : Structure, function and significance, essential and non-essential amino acids, transformation of amino acids: deamination, transmination, decarboxylation. Synthesis of protein and urea, fate of ammonia (Ornithine cycle), fate of carbon skeleton.
3. Lipids: Structure, function and significance; Beta-oxidative pathway of fatty acids; brief account of biosynthesis of triglycerides. Cholesterol and its metabolism.

Paper – III: Z-203
Immunology, Microbiology & Biotechnology

NOTE:

1. There will be two parts of this theory question paper with a total duration of 3 hours. First part of question paper will comprise of question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section, out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

Section - A

Immunology

1. Immunology: Definition, types of immunity: innate and acquired; humoral and cell mediated, Organs of immune system.
2. Antigen and antibody: Antigenicity of molecules, haptens, antibody types.

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3. Antigen-Antibody reactions: Precipitation reaction, agglutination reaction, neutralizing reaction, complement and lytic reactions and phagocytosis.
4. Immunity Regulating Cells: Macrophages, lymphocytes (B and T-Types) T-helper cells, T-Killer cells, plasma cells and memory cells.
5. Mechanism of humoral or antibody mediated immunity and cell mediated immunity.

Section - B

Microbiology

1. Brief introduction to the History of Microbiology: Work of Anatony Van Leeuwenhoek, theory of spontaneous generation, germ theory of fermentation and disease: Works of Louis Pasteur, John Tyndall, Robert Koch and Edward Jenner.
2. The Prokaryota (Bacteria) : Structural organization:
   (i) Size, shapes and patterns of arrangement.
   (ii) Structural organization: Slime layer (capsule), cell envelopes: cytoplasmic membrane (inner membrane). Cell wall (outer membrane) of Gram- negative and Gram-positive bacteria; mesosmes; cytoplasmic organization; cell projections: flagella and cilia.
3. Genetic material of Bacteria: Chromosome, replication of bacterial DNA.
4. Reproduction in Bacteria: Asexual reproduction, binary fission, budding, endospore formation, exospores and cyst formation; sexual reproduction, conjugation.
5. Microbial Nutrition : Culture of bacteria
   a. Carbon and energy source
   b. Nitrogen and minerals
   c. Organic growth factors
   d. Environmental factors : Temperature and pH
6. Bacteria of Medical Importance:
   (i) Gram-Positive
      a. Cocci: *Staphylococci, Streptococci*
      b. Bacilli: *Diptheria, Tetanus.*
   (ii) Gram-Negative
      a. Cocci: *Gonnorhea, Meningitis*
      b. Bacilli: Diarrhoea
   (iii) Mycobacteria: Tuberculosis, Leprosy

Section - C

Biotechnology

1. Definition, history, scope and application of biotechnology, major areas of biotechnology (microbial, plant and animal biotechnology).
2. Vectors for gene transfer.
3. Basic concepts of animal cell, tissue, organ and embryo culture.
4. Genetic engineering (outline idea only): Applications of genetic engineering, hazards and regulations.
5. Protoplast fusion in prokaryotes and eukaryotes.
6. Recombinant DNA technology; hybridomas and their applications, PCR. DNA finger printing, DNA foot printing. RFLP, RAPD & AFLP, Human genome project.
7. Monoclonal antibodies and their applications.
8. Brief account of cloning: its advantages and disadvantages.
9. Biotechnology in medicine (outline idea only), antibiotics, vaccines, enzymes, vitamins, artificial blood.

10. Environmental Biotechnology (outline idea only): Metal and petroleum recovery, pest control, waste water treatment.
11. Food, drink and dairy biotechnology (outline idea only): Fermented food production; dairy products, wine, beer, vinegar and food preservation.

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Syllabus: B.Sc. Part – II (2022-2023)

Practical - Zoology

Min. Marks: 18 **4 Hrs. / Week** **Max. Marks: 50**

I. Study of Museum Specimens:

Onychophora	:	*Peripatus*
Arthropoda	:	*Limulus*, Spider, Scorpion, Centipede, Millipede, *Lepas,Balanus*, *Squilla,Eupagurus*, Crab, *Mantis*, Honey-bee, (queen, king, worker) Locust, Silkworm Moth, Beetle, White grub.
Mollusca	:	*Chiton, Aplysia, Cypraea, Mytilus*, Pearl*Oyster, Dentalium, Loligo, Nautilus.*
Echinodermata	:	*Pentaceros, Echinus, Ophiothrix, Cucumaria,Antendon.*
Hemichordata	:	*Balanoglossus.*

II. Study of Microscopic Slides:

Arthropoda	:	V.S. of integument (cuticle): *Pediculus,* Bedbug, Termite and its castes, *Cyclops, Daphnia,* crustacean larvae (Nauplius, Metanauplius, Zoea, Mysis, Megalopa, Phyllosoma), statocyst of prawn.
Mollusca	:	V.S. of shell, T.S. gill of *Pila,* T.S of gill of Unio, Glochidium larva.
Echinodermata	:	Larval forms

III. Anatomy:

Prawn/Squilla	:	External features, appendages, alimentary canal and nervous system; Hastate Plate

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Pila : External features,pallial organs and nervous system; osphradium, radula.

IV. Study of the Following Through Permanent Slide Preparation:

(i) Study of different cell types -Blood smear (Wrights or Leishman stain).
(ii) Ospharadium, gill lamella and radula of pila.
(iii) Statocyst and Hastate plate of Prawn/Squilla

V. Microbiology Immunology and Biotechnology:

1. Preparation and use of culture media for microbes.
2. Study of microbes in food materials like curd,etc (Gram +ve& Gram-ve bacteria, Aspergillus, Mucor, Rhizopus, Penicillium, Alternaria and Fusarium).
3. Educational tour to any Microbiology laboratory/ Dairy/ Food processing factory/ Distillery. Collection of material may also be encouraged wherever possible. Candidates are required to submit a detailed report of the visit.
4. Antigen-antibody reactions-precipitation, agglutination.

VI. Animal Physiology:

1. Counting of red and white blood cells in the given blood sample.
2. Estimation of hemoglobin in the given blood sample.
3. Estimation of haematocrit value (PCV) in the given blood sample.
4. Demonstration of enzyme activity (catalase) in liver.
5. Study of salivary digestion of starch and the effect of heat and alcohol on salivary digestion of starch.
6. Study of histological structure of major endocrine glands of mammals.

VII. Biochemistry:

1. Detection of protein, carbohydrate and lipid in the animal tissue/food samples.
2. Identification of different kinds of mono-, di- and poly-saccharides in the given food samples.
3. Circular Paper chromatography of dyes/amino acids.

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B.Sc. Part - II

Scheme of Practical Examination Distribution of Marks

Time: 4 Hrs. **Min. Pass Marks. : 18** **Max. Marks: 50**

		Regular	Ex. /N.C. Students
1.	Anatomy (any system)	6	5
2.	Permanent Preparation	4	6
3.	Exercise in Microbiology/immunology/Biotechnology	4	6
4.	Exercise in Animal Physiology	5	6
5.	Exercise in Biochemistry	5	6
6.	Identification and comments on Spots (1 to 8)	16	16
7.	Viva Voce	5	5
8.	Class Record	5	-
		50	**50**

Notes:

1. Anatomy: Study of systems of the prescribed types with the help of dissection.
2. With reference tomicroscopic slides, in case of non-availability, the exercise should be **substituted with diagrams/ photographs.**
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
5. **It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.**

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Recommended Books:

1. Barnes R. D: Invertebrate Zoology, W. B. Saunders, 1969.
2. Barrington EJW: Invertebrate Structure and Function. 2nd edition John Wiley & Sons, Inc., 1978.
3. Barrington EJW: The Biology of Hemichordata and Protochordata. Oliver & Boyd, London 1965.
4. Barrett KE, Barman SM, Boctano, S and Brooks HL. Ganongs: Review of Medical Physiology. 24th edition McGraw Hill Education India Pvt. Ltd., 2012.
5. Berril NJ: The Tunicates. The Roy Society, London.
6. Brusca RG and Brusca GJ: Invertebrates. 2nd edition Sinauer/Panima Books, 2003.
7. Cooper GM and Hausman RE: The Cell: A Molecular Approach. 6th edition ASM Press Washington, DC/ Sinauer/Panima Books, 2013.
8. Conn EE, Stumpf PK, Bruening G, Doi, RH: Outline of Biochemistry. 5th edition. John Wiley & Sons, 1987.
9. De Robertis EDP and De RobertisJr EMF: Cell and Molecular Biology. 8th edition Lippincot Williams & Wilkins, 2006.
10. David R, Burggren Wand French K: Eckert Animal Physiology. 5th edition W H Freeman & Company, New York, 2001.
11. Eckert R, Randall D. J. Burggen W, French K: Eckert Animal Physiology and Burggren WW & Co. Ltd., 1997.
12. Fox SI: Human Physiology. 8th edition McGraw Hill Education 2003.
13. Gardner EL, Simmons MJ and Snustad DP: Principles of Genetics 8th edition John Wiley & Sons, Inc., 2006.
14. Giese A. C: Cell Physiology. 4th Edition, Saunders, 1973.
15. Glick BR., Paeternak JJ: Molecular Biotechnology, 4th edition ASM Press, 2010.
16. Goldsby RA, Kindt TJ and Osborne BA: Kuby Immunology. WH Freeman and Co., New York, 2002.
17. Grant: Biology of Developmental System
18. Gupta PK. Genetics: Classical to Modern. Rastogi Publications,2007.
19. Hall JE: Guyton and Hall Textbook of Medical Physiology. 12th edition Saunders Publications, 2010.
20. Hill RW, Wyse GA, Anderson M: Animal Physiology. 3rd edition Sinauer Associates Inc.USA, 2012.
21. Hyman LH: The Invertebrates, Vol. 6, McGraw Hill.
22. Jordan EL and Verma PS: Invertebrate Zoology.S. Chand & Company Ltd., 2012.
23. Karp G: Cell & Molecular Biology: Concepts and Experiments.7th editionJohn Wiley & Sons, Inc., 2013.
24. Kotpal RL: Modern Text Book of Zoology:Invertebrates.Rastogi Publications, 2012.
25. Lal SS: Practical Zoology Invertebrate.11th revised editionRastogi Publications, 2014.
26. Lehninger AL: Biochemistry. 2nd edition Kalyani Publishers, 1991.
27. Lal SS: Practical Zoology Invertebrate. 11th revised edition, Rastogi Publications, 2014.
28. Lehninger AL: Biochemistry. Kalyani Publisher, 2008.
29. Lodish H, Berk A, Kaiser CA, Krieger M, Bertscher A, Ploegh H, Amon A, Scott M P. Molecular Cell Biology. 7th edition. Mac Millian High Education (International edition) England, 2013.
30. Meyers R. A: Molecular Biology and Biotechnology (A comprehensive Desk References John Wiley & Sons, 1995.
31. Murphy K: Janeway's Immunology. Garland Science; 8th edition, 2011.

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32. Nelson DL and Cox MM: .Lehninger Principles of Biochemistry. 5th edition W. H. Freeman, 2008.
33. Nelson DL and Cox MM: Lehninger Principles of Biochemistry. 6th edition W. H. Freeman, 2013.
34. Owen J, Punt J, Stranford S: Kuby Immunology. 7th edition WH Freeman & Co. Ltd., 2013.
35. Old RW and Primrose SB: Principles of Gene Manipulation: An Introduction to Genetic Engineering. University of California, 1980.
36. Sastry KV: Animal Physiology and Biochemistry. 2nd edition Rastogi Publications, 2014-15.
37. Vander AJ, Sheerman J, Liciano D: Human Physiology: The Mechanics of Body Function. McGraw Hill Co., New York, 1998.
38. Verma PS and Jordan EL: Invertebrate Zoology. S Chand &Co. Ltd, New Delhi, 2001.
39. Verma PS, Tyagi BS, Agarwal VK: Animal Physiology. 6th edition S. Chand& Co., 2004.
40. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & Sons, Inc., 2011.
41. Voet D and Voet JG: Biochemistry. John Wiley & Sons, New York, 1990.
42. Verma PS: A Manual of Practical Zoology: Invertebrates. S.Chand &Co. Ltd.New Delhi, 1971.
43. Voet D and Voet JG: Biochemistry. 4th edition, John Wiley & SonsInc., 2011.
44. Wake MH: Hyman's Comparative Vertebrate Anatomy. 3rdedition University of Chicago Press Ltd., London, 1992.

BOTANY
B.Sc. Part II (Pass Course Syllabus)

Scheme

Min. Pass Marks: 36		**Max Marks: 100**
Paper I	3 hrs. duration	**Max. Marks 33**
Paper II	3 hrs. duration	**Max. Marks 33**
Paper III	3 hrs. duration	**Max. Marks34**
Practical Min.Marks: 18	4 hrs, duration	**Max. Marks 50**

Duration of examination of each theory paper- **3 hours**
Duration of examination of practicals- **4 hours**

Note:

1. There will be 5 questions in each paper. Allquestions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. 1 will have 18 very short answer type Questions(not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one questionfrom each unit.These Q.No. 2 to 5 will have internal choice.

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PAPER-I
Molecular Biology and Biotechnology
(2 hrs /week)

Unit-1

Genetic Material: Biological, chemical and physical nature of heredity material,Structure of DNA and RNAs (mRNA, tRNA and rRNA). Watson and Crick model of DNA,Nucleosome model.

DNA replication: Meselson – Stahl experiment of semiconservative replication of DNA; RNA Primers, Okazaki-fragments, polymerases; DNA-Protein interactions.

Preliminary account of DNA damage and repair.

Unit-2

Central dogma of life, **Transcription** in eukaryotes: role of promoter, gene, pre mRNA synthesis, pre mRNA processing: capping, splicing and polyadenylation.

Translation : genetic code (codon),Initiation, elongation and termination.

Regulation of gene expression in prokaryotes and eukaryotes: Negative and positive control, attenuation and antitermination, Reverse transcriptase and its application.

Unit-3

Biotechnology: Functional definition. Basic aspects of Plant tissue culture, basal medium, media preparation and aseptic culture technique. Concept of cellular totipotency; Callusing; Differentiation and morphogenesis; Micropropagation; Tissue culture and its applications. Basic concept of Protoplast culture, Anther culture, Embryo culture and their applications.

Unit-4

Recombinant DNA technology : Tools and techniques used in rDNA technology - Restriction enzymes. Vectors for gene transfer: Bacteriophage, plasmids, cosmids and Artificial chromosome, cDNA technology, gene amplification,Polymerase chain reaction, Application of PCR technique, DNA fingerprinting and its uses. Application of Biotechnology and Transgenic plants.

Practical Exercises:

1. *Elementary knowledge of principles and uses of various instruments in molecular biology and biotechnology -Laminarair flow, Centrifuge, Autoclave, Incubator, Spectrophotometer, pH meter, Gel electrophoresis unit.*
2. *Media preparation*
3. *Aseptic culture technique*
4. *Explant culture-shoot tip, nodal segment*
5. *DNA isolation from plant parts.*
6. *Gel electrophoresis technique.*

Suggested Books :

1. *Gupta PK. (2012). Cell and Molecular Biology.* Rastogi Publicatios, Meerut.
2. *Gamborg OL. andPhilips GC. (1995). Plant Cell, Tissue and Organ cultue.*
3. Dnyansagar, VR. (1986). Cytology and Genetics, Tata McGraw-Hill Pub. Co. Ltd. New Delhi.
4. Verma, PS. and Agarwal, VK. (2012). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Co. Ltd. New Delhi.
5. Alberts, B., Bray, DJ, Raff, M., Roberts, K. and Wasson, LD. (2001). Molecular Biology of Cell, Garland Publishing Co., Inc., New York.
6. Micklos, DA. Freyer, GA. and Crotty, DA. (2003). DNA Science a first course (Second Ed.). Cold Spring Harbor Laboratory Press, NY., USA.
7. Razdan, MK. (1993). An Introduction to Plant Tissue Culture. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
8. Mascarenhas, AF. (1988). Handbook of Plant tissue culture. Publication & Information Div., ICAR, New Delhi.
9. Purohit, SS. and Mathur, SK. (1996). Biotechnology fundamentals and applications. Agro Botanical Publishers, Bikaner.
10. Rana, SVS. (2012). Biotechniques theory & practice (Third Ed.). Rastogi Publicatios, Meerut.

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Paper-II

PLANT PHYSIOLOGY AND BIOCHEMISTRY

(2 hrs /week)

Unit-1

Water: Structure, physico-chemical properties, importance to plant life, concept of water potential. Absorption and Transport of water; Ascent of sap, Transpiration, Guttation, stomatal movement, factors affecting transpiration. Guttation.

Mineral Nutrition: Essential micro and macro nutrients; their uptake, hydroponics-and nutrient requirement deficiency and toxicity symptoms.

Transport of organic substances: Mechanisms of phloem transport, factors regulating the translocations of nutrients.

Unit-2

Photosynthesis: Pigments, Photosynthetic apparatus, light reaction, photo system I & II, Z scheme, photophosphorylation, C_3(Calvin cycle), C_4 cycle, and factors affecting the photosynthesis.

Respiration: - Aerobic and anaerobic respiration; RQ (Respiratory Quotient),Kreb's cycle, electron transport system, oxidative phosphorylation,and factors affecting the process.Fermentation.

Unit-3

Carbohydrates: Introduction, importance, nomenclature, classification, molecular structure & function of mono, di and polysaccharides, their properties, glycosidic linkages and glycoprotein.

Proteins: Amino acids-structure, electrochemical properties, peptide bonds, chemical bonds and nomenclare, structure and classification of proteins, physical and chemical properties.

Enzymes: Structure, nomenclature & classification of enzyme.Characteristics of enzymes, mechanism of action, multi-enzyme system, regulation of enzyme activity.

Lipids: Importance of fatty acids (saturated and unsaturated). Alpha and Beta oxidation.

Brief introduction and application of secondary metabolites.

Unit-4

Phases of growth and development: Seed dormancy and germination, plant movement, Biological clock-their regulatory factors.

Photoperiodism & vernalisation; physiology and mechanism of action, concept of florigen and phytochrome.

Plant hormones: auxins, gibberellins, cytokinins, ethylene andABA;discovery& physiological effects.

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Suggested Readings:

1. Verma, S.K.: Textbook of plant physiology. S. Chand & Company, 1999.
2. Parashar, A. N. and Bhatia, K. N.: Plant physiology. Trueman Book Company, 1985.
3. Jain, V. K.: Fundamentals of plant physiology. S. Chand & Company Ltd., 2013.
4. Verma, S. K. and Verma, M.: A textbook of plant physiology, biochemistry and biotechnology. S. Chand Ltd., 2000.
5. Verma, V.: Textbook of plant physiology. ANE Books India, 2007.
6. Malik, C. P. and Srivastava, A. K.: Textbook of plant physiology. Kalyani publication, 1982.

Practical Exercises:

1. To determine the osmotic potential of vacuolar sap by plasmolytic method.
2. To study the permeability of plasma membrane using different concentrations of organic solvents.
3. To study the effect of temperature of permeability of plasma membrane.
4. To separate chloroplast pigments by solvent method.
5. To separate chloroplast pigments using paper chromatography.
6. To separate amino acids in a mixture by paper chromatography.
7. To prepare the standard curve of protein.
8. To demonstrate the tests for proteins in the unknown samples.
9. To demonstrate the enzyme activity - Catalase, peroxidase and amylase.
10. To demonstrate the tests for different types of carbohydrates and lipids.
11. Bioassay of growth hormone (auxin, cytokinin, gibberellin)
12. Demonstration of phenomenon of osmosis by use of potato osmometer
13. To demonstrate root pressure
14. To demonstrate rate of transpiration by use of potometers.
15. Photosynthesis by inverted funnel method, Moll's experiment
16. To demonstrate anaerobic and aerobic respiration
17. R.Q. by Ganong's respirometer
18. Measurement of growth using auxanometer.

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Paper III
Pteridophytes, Gymnosperms & Palaeobotany
(2 hrs./week)

Unit-1

General characters of Pteridophytes, Classification (G.M. Smith).Distribution and alternation of generation. Stelar system in Pteridophytes. Eusporangiate and leptosporangiate development of Sporangia, Apogamy, and Apospory. Economic importance of Pteridophytes.

Unit-2

Morphology, anatomy and reproduction of *Psilotum, Selaginella, Equisetum* and *Marsilea.*

Characteristics of Gymnosperms, distribution and classification (K.R.Sporne).

Unit-3

Morphology, anatomy, reproduction and life cycle of *Cycas, Pinus* and *Ephedra.* Economic importance of Gymnosperms.

Unit-4

Process of fossilization, types of fossils, techniques of study of fossils. Geological time scale. Primitive land plant: *Rhynia*, Fossil Pteridophytes: reconstructed plants-Lepidodendron and Calamites. Fossil Gymnosperm- *Williamsonia.*

Suggested Laboratory Exercises:

1. Study of external morphology, anatomy of vegetative and reproductive parts of *Psilotum, Selaginella, Equisetum* and *Marsilea.*
2. Study of external morphology, anatomy of vegetative and reproductive parts of *Cycas, Pinus* and *Ephedra.*
3. Study of fossils and slides of fossils.
4. Preparation of charts of Geological time scale

Suggested Readings

Bold, H.C., Alexopolous, C.J. and Delevoryas, T. 1987 Morphology of Plant and Fungi (5th). Harper and Foul Co., New York.

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Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants. W.H. Freeman and Company, New York.

Sharma, O.P. Pteridophytes. 2000. Today and Tomorrow Publications.

Sarabhai, R.C. and Saxena, R.C.1990. A text book of Botany. Rastogi Publications, Meerut.

Sporne, K.R. 2002.The Morphology of Gymnosperms. B.I. Pub. Pvt. Ltd., Mumbai, Kolkata, Delhi.

Vashishta, P.C. 2002. Pteridophytes. S. Chand & Co.New Delhi.

Wilson, N.S. and Rothewall, G.W. 1993. Palaeobotany and Evolution of Plants. (2nd Ed.). Cambridge University Press, U.K.

Singh, V. Pandey, P.C. & Jain, D.K.2013. A Text book of Botany (IV Ed). Rastogi Publications, Meerut.

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BOTANY PRACTICAL EXAMINATION B.Sc PART-II

SKELETON PAPER

M.M. 50 **TIME: 4 Hours**

S.No.	Practical	Regular	ExNC
1(a)	Comment on the Tissue culture or Biotechnology technique	5	5
1(b)	Exercise based on molecular biology	5	5
2	Perform the given physiological experiment and write the principle, procedure, results based on observations and precautions involved.	7	7
3	Perform the bio-chemical test of the given sample and discuss the observation giving reasons.	3	3
4	Make a suitable preparation of material "A" (Pteridophyte)(vegetative/reproductive part). Draw a labelled sketch. Identify giving reasons.	5	5
5	Make a suitable preparation of material "B"(Gymnosperm)(vegetative/reproductive part).Draw a labelled sketch.Identify giving reasons.	5	5
6	Comment upon spots (1-5)	10	15
7	Viva-Voce	5	5
8	Practical record	5	-
	TOTAL	50	50

5. GEOLOGY

Scheme

Min. Pass Marks : 36

Paper-I	3 hs. duration	Max. Marks : 100
Paper-II	3 hs. duration	Max. Marks : 50
Practical one	3 hrs. duration	Max. Marks. : 50
		Max. Marks : 50
		Min. Pass Parks : 18

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Note : The paper will contain nine questions having three question in each section. Candidates are required to attempt five question in all taking atleast one question from each section.

Paper-I : Palaeontology and Structural Geology

Section-A

Definition, Scope, sub-division, and relationship of palaeontology with other branches.

Fossils-condition necessary for preservation, modes of preservation, uses. Elementary ideas about origin of life, evolution and fossil records.

Skeletal morphology and geological distribution of following groups :—

Foramanifers, Brachiopods. Mollusca (Lamelibranches, Gastropods and Cephalopods-Nautiloids, Ammnoids, Dibranchia), Trilobites. Echinoids, Graptoloids and Corals.

Section-B

Gondwana Flora-morphological characters of the flora : Vertebraria, Glossopteris, Gangamopteris, Ptilophyllum.

Unconformity-its kinds, recognition in the field and geological significance. Overlap and Offlap.

Inliers and Outliners. Basic Concept of cleavages. Lineation, Joints, Salt Domes.

Section-C

Attitude of planes (Bledding Planes) and lines. Dip (true and apparent, Strike, Pitch and Plunge. Uses of Clinometer/Bed : apparent and vertical thickness. Criteria to determine top and bottom sequence, Morphology of folds and faults, their geometric and genetic classification and recognition in the field. Elementary ideas of the mechanics of folding and faulting.

Practical

Palaeontology : Identification, description and drawing of different views of the following fossils :

Nummulites, Calymene, Paradoxide, Trinucleus, Phacops, Olenus, Olenellus, Terebratuala, Products, Spirifer, Rhynchonella, Atrypa, athyris, Lingula, Strophomena, Arca, Pecten, trigonia, Cardium, Hippurite, Venus, Lima, Inoceramus, Lopha, Gryphaea, Exogyra, Spondlylus, Trochus, Conus, Natica, Turritella, Physa, Murex, Cyprea, Bellerophone, Naulilus, Ganlatites, Ceratites,

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Perisphinctes, Belemnite, Cidaris, Hemiaster, Glossopteris, Gangamopteris, Vertebraria, Ptillophylum.

Structural Geology : Study of physiographic features in topographical maps and use of clinometer compass, drawing profiles and geological section along given direction.

Simple dip and strike problems connected with true and apparent dips, true and vertical thickness and width of the outcrop by calculation and geometrical methods.

Completion of outcrops : Determination of thickness of beds, identification of structural features in hand specimen, drawing of profiles and section showing the following features : Simple beds, folds, faults, unconformities, overlaps, offlaps and intrusion.

Books recommended.

- Woods, H. : Palaeontology invertebrate.
- Lehmann, U., Hillmer, g. 1983; Fossil Invertebrates. Gambridge University Press.
- Nield, E.W. and Tucer V.C.T., 1985; Palaeontology-An Introduction, Pergamon Press.

Paper-II : Petrology

Note : The paper will contain nine question in each section. Candidates are required to attempt five questions in all selecting at least one question from each section.

Section-A

Nature and composition of magmas, plutonic, hypabysal and volcanic rocks, intrusive and extrusive forms, structure and texture. Elements of classification of igneous rocks.

Crystallization of basaltic magma, Bowen's Reaction Principle, differentiation and assimilation.

Crystallisation of unicomponent and bicomponent silicate melts. Diposide-Albite-Anorthite basalt system and variation of igneous rocks. Study of common igneous rocks-Granite, rhyolite, gabbro, basalt, Pegmatite, dolerite, syenite, diorite and peridotite.

Section-B

Process of formation of sedimentary rocks-Weathering, decomposition, disintegration, transportation and deposition. Concept of lithification and diagenesis.

Sedimentary rocks-Structure, texture, residual, mechanically transported, chemical and organic deposits. Elementary idea of sedimentary environments and provenance.

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Study of common sedimentary rocks-sandstone, limestone, shale, conglomerate and greywacke.

Section-C

Metamorphism : agents and types, Concept of grade and facies of metamorphism, Texture, structure and classification of metamorphic rocks.

Types of metamorphism and their products, Cataclastic, thermal and regional metamorphism. Dynamothermal metamorphism of argillaceous and calcareous rocks.

Retrograde metamorphism and metasomatism; anatexis. Study of important metamorphic rock; slate, schist, gneiss, granulite, marble.

Practical

Petrology : Neat drawing of different forms assumed by intrusive igneous rocks. Study and recording of the typical textures of plutonic, hypabyassal and volcanic rocks.

Megascopic study of the following igneous rocks : Granite, pegmatite, aplite, syenite, nepeline syenite, diorite, gabbro, norite, dunite, peridotite, basalts, obsidian, lamprophyre, phonolite and trachyte.

Microscopic study of the following rocks; Granite, syenite, diorite, gabbro, dunite, pyroxenite, dolerite, rhyolite and basalt.

Sedimentary and Metamorphic rocks : Study of typical textures of sedimentary and metamorphic rocks. Systematic megascopic and microscopic study of the following rocks types : Conglomerate, breccia, sandstone, arkose, greywacks, shale, limestone, slate, phyllite, schist, gneiss, marble, quartzite, migmatite and charnockite.

Book Recommended

1. Tyrrel., G.W. : The principles of Petrology, Metheum & Co. London.
2. Harker, A. : Petrology, McGraw Hill Book Co. Inc. New York.
3. William, Turner & Gilbert, Petrography CBS Publisher, Delhi.
4. Jackson, J. Text Book of Lithology.
5. Hatch & Wales, Petrology.
6. Smith, H.G. : Minerals & Microscope.
7. Kerr : Optical Mineralogy, CBS Publisher, Delhi.

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6. MATHEMATICS

B.Sc. Part-II 2020

Teaching : 3 Hours per Week per Theory Paper.
2 Hours per Week per Batch for Practical

Examination Scheme:

	Min.Pass Marks		Max. Marks
	Science – 54		150
	Arts – 72		200
		Duration	Max. Marks
Paper – I	Real Analysis	3 hrs.	40 (Science) 53 (Arts)
Paper – II	Differential Equations	3 hrs.	40 (Science) 53 (Arts)
Paper – III	Numerical Analysis	3 hrs.	40 (Science) 54 (Arts)
Practical		2 hrs.	30 (Science) 40 (Arts)

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than **100 (Hundred)** Candidates.
4. Each candidate has to pass in Theory and Practical examinations separately.

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Paper – I: Real Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Real numbers as complete ordered field, Limit point, Bolzano-Weierstrass theorem, closed and Open sets. Concept of compactness and connectedness. Heine-Borel theorem. Holder inequality & Minkowski inequality, Metric space – Definition and examples, Open and Closed sets, Interior and Closure of a set, Limit point of a set in metric space.

Unit 2: Real sequences- Limit and Convergence of a sequence, Monotonic sequences. Cauchy's sequences, Subsequences, Cauchy's general principle of convergence. Properties of continuous functions on closed intervals.

Unit 3: Properties of derivable functions, Darboux's and Rolle's theorem. Notion of limit, continuity and differentiability for functions of several variables. The directional derivative, the total derivative, expression of total derivative in terms of partial derivatives.

Unit 4: Riemann integration – Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus, Fundamental theorem of integral calculus. Functions of bounded variations. Introduction, properties of functions of bounded variations, total variation.

Unit 5: Sequence and series of functions – Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions, Uniform convergence and Continuity of series of functions, Term by term differentiation and integration.

Reference Books :

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd.., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition),2011.
4. S. Kumaresan, Topology of Metric Spaces, Narosa Publishing House, Second Edition 2011.
5. G. F. Simmons, Introduction to Topology and Modern Analysis, Mcgraw-Hill, Edition 2004.

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Paper – II: Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations which can be made exact.

Unit 2: First order but higher degree differential equations solvable for x,y and p. Clairaut's form and singular solutions with Extraneous Loci. Linear differential equations with constant coefficients, Complimentary function and Particular integral.

Unit 3: Homogeneous linear differential equations, Simultaneous differential equations. Exact linear differential equations of nth order. Existence and uniqueness theorem.

Unit 4 : Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing the dependent variable/the independent variable, Factorization of operators, Method of variation of parameters, Method of undetermined coefficients.

Unit 5: Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution. Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Reference Books :

1. R.S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
2. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
3. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.

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Paper – III: Numerical Analysis and Vector Calculus

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: (i) This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.
(ii) Non-Programmable Scientific Calculators are allowed.

Unit 1: Differences. Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation. Divided differences. Newton's divided difference, Lagrange's interpolation formula.

Unit 2: Central differences.Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae. Numerical integration, Derivations of general quadrature formulas, Trapazoidal rule. Simpson's one-third, Simpson's three-eighth and Gauss's quadrature formulae.

Unit 3: Relation between the roots and coefficients of general polynomial equation in one variable, transformation of equations, Descarte's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferari's method.
Numerical solution of Algebraic and Transcendental equations, Bisection method, Secant method, Regula-Falsi method, Iteration method, Newton- Raphson Method (derivation of formulae and rate of convergence only).

Unit 4: Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic equations. Partial Pivoting method, ill conditioned systems, Numerical solutions of ordinary differential equations of first order with initial condition using Picard's, Euler and modified Euler's method.

Unit 5: Scalar and Vector point functions. Differentiation and integration of vector point functions. Directional derivative. Differential operators. Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

Reference Books :

1. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2. C. F. Gerald and P. O. Wheatley, App;ied Numerical Analysis, Pearson Education, India,7th edition, 2008.
3. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.

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Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination Scheme: **Duration: 2 Hours**

	Science	Arts
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks (13 Marks each)	26
Practical Record	=	05 Marks	07
Viva-voce	=	05 Marks	07
Total Marks	=	30 Marks	40

The paper will contain TWO practical. The candidates are required to attempt both practical.

Practicals with Computer Programming in C Language.

Programming languages and problem solving on computers, Algorithm, Flow chart, Programming in C- Constants, Variables, Arithmetic and logical expressions, Input-Output, Conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

Group A:

1. Printing n terms of Fibonacci sequence.
2. Finding $n!$, $\sum n, \sum n^2$ etc.
3. Defining a function and finding sum of n terms of a series/sequence whose general term is given (e.g. $a_n = \frac{n^2+3}{n+1}$).
4. Printing Pascal's triangle.
5. Finding gcd and lcm of two numbers by Euclid's algorithm.
6. Checking prime/composite number.
7. Finding number of primes less than n, $n \in Z$.
8. Finding mean, standard deviation and ${}^nP_r$, ${}^nC_r$ for different n and r.

Group B:

1. Numerical integration using Trapezoidal, Simpson's 1/3, 3/8 and Waddle rules.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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7. Economics

B.Sc. Part-II 2020

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150

Each paper shall be of three hour duration and of 100 marks for Arts students and of 75 marks for Science students.

Paper – I Introductory Macro Economics

Paper – II (a) Elements of Statistics and Mathematics
(b) History of Economic Thought

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No I consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) question. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Part A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

Paper-I

Introductory Macro Economics

Section- A

Macroeconomics, Meaning, Subject matter and Importance. Basic tenets of Classical, Keynesian, New-Classical and New –Keynesian economics, Macrocosmic variables, Circular flow of Income, National Income: Basic concepts, Measurement, Sectoral Accounts, Nominal and Real Aggregates.

Money function. Demand and Supply Quantity Theory of Money Transaction Approach. Cash Balance Approach. Keynes reformulation of the Quantity Theory of Money inflation Meaning and Impact. Theories of Inflation- Demand Pull (Keynesian and modern), Demand Push. Structural Theories of Inflation.

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Section-B

Income and Employment Determination : Classical Modal and Keynesian Model, Consumption Function: Psychological Law of Consumption, Determinants of Consumption, Paradox of, Thrift, Investment Function: Determinants of investment, Marginal Efficiency of Capital and Marginal Efficiency of Investment, Concept of Multiplier and Accelerator.

Section-C

Central Bank: Organizational set-up and functions of Central Bank (with special reference to RBI). Commercial Bank: Functions, Modern trends of Commercial Banking. Quantitative and Qualitative Credit control by RBI. Money Supply: Meaning & Definition, four measures (M_1 M_2 M_3 and M_4) Monetary Policy: Objectives, Targets and Indicators, Transmission Mechanism.

Recommended Books :

1. G.S. Gupta Macro Economics, Theory and Application, 4th Ed, McGraw Hill, New Delhi.
2. Dornbusch, Fisher and Startz: Macroeconomics, XI Edition, Indian Reprint, Tata McGraw-Hill, Publishing Company Ltd. New Delhi.
3. N. Gregory Mankiw, Macroeconomics, Worth Publishers (Latest Edition).
4. H.L. Ahuja. (Hindi and English edition) Macro Economics, Theory and Policy; S. Chand & Co. Ltd, New Delhi.
5. Suraj B. Gupta: Monetary Economics, S. Chand and Co. Ltd.
6. L.N. Nathuranmka, Prarambhik Samashti Arthshastra, Ramesh Book Publishing House, Jaipur
7. Rana and Verma: Macroeconomic Analysis, Vishal Publications,
8. Richard T. Froyen, Macroeconomics, Theories and policies, (X Edition), Adapted by Pearson Education.

Paper –II (a): Elements of statistics and Mathematics

Duration: 3 hrs **Max Marks: 100**

Section- A

Surds, Indices, Quadratic Equation, Logarithms, Permutation and Combination, Binomial Theorem, Arithmetic progression, Geometric Progression and Harmonic Progression, Analytical Geometry: Straight Line, Parabola and Hyperbola, Matrices and Determinants, solution of Simultaneous equations by Cramer's rule and Matrix Inverse. Simple differentiation, Partial differentiation (involving two independent variables). Maxima, minima point of inflexion. Simple Integration involving one independent variable, Application in Economics (Elasticity, Average, Marginal Concepts)

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Section – B

Statistics-definition, nature and importance, Uses and relevance of statistical methods, Census and Sample survey, Methods of data collection and tabulation, Diagrammatic and Graphical representation of data; Measures of Central Tendency: Arithmetic Mean, Mode, Median, Geometric Mean, Harmonic Mean. Concept and Measures of Dispersion and Skewness.

Section – C

Simple Correlation: karl Pearson's and Rank Correlation, Regression analysis, Fitting of Linear Regression lines using Least Square Method, Analysis of Time Series, Determination of trend by straight line trend equation, Index numbers, Interpolation (Binomial Expansion and Newton's method), Association of Attributes.

(**Note:** Use of non-programmable calculator is permitted)

Books Recommended :

1 B.C. Mahta and G.M.K Madanani Elementary Mathematics for use in Economics Laxmi Narain Agarwal, Agra

2 S.C. Gupta. Statistical Methods. Sultan Chand and Sons. New Delhi

3 Murray R. Spiegel Theory and Problems of Statistics McGraw Hill Book London

4 S.C. Gupta and V.K. kapoor Fundamentals of Applied Statistics. S Chand and New Delhi

5 Salvatore. D Mathematies and Statistics. Schaum's Series. Tata McGraw Hill

6 G.S. Monga Mathematics and Statistics for Economics, Vikas Publishing House. New Delhi

7 बी सी मेहता एंव जी एम के मदनानी अर्थशास्त्र में प्रारम्भिक गणित लक्ष्मीनारायण अग्रवाल आगरा।

8 कैलाशनाथनागर सांख्यिकी के मूलतत्व मीनाक्षीप्रकाशन मेंरठ।

Paper- II (b) History of Economic Thought

Section –A

Mercantilism Views on Trade Money, Prices. Wages and Employment Physiocracy:Natutal Order. Primacy of Agriculture. Net Product and Circulation of Wealth.Theory of taxation and role of government. Classical School : Adam Smith.Views on Division of Labour. Theory of Value, Capital accumulation Distribution, International trade, Economic Development Critiques of Adam Smith T.R. Malthus .Theory of Population .Theory of gluts. David Ricardo. Theory of Valve and Distribution. Foreign Trade, Economic Development and Theory of Rent

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Section-B

Crítities of the Classical School – Sismondi. Robert Owen, Friedrich List.
J.S. Mill theory of value. Views on Production and Distribution Karl Marx: Efforts at Scientific Socialism Theory of Money Labor Theory of Value, Theory of Capital Accumulation and crisis Distribution. German Historical School and the Development of Marginalism. Neo-classical School: Marshall-Price Determination and Elasticity. Consumer Surplus costs: Economics Rent and Profit

Section C

Economic of Kautilya, Economic thought of Dadabhai Naroji, Mahatma Gandhi, G.K. Mehta, Deendayal Upadhayaya.

Books Recommended :

1. Louise Haney, History of Economic Thought, Surjit Publication, New Delhi
2. Enc Roll: History of Economic Thought, Faber and Faber (Rupa)
3. Gide and Rist: History of Economic Doctrine
4. M.R. blaug, Economic Theory in Retrospect: History of Economic Thought from Adam Smith to J.M. Keynes. (5th Edition), Cambridge University Press, Cambridge.
5. T.N. Hajela. History of Economic thought, Ane's Student Edition, Daryaganj, New Delhi.
6. B.N. Ganguli, Indian Economic Thought: A 19th Century Perspective, Tata McGraw Hill, New Delhi.
7. J.A. Schumpeter, History of Economic Thought. Oxford University Press.

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8. Geography

Scheme of Examination

Faculty	Min. Pass Marks	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	Resources Geography	Arts 75 Science 50
Paper II	Human Geography	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q. No. 1 of 20% marks of the maximum marks be set in two parts

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examinations.

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• Paper I: Resources Geography

Section A

Nature, scope and significance of resources geography, definition and classification of resources: renewable and non renewable resources, resource classification of Zimmerman. Natural Resources: Distribution, exploitation, uses and conservation of forest, water, soils, fisheries, mineral resources, energy resources (coal, petroleum, natural gas and non-conventional energy resources).

Section B

Human resources: Population growth, distribution and density, causes of inequalities, population-resources relationship and problems, Agricultural resources: fisheries and cereal crops: rice, wheat, maize and barley; beverages: tea, coffee and tobacco, commercial crops: cotton, rubber, jute, sugarcane, silk and artificial fibres. Agricultural regions of the world.

Section C

Concepts of Resources utilization, their conservation, environmental and cultural constraints in resource utilization, water conservation and rainwater harvesting, soil and forest resources conservation, land capability classes, resources regions of the world, resources regions of the India, economic regions of the India, sustainable development.

Recommended Readings:

Alexander, E.W. 1988: Economic Geography. Prentice Hall India, New Delhi.
Bunting, B.C., 1987: The Geography of Soil. Prentice hall, New York.
कौशिक, एस.डी. 2010: संसाधन भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
माथुर, वी. एस.: संसाधन भूगोल। रस्तोगी प्रकाशन, मेरठ।
Mitchell, Bruce. 1979: Geography and Resource Analysis. Longmans, London.
Park, C.C. 2001: The Environment-Principles and applicatons. Routledge, London.
Robinson, G.W. 1932 : *Soils, their Origin, Constitution* and *Classification*. London
Shafi, M. 2004: Agricultural Geography. Pearson India.

Paper II: Human Geography

Section A

Definition, aims and scope of human geography, relation of human geography with other social sciences. Principles of human geography, essential factors of human geography

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according to Brunhes and Huntington, schools of man-environment relations: determinism possibilism and neo determinism.

Section B

Human races: evolution and migration, zone-strata theory, classification of races: types, characteristics and distribution. human races in India, tribes of the world: eskimos, bushman, pigmy, masai, badduien and khirgiz; tribes in India: bhils, nagas, santhal, gond, gujjar of Jammu and Kashmir and toda. Population growth and theories, distribution and density of world population.

Section C

Migration of population: causes, types and impact; population regions and population policies in India. Rural settlements: factors affecting development of rural settlement, types and patterns of rural settlements, building materials and house types, urban settlements: process of urbanization, urban problems in India, impact of human activities on environment.

Recommended Readings:

Chandna, R.C. 2000: Geography of Population. Kalyani Publishers; New Delhi
Dohrs, F.E. and Summners, L.W. (eds.) 1967: Introduction to Geography. Thomas Crowell Co., New York.
Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity, Readings in Human Geography. Blackwell Publishers Ltd., Oxford.
Fellmen, Getis and Getis, J. 1998: Human Geography-Landscape of human activities. Longman, London.
Husain, M. 2012: Human Geography. Rawat Publications, Jaipur.
सिंह, एल. 2008: संसाधन भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
Leong, G.C. and Morgan, E.C. 1982: Human and Economic Geography. Oxford University Press, Oxford 2nd Edition.
कौशिक, एस.डी. 2012: मानव भूगोल। रस्तोगी पब्लिकेशन्स, मेरठ।
मौर्य, एस.डी. 2005: जनसंख्या भूगोल। शारदा पुस्तक भवन, एलाहबाद।
पण्डा, बी.पी. 2001: जनसंख्या भूगोल। मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, भोपाल।
राव, बी.पी. एवं श्रीवास्तव, बी.वे. 2008: मानव भूगोल। वसुन्धरा प्रकाशन, जयपुर।
Singh, R.L. 2005: Fundamentals of Human Geography. Sharda Pustak Bhawan, Allahabad.

Practicals

Scheme of examination

Min. Pass Marks: 18 — Max. Marks: 50

	Bifurcation of Marks	Time
Written test	24	3 hrs.
Field survey and viva voce	10+04	2½ hrs.
Record and viva voce	08+04	

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N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks

Section A

Definition of cartography, types of cartographic symbols and their uses, drawing instruments and materials, classification and representation of data with the help of squares, rectangles, circles, spheres, ring, pyramids, wheel diagrams, traffic flow diagram , isochronic chart.

Section B

Classification and uses of maps, drawing of isopleth, choropleth, chorochromatic, choroschematic and dot maps (simple, multiple and multi colour), measures of central tendency and dispersion: mean, median, mode, quartiles, standard deviation.

Section C

Elements of map reading. History of topographical maps in India. Scheme of topographical mapping in India as per National Map Policy, 2005. Conventional symbols and interpretation of physical and cultural features on topographical maps.
Prismatic Compass survey: equipments, methods of measurement of bearings, correction of bearings, record of survey closing error and its corrections.

Recommended Readings:

Monkhouse, F. J. and Wilkinson, F.J. 1985: Maps and Diagrams. Methuen, London
Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi (fourth revised edition).
Raisz, E. 1962: General Cartography. John Wiley and Sons, New York. 5th edition.
Singh, R.L. and Singh, Rana, P.B., 1991: Elements of Practical Geography. Kalayani Publishers, New Delhi.
Sarkar, A. K. 1997: Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
शर्मा, जे.पी. 2011: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्से, मेरठ।
Singh, L.R 2006: Fundamentals of Practical Geography. Sharda Pustak Bhawan, Allahabad.
Venkatrameiah, C , 1997: A Text book of Surveying. University Press, Hyderabad

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9. STATISTICS
Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Statistical Inference	50 marks	65 marks
Paper II	Statistical Applications in Society and Industry	50 marks	65 marks
Paper III	Practical based on Paper I, II	50 marks	70 marks

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Total	150	200 Marks

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I

(Statistical Inference)

Unit-I

Sampling from a distribution :- Concept of statistic and its sampling distributions. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution: Definition, Moments, MGF, moments, C.G.F., Modes & Skewness, Limiting and Additive Property. Distribution of ratio of chi-square variates. Applications: Testing Normal Population variance, Test for Goodness of fit, Contingency table & Independence of attributes, Yate's correction. 18 hours

Unit-II

t-Distribution :- Definition of Student's -t & Fisher's -t Statistic and derivations of their distributions. Constants & Limiting Property of 't' distribution. Applications-Testing of Single mean, Difference of two means; paired t-test and sample correlation coefficient. F-Distribution :- Definition, Derivation, Constants, Application—Testing of equality of two variances. Relationship between t, F and chi-square Distributions. 18 hours

Unit-III

Theory of Estimation: Point Estimation-Concept and Problem for Point Estimation; Criterion of a good estimator (Unbiasedness, Methods of Maximum likelihood, Consistency, Efficiency, Sufficiency). MVUE. Method of moments. Interval Estimation-Concept, Confidence Interval, Confidence Coefficient, Construction of Confidence Interval for Population Mean, Variance, Difference of Population Means & Ratio of Variances for Normal Distributions. 18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region. BCR, Neyman-Person's Lemma for BCR, BCR in case of Binomial, Poisson, and Normal and Exponential Population. 18 hours

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Unit-V

Large sample tests-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test for one sample and two sample cases, Run Test, Median test. **18 hours**

REFERENCES

1. Goon A.M. Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
2. Hodges J.L. and Lehmann E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
4. Freund J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
5. Gupta S.C. & Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

ADDITIONAL REFERENCES

1. Bhatt B.R. Srivenkatramana T. and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G. (1967) : Statistical Methods, Iowa State University Press.
4. Dudewicz E.J. & Misra S.N. : Modern Mathematical Statistics, John Wiley and Sons.

Paper II

STATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY

Unit-I

Demographic Methods : Sources of demographic data-census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features, Mortality rate and probability of dying. Relation between different columns of life table, uses of life table and its limitations. Measurement of fertility

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Crude birth rate, General fertility rate, Specific fertility rate, Total fertility rate, Gross Reproduction Rate, Net Reproduction Rate.

18 hours

Unit-II

Economic Statistics: Index numbers-Defination, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives. Problems involved in computation of index number. Use of averages, Simple aggregative and Weighted average methods. Laspeyre's, Paasche's and Fisher's index number. Tests for index numbers. Consumer price index. **18 hours**

Unit-III

Time Series Analysis-Definition & its different components, Illustrations, additive and multiplicative models. Different Methods for determination of trend & seasonal fluctuation along with their merits & demerits. **18 hours**

Unit-IV

Educational Statistics: Methods of standardization of scales and tests, Z-scores, t-scores, Standard scores, Percentile score, Intelligence Quotient and its measurement and uses. Validity of test scores reliability of Scores and their determination. **18 hours**

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality. General theory of control charts, control limits, sub-grouping. Summary of out of control criteria. Control charts for variables: Construction of Mean and Range charts. Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and demerits. **18 hours**

REFERENCES:

1. Croxton F.E., Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.
3. Goon A.M. Gupta M.K. Das Gupta. B. (1986): Fundamentals of Statistics, Vol.II World Press, Calcutta.
4. Grant E.L. (1964): Statistical Quality Control, Mc Graw Hill.
5. Guilford J.P. & Fruchter B: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.

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6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srivatava O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. Gupta S.C. & Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.

ADDEFIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.
2. Gupta and Mukhopadhyay P.P.: Applied Statistics, Central Book Agency.
3. Prassat R. (1978): Statistical Demography, Methuen and Co. Ltd.

Paper III

Practical Paper

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient. Use of Z-transformation.
2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.
3. Non parametric tests: Sign, Run, Median (for large samples)
4. Computation of mortality and fertility rates. Construction of life table.
5. Construction of Index Numbers by Laspeyre's, Paasche's, Fisher's, Chain Base Indices. Consumer price index.
6. Tests for Index numbers.
7. Determination of trend in a time series and construction of seasonal indices.
8. Drawing of $\bar{X}$, R, np, p and C-Charts.

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10. APPLIED STATISTICS

Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Statistical Inference	50 mark	65 marks
Paper II	Statistical Applications in Society and Industry	50 mark	65 marks
Paper III	Practical based on	50 mark	70 marks

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Paper I, II

Total 150 200 Marks

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I

Statistical Inference

Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution : Definition, MGF, moments, C.G.F., Mode & Skewness and other properties (without proof). Applications. Testing Normal Population variance, Test for Goodness of fit, Contingency Table & Independence of attributes, Yate's correction.

18 hours

Unit-II

t-Distribution : Definition of Student s -t & Fisher's -t Statistic. Property and Applications of t-distribution for testing Single mean, difference of two means, observed sample correlation coefficient Paired t-test, F-Distribution : Definition, Mean, Variance & mode, Application of F-distribution- Testing of equality of two variances. Relationship between t, F and chi-square Distributions (without proof)

18 hours

Unit-III

Theory of Estimation: Point Estimation- Problems for Point Estimation; Criterion of a good estimator (Unbiasedness, Consistency, Efficiency, Sufficiency). MVUE. Method of moments and Methods of Maximum likelihood. Interval Estimation- Confidence Interval for mean, variance, difference of means and ratio of variances for normal populations.

18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region. BCR, Neyman-Person's Lemma (statement only) and its application. BCR in case of Binomial, Poisson, and Normal Population.

18 hours

Unit-V

Large sample test-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test (for one sample and two sample cases) Run Test, Median test.

18 hours

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REFERENCES

1. Goon A.M. Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
2. Hodges J.L. and Lehman E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
4. Freund J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
5. Gupta S.C. & Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

ADDITIONAL REFERENCES

1. Bhatt B.R. Srivenkatramana T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G (1967) : Statistical Methods, Iowa State University Press.
4. Dudewicz E.J. & Misra S.N. : Modern Mathematical Statistics, John Wiley and Sons.

Paper II

STATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY

(Course contents are same as that of subject statistics.)

Unit-I

Demographic Methods : Sources of demographic data census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features, Mortality rate and probability of dying. Relation between different columns of life table, uses of life table and its limitations. Measurement of fertility : Crude birth rate, General fertility rate, Specific fertility rate, Total fertility rate, Gross Reproduction Rate, Net Reproduction Rate. 18 hours

Unit-II

Economic Statistics : Index numbers-Definition, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives. Problems involved in computation of index number. Use of averages, Simple aggregative and Weighted average

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methods. Laspeyre's Paasche's and Fisher's index number. Tests for index numbers. Consumer price index. 18 hours.

Unit-III

Time Series Analysis: Definition and its different components, illustrations, additive and multiplicative models. Different Methods for determination of trend & seasonal fluctuation along with their merits & demerits. 18 hours

Unit-IV

Educational Statistics: Methods of standardization of scales and tests, Z-scores, t-scores, Standard scores, Percentile score, Intelligence Quotient and its measurement and uses, Validity of test scores. Reliability of Test Scores and their determination. 18 hours

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality, General theory of control charts, control limits, sub-grouping, Summary of out-of control criteria. Control charts for variables: Construction of Mean and Range charts. Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and Semerits 18 hours

REFERENCES:

1. Croxton F.E. Gowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.
3. Goon A.M. Gupta M.K. Das Gupta B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Grant E.L. (1964): Statistical Quality Control, Mc Graw Hill.
5. Guilford J.P. & Fruchter B: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.
6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srtivatava O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. Gupta S.C. & Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.

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2. Gupta and Mukhopadhyay P.P : Applied Statistics, Central Book Agency.
3. Pressat R(1978): Statistical Demography, Methuen and Co. Ltd.

PAPER III
Practical Paper

(Course contents are same as that of subject statistics.)

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient mation.
2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.
3. Non-parametric tests: Sign, Run, Median (for large samples)
4. Computation of mortality and fertility rates. Construction of life table.
5. Construction of Index Numbers by Laspeyre's, Paasche's, Fisher's, Chain Base Indices. Consumer price index.
6. Tests for Index numbers.
7. Determination of trend in a time series and construction of seasonal indices.
8. Drawing of $\overline{X}$, R, np, p and C-Charts.

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11. PSYCHOLOGY

B.A. /B.Sc. Pass Course Part-II

SCHEME OF EXAMINATION:

Faculty		Max. Marks	Min. Passing Marks
	Arts	200	72 (Th.54 Pr.18)
	Science	150	54 (Th.36 Pr.18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Abnormal Psychology	3 Hrs.	75	50
II	Psychological Statistics	3 Hrs.	75	50
	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

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For clarification the distribution of marks is tabulated as below:-

ARTS			
Section	**No. of Questions**	**Marks**	**Total**
A	10	1.5	15
B	5 (Out of 7)	03	15
C	3 (with internal choice)	15	45
		Total Marks	**75**
	SCIENCE		
Section	**No. of Questions**	**Marks**	**Total**
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (with internal choice)	10	30
		Total Marks	**50**

2. Use of simple calculator will be allowed for statistical portions of all papers.

Paper I - Abnormal Psychology

Section: A

1. Mental Disorder : Definition, Indicators of Abnormality, DS M - 5 and ICD - 10 Classification Systems, Mental Health Professionals .
2. Causal Factors and View points : Risk Factors and Causes; Necessary, Sufficient and Contributory causes; Diathesis - Stress Models, Biological, Psychological and Social perspectives .
3. Clinical Assessment and Diagnosis : Basic elements in Assessment, Physical and Psychosocial Assessment .

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	Section: B
4.	Anxiety, Obsession Compulsion and Trauma and Stress or Related Disorders :
	Types, Clinical Picture and Causal Factors.
5.	Mood Disorders and Suicide : Types, Clinical Picture and Causal Fact ors .

6 . Somatic Symptoms and Dissociative Disorders : Types, Clinical Picture and Causal Factors

Section: C

7 . Feeding and Eating Disorders : Types, Clinical Picture and Causal Factors

8.	Schizophrenia and Other	Psychotic	Disorders : Types, Clinical	picture and
	Causal Factors.			
9.	Psychological Treatment /	Therapies : Behavioral Therapy, Cognitive and		
	Cognitive - Behavioral	Therapy,	Humanistic - Existential	Therapies ,
	Psychodynamic Therapies.			

Books Recommended:

- Butcher, J. N., Hooley, J .M. & Mineka, S. (2017). *Abnormal Psychology.* Noida : Pearson India Education.
- Oltmanns, T . F. & Emery, R . E . (2017) . *Abnormal Psychology* . Noida : Pearson India Education.
- David, B. H. & Durand V. M. (2007). *Abnormal Psychology : An Integrated Approach.* New Delhi: Thomson.
- Ray, W. J. (2015). *Abnormal Psychology.* New Delhi : Sage.

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Paper II - Psychological Statistics

Section-A

1. Introduction: Nature and Scope of Statistics and Psychological Data; Application of Statistics in Psychology; Nature and Levels of Measurement - Categorical and Continuous Variables.

2. Frequency Distribution: Drawing of Frequency Distribution. Bivariate Frequency Distribution, Graphical Representation of Grouped Data-Histogram, Polygon.
3. Measurement of Central Tendency: Purpose and Types; Characteristics and Computation of Mean, Median and Mode.

Section-B

4. Measures of Variability: Concept and Uses; Characteristics and Computation of Range, Quartile Deviation, Average Deviation and Standard Deviation.
5. Correlation: Concept and Types- Pearson's Product Moment Correlation (for Ungrouped Data by Assumed Mean and Actual Mean); Spearman's Rank Order Correlation.
6. Hypothesis Testing and Inferences Making: Population and Sample, Types of Sampling, Standard error of Mean, 't' test (Independent group), Interpretation of 't' values, levels of Significance.

Section-C

7. Non Parametric Tests: Nature and Assumptions of Distribution-free Statistics; Chi-Square; Equal Probability, 2 x 2 Contingency Table; Median Tests.
8. ANOVA: Purpose and Assumptions of ANOVA. One way ANOVA
9. Computer Analysis: Preparation of Data, Uses of SPSS.

Books Recommended:

- Broota K.D. (1992): *Experimental design in behavioural research*. New Delhi: Wiley Eastern.
- Garrett, H. (1981). *Statistics in psychology and education*. Mumbai: Vakil Febber and Simons.
- Mininum, E.W., King, B.M. & Bear. G. (1993). *Statistical Reasoning in Psychology and Education*. New York: John Wiley.
- Siegel. S. (1994). *Non-parametric Statistics*. New York: McGraw Hill.

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Practical

1. Assessment of Mental Health
2. Assessment of State and Trait Anxiety
3. Measurement of Depression
4. Measurement of Coping – Styles
5. Assessment of Family Pathology
6. Word – Association Test
7. Eight-State Questionnaire
8. Neuropsychological Assessment
9. Stress: Measurement and Analysis of Group Data (Mean and Median)
10. Stress: Measurement and Analysis of Group Data ('t' test)

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12.

12 ELECTRONICS

Scheme :

Min. Pass Marks 36 Max. Marks : 100

Paper-I	3 hrs.duration	Max. Marks : 33
Paper-II	3 hrs.duration	Max. Marks : 33
Paper-III	3 hrs.duration	Max. Marks : 34
Practical Min.-18	5 hrs. duration	Max. Marks : 50

Paper-I- Amplifier Circuits

Max. Marks-33 Time.: 3 Hours

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Five questions are to be set taking one from each unit (each question will have an internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Q-point, Stability of Q point, Various Transistor biasing circuits, Thermal bias stability, An amplifier with feedback gain, Stabilization. Reduction of non linear distortion by negative feed back. Effect of feedback on input and output impedances.

Unit-2

Frequency response of linear amplifiers and noise distortion, current and voltage, series and parallel feed back. Examples of positive and negative feedback, Emitter follower, Differential amplifiers with balanced, unbalanced, single input and double input (DC and AC analysis), common mode rejection ratio.

Unit-3

Operational amplifiers, Differential amplifier, operational amplifiers as an integrator, differentiator, inverting amplifier, adder and subtractor amplifier, voltage comparator and logarithmic amplifier, Ideal and practical operational amplifier for offsets, input offset current and voltage, power supply using 741 operational amplifier, uses of operational amplifier as oscillator.

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Unit-4

Class A, B and C operating conditions for power amplifiers, condition of maximum power transfer, special features of transistors used for power amplification. Need of impedence matching in power amplifier, shunt feed power amplifier, Efficiency, Distortion, power dissipation and power amplification, phase inverters of push-pull amplifier, Class A, AB and B push-pull amplifier using transistors.

Unit-5

Problems in amplifier circuit elements at high frequency, Equivalent circuit, wide band amplifiers, High and low frequency compensation, pulse response and testing of an amplifier. Tuned amplifiers (single and double tuned) and their uses as I.F. amplification in radio and T.V. receivers (No mathematical derivations, only qualitative description)

Paper-II- Rectifiers and Oscillators

Max. Marks 33 Time : 3 Hours

Five questions are to be set taking one from each unit (each question will have internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Half wave, Full wave and bridge rectifiers, Definition of ripple factor. Efficiency, voltage regulation, smoothing filters, L-section and π - section filters and their cascading, Filter efficiency, Metal rectifiers, common power supply, voltage regulation and V.R. tubes.

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Unit-2

Zener diode Electronically regulated power supply, voltage multipilers, Trouble in low and high voltage power supply.

Barkhausen Criterion for maintained oscillations, grid biasing and self sustained oscillations, Tuned grid, Tuned emitters oscillator (Mainly transistor type), crystal controlled oscillators, R-C phase shift oscillators, Designing, Considerations of Harteley and Wein bridge oscillators.

Unit-3

Bistable multivibrator, Monostable and Bistable multivibrator (Collector coupled), Improvement of multivibrator response, synchronization Triggering in relaxation oscillators.

Unit-4

Response of sinusoidal, Triangular and Rectangular waves to CR and LR circuits. Their uses as integrating and differentiating circuits.

Non linear wave shapping circuits, Clipping and clamping circuits, slicer, limiter circuits, Limiting and clipping amplifier, peaping circuits.

Unit-5

Terminology used to describe sweep generator, Fundamental sweep voltage generator, Transistor constant current sweep generator.

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References

1. Electron tube circuits J. Seeley
2. Engineering Electronics- Ryder
3. Hand book of Electronics-Gupta & Kumar
4. Applied Electronics - G.K. Mithal
5. Electronics - V.P. Arora

Paper-III- Digital Computer and Programming

Max. Marks-34 **Time : 3 Hours**

Five questions are to be set taking one from each unit (each question will have an internal choice). Student will attempt all the five questions. 40% weightage will be given to problems and numericals.

Unit-1

Variable resister network, Binary ladder, D/A Converter, A/D converter, simultaneous conversion, A/D converter-counter method, electromechanical A/D conversion, D/A and A/D conversion controls. Block diagram of a general purpose computer organization and control.

Unit-2

Central Processing Unit, I/O units, Arithmetic logic unit, Internal storage, Auxiliary storges like HDD, FDD, CD etc. Read only memory, Random Access Memory. Computer generations and classification.

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Unit-3

Alogrithm-Definition and properties of alogrithm, flow chart, symbols of flow chart, converting a flow chart into a high level language. Examples of simple alogrithms. Low level language viz. machine language, assembly language, high level language like BASIC.

Unit-4

BASIC: BASIC character set, numeric constants and variables, arithmatic operators, expressions and functions, character string constrants and variables string operator, expressions and functions. Terminal features, system commands and editing, PRINT, REM, INPUT/OUTPUT statements.

Elementary BASIC programmes for numeric and string processing.

Unit-5

Flow of control, unconditional and conditional branching, relational logic operators, two way and multi way selection statements; nesting repetition statements.

Definite and indefinite loops, subscripted variables. Vectors and arrays, simple programme exercises. Function definition and invocation. Subroutine, modular programmes; entering and exiting subroutine. Files, random and sequential files. Simple programming exercises.

Experiments for Practical work

Note:

A candidate has to perform at least sixteen experiments in all taking eight experiments from each section 'A' and 'B'.

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In practical examination the candidate will be required to perform two experiments: one from section 'A' and the other from section 'B'. The distribution of marks will be as follows–

Time duration - 5.00 Hrs. Expts.(two) - 30 (15 for each expt) marks

Viva Voce - 10 marks

Practical record - 10 marks

Total- 50 marks

Section-A

1. To study high pass frequency filter.
2. To study low pass frequency filter.
3. To study RC differentiating circuit.
4. To study RC integrating circuit.
5. To study bridge rectifier with L & π filter.
6. To study transistor biasing circuits.
7. Study of counters and shift registors.
8. To study bistable multivibrator (collector coupled).
9. To study Exclusive OR (XOR) gate and verify its truth table.
10. Solution of simple equations using analog computer.

Section-B

1. To study analog to digital convertor circuit.
2. To study digital to analog convertor circuit.

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3. To study negative feed back amplifier.
4. To study triode value characteristics and calculate its parameters.
5. To study OP Amp as summing amplifier.
6. To study OP Amp as an inverter.
7. To study OP Amp as a non-inverter.
8. To study push-pull amplifier using transistor.
9. To study emitter follower and its frequency response.

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13. Textile Craft

B.Sc. Part-II 2020

SCHEME : B.A/B.Com/B.Sc. PART-II

			Duration	Max mark	Min mark
1.	Theory:	Paper-I	3Hrs	30	22
		Paper-II	3 Hrs	30	
2.	Practical :	Paper-I	3Hrs	35	25
		Paper-II	3 Hrs	35	
3.	Submission	Paper-I		35	25
		Paper-II		35	

Paper-I : _Weaving Theory-I

UNIT-I

Yarn numbering system –Indirect (cotton, metric, woollen and worsted count) and Direct (Tex and Denier)

Yarn Twist and their types, Balance of fabric

Methods of fabric construction: Braiding &Lacing, knitting, felting and weaving

UNIT-II

Types of loom- Shuttle & Shuttle less; introduction to shuttleless looms- airjet, waterjet, projectile and rapier loom

Preparation of Warp and Weft for weaving

Draft, Peg plan, Weave, Repeat, Design

UNIT-III

Derivatives of Plain weave- Rib and Basket
Derivative of twill weave- Regular, Irregular, Left hand, Right hand,
Pointed and curved twill
Fabric defects, Selvedge, Types of Selvedge's

Paper-II: Dyeing Theory –I

UNIT-I

Difference between dyeing and printing
Mechanical finishes- basic process of beating, singeing, napping, calendaring and embossing.

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UNIT-II

Stages of Dyeing (fibre, yarn & fabric)
Wool dyeing and silk dyeing
Dyeing machines- Jigger and Winch dyeing machine

UNIT-III

Steps of printing- preparation of cloth & colour
Methods of Direct printing- Block & Roller printing
Thickeners and types of thickeners

Practical (Paper-I)

1. Thread count and Balance of the cloth
2. Weave samples of derivatives of plain and twill weave

Practical (Paper-II)

1. Introduction to motif, repeat and layout
2. Block printing- samples preparation
3. Batik-spot, crack, scratch and painting (samples)

Submission (Paper-I)

1. Assessment of samples
2. Preparation of weave samples

Submission (Paper-II)

1. Any one article using block
2. Any one article using batik

Examination Scheme:

One Major Problem: 20 Marks
One Minor Problem: 15 Marks

Reference books :

Sahnai, V.A. (1989) Theory of Dyeing, Sevak publications. Mumbai

Trotman, E.R. (1985) Technology of Dyeing, John wiley & sons Inc London. London

Pryag, R.S. (1994) Technology of Printing, India publisher.

Pryag, R.S. (1995) Technology of Finishing, India publisher.

Bucker, (1998) Textiles, Abhishek spublications.

Kulkarni, M.M., Weaving technology, Virindra publication, Jalgon

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14. Garment Production & Export Management
B.Sc. Part-II 2020

B.A/B.Com.– Maxmium Marks 40 Hrs.3
B.Sc. Maxmium Marks 50

THEORY PAPER – 1
Fashion and Apparel Design

OBJECTIVES : -

1. To Develop Sensitivity & Understanding towards Historical World Costumes.
2. To Focus on Design Elements & Principles and their Details on Garments.
3. To Create Awareness About the Techniques of Pattern Making & Principle of Fittings.

SECTION –A
TRADITIONAL COSTUMES

1. Study of traditional costumes of various regions of India.
2. History of costumes of Indian civilization.
3. Brief knowledge of world costumes ; French , German, Greek, European

SECTION –B
TECHNIQUES IN PATTERN MAKING

4. Eight head theory – principles and advantages.
5. Pattern making techniques- drafting, draping, flat pattern.
6. Colour and colour schemes, psychological effects of colour on clothes.
7. Fitting – principles of fitting, factors to be considerd while fitting, common fitting problems, remedying fitting defects of bodice, sleeves, and skirts.

SECTION – C
DESIGN

8. Classification of design – structural and decorative
9. Elements and principles of design.
10. Layout of design of fabric in cutting - floral , checks, plaids, lines.

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References :

1. Erwin, M. D., Kinchen, L.A. & Peters, A. (1979). Clothing for moderns. Macmillan publishing new York.
2. Jo, K. M. (1985). Clothing construction I&II. Prentice Hall.
3. Mathews, M. (1974). Practical clothing construction part I & II. Chennai,Cosmic press.
4. Doogaji, & Deshpandey, R. (1988). Basic process and clothing construction. Raaj Prakashan.

THEORY PAPER – 1I

ELEMENTS OF MARKETING AND FINANCE

B.A./B.Com.-Maxmium Marks 40 Hrs. – 3

B.Sc. – Maxmium Marks 50

OBJECTIVES :

1. To create awareness about the procedures to select, proceed & start the Small Scale Industry.
2. To guide the process of product development according to the market needs.
3. To become familiar with the methods of payment in foreign trades & about types or bills.

SECTION A

1. Market structure- Types of market, market survey, elements of cost.
2. History of readymade garment industry, Problem and prospects in global market
3. Branded versus non -branded market.
4. Types of garments exported.

SECTION B

5. Elementary knowledge of working capital factors affecting working capital, operating cycle.
6. Sources of finance.
7. Letter of credit
8. Methods of payment in foreign trade
9. Various typed of bills.
10. Insurance

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SECTION C

Brief study of ;

11. ECGC (export credit and guarantee corporation)
12. EIC (export inspection council)
13. IIP (Indian institute of packaging)
14. ICA (Indian of arbitration)

References :

1. Srivastav, & Aggarwal. (). Vipdan prabandh.
2. Mamoria, C.B., Joshi, R. L. & Mulla, N.I. (2003). Principles & practice of marketing in india. Kitab Mahal distributers.
3. Satya narayan; Sales management.
4. Daver R.S. (2009). Salesmanship and Publicity. Vikas publishing house Pvt Limited.

PRACTICAL- 1
APPAREL DESIGNING

B.A/B.Com.–Maxmium Marks 60 Hrs.- 4

B.Sc. – Maxmium Marks 25

OBJECTIVES :

To familiarize with basics of color

To develop expertise in drawing croquis and draping dresses on them.

Contents:

1. Colour wheel and colour scheme.
2. Introduction to eight head theory and stick figure 9.5", 10.5".
3. Developing an adult croquis from block figure.
4. Draping of garments on croquis (at least 8 sheets) using different colours schemes and occasions.
5. Preparation of a portfolio.

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Examination Scheme :

B.A.\B.COM:-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20
Internal:-10

B.SC:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10
Internal:-5

PRACTICAL – II

CLOTHING CONSTRUCTION

B.A./B.Com.–Maxmium Marks 60 Hrs- 4

B.Sc. – Maxmium Marks - 25

OBJECTIVES :

1. To be able to make basic drafts of bodice, sleeve and collar.
2. To learn the knowhow of stitching and all basic processes and ornamentation techniques.

Contents :

1. Pattern making
    1. Child basic block and sleeve block.
    2. Sleeve variations; slash and spread method-puff, bell, legomutton, bishops sleeves.
    3. Sleeve bodice combination; Magyar, raglan, dolman sleeves.
    4. Different types of collars.
    5. Different types of yokes.
2. Stitching of each sleeve, collar and yokes on bodice block.
3. Fashion designing (5 each) on sheet baby frocks, a line frocks , rompers. sun suits skirts and tops, bush -shirts with shorts.
4. Redesigning of old garment using the idea such as; to consider factors such as money, creativity, individuality, skills, needs,
    (i) Patchwork
    (ii) Ornamental fabric.
    (iii) Decorative embroideries
    (iv) Trims
    (v) Paints and dyes
    (vi) Introduction of fashion designing in fashion shows.
5. Introduction fashion designing in fashion shows.

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References :

1. Jo, K.M. & Beazley. (1985).The sewing book of a complete guide. Prentice Hall.
2. Ireland, P. J. (1982). Fashion designing drawing and presentation. Batsford Ltd. 4th Revised edition.
3. Chase, R.W. (1997). CAD for fashion design. Prentice Hall; Pap/DSKT edition.

Examination Scheme :

B.A.\B.Com.-Max Marks:-60
1. Major Problems-30
2. Minor Problems:-20
Internal:-10

B.Sc:-Max Marks:-25
1. Major Problem:-10
2. Minor Problems:-10
Internal:-5

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15. Geology and Mining

Scheme:

Theory: Max Marks 100 Minimum Pass marks: 36

Paper I: Petrology 3 hrs duration Max Marks 50

Paper II: Principles of Stratigraphy and Geology of India 3 hrs duration Max Marks 50

Practical (one) 4 hrs duration Max Marks 50

Paper I: Petrology

Section-A –Igneous Rocks

Composition of magmas; intrusive and extrusive forms; structure and texture; Classification

Crystallization of basaltic magma; Bowen Reaction Principle; differentiation

Study of common igneous rocks: Granite, rhyolite, gabbro, basalt, pegmatite, dolerite, syenite and peridotite

Section-B- Sedimetary Rocks

Process of formation of sedimentary rocks; lithification and diagenesis

Structure and texture of rocks; Elementary idea of sedimentary deposits, sedimentary environments and provenance

Study of common sedimentary rocks: Sandstone, limestone, shale, conglomerate and breccia

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Section-C –Metamorphic Rocks

Agents and types of metamorphism; concept of grade and facies; Structure and classification

Types of metamorphism and their products; metasomatism and anatexis

Study of common metamorphic rocks: Marble, schist, gneiss, quartzite, slate

Paper II: Principles of Stratigraphy and Geology of India

Section-A

Principles of stratigraphy; standard stratigraphic scale, principles of correlation

Palaeogeography of India in Permo-Carboniferous period, Physiographic subdivisions of India

Stratigraphic divisions in India and their equivalents

Section-B

Stratigraphy, distribution, lithology and correlation of the Aravalli, Delhi and Vindhyans Supergroup of rocks

Distribution, succession, climate, correlation, fossil content and mineral resources of the Gondwana Supergroup

Section-C

Lithology, succession, distribution and fossil content of Triassic of Spiti, Jurassic of Kachchh, Tertiary period, Siwalik Supergroup

Origin, composition, distribution and age of Deccan Traps; Tectonic framework of India

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Practical

Study of typical textures of rocks; Megascopic study of common Igneous, sedimentary and metamorphic rocks; Microscopic studies of granite, rhyolite, gabbro, dolerite, limestone, sandstone, schist, gneiss and marble.

Neat drawings of paleogeographical maps of India during Permo-Carboniferous; Distribution of various geological formation in outline map of India; Identification and description of the representative stratigraphic rocks.

Geological field work and collection of samples.

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16. ENVIRONMENT SCIENCE

B.Sc. Pt II- 2020

Scheme:

Theory			
Max Marks: 100			Min. Marks:36
Paper 1	3 hours duration		Max Marks:50
Paper 2	3 hours duration		Max Marks:50
Practical	4 hours duration	Min. Marks:18	Max Marks:50

Note:

1. Two types of Question papers for each theory paper will be applicable. Total duration of 3 hours for each paper. One question paper will comprise of the objective questions and the other will be of descriptive type question.
2. Descriptive type question paper (to be given during 1st 2 hours of examination) will have 9 questions from each section out of which a student is supposed to attempt 4 questions selection at least 1 from each section. This portion of the paper will carry maximum 30 marks. Each descriptive question will be of 7.5 marks.
3. The objective question paper will be given after 2 hours of commencement of descriptive type paper and will have 35 questions of the objective type. This portion of the paper will carry 20 marks. The objective type questions will be of the following types:
    a. Multiple choice type questions:20 questions of ½ marks each.
    b. Fill in the blanks/one word/true or false type questions:10 questions of ½ mark each.
    c. Very short answer type questions:5 questions of 1 mark each

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Paper I: Environmental Pollution

Section-A

1. Sources and Classification of Air pollutants; aerosols, gases, vapors.
2. Meteorological Aspects; Factors affecting Air Pollution, wind roses, plume behavior, estimation of plume rise.
3. Air Pollution modeling; Dispersion models, Pasquill model, ASME model, Gaussian plume model, assumption, limitation applications.
4. Effects of Air Pollution; effects on economics, effects on environment and effects on human beings.
5. Global effects of Air Pollution, Greenhouse effect, Global warming, climate change, Acid rains, Ozone depletion.
6. Air Pollution due to automobile; Vehicular emissions, Motor fuel combustion, automobile emission mechanism from various vehicles.

Section-B

1. Classification of water pollutants.
2. Different types of sources of water pollution.
3. Types of wastewater and its quantum.
4. Effects of water pollution on Environment(Soil, organisms, vegetation, crop plants)
5. Effects of water pollution on human beings.
6. Pollution of water by Industries and power plants.
7. Marine pollution; quantum, types of pollutants, effects on water quality, organisms and ultimate effects on human beings.

Section-C

1. Various sources of Noise Pollution.
2. Methods of measurements of Noise Pollution.
3. Temporary effects of Noise Pollution on human beings.
4. Permanent effects of Noise Pollution on human beings.
5. Land pollution due to Municipal solid waste.
6. Pollution due to agricultural chemicals on land and crop plants.

Suggested Readings:

- Banerjee, B.N. 1987, Environmental Pollution and Bhopal Killings, Gian Publishing House, New Delhi.
- Environmental Radiation and Thermal Pollution and their control, Acol Publication, New Delhi.

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- Katyal, T. and Satake, M. 2001. Environmental Pollution. Anmole Publications Pvt. Ltd. New Delhi.
- Liu, D.H.F. and Liptak, B.G. 2000. Air Pollution. Washington. D.C.
- Nath, P. and Nath, S. 1990. Environmental Pollution conservation and Planning, Chng Publication, Allahabad.
- S.A. 1991, Environmental Impacts on Water Resources Project, Discovery Publishing Home, New Delhi.
- Santara, S.C. 2001. Environmental science. New Central Book Agency (P) Ltd. Calcutta.
- Sharma, P.D. 2005. Ecology and Environment. Rastogi Publications, Meerut.
- Sinha, U.K. 1986, Ganga Pollution and Health Hazards, Alka Enterprises, New Delhi.
- Tebbntt, T.H.Y.1983, Principles of water quality control, Pragmon Press, Oxford.

Paper II: Computer Techniques, Environmental Biotechnology and Environmental Microbiology

Section A

1. Biotechnology and its possible role in Environmental conservation.
2. Oil Slicks, oil spills, pesticide, tannery food industries and applications of biotechnology.
3. Bioremediation: Bioremediation of polluted soil.
4. Hazardous wastes in environment and use of Biotechnology.
5. Air Pollution abatement and Biotechnology (Bio scrubbers, Bio beds, Bio trickling filters).
6. Biotechnology and Wastewater treatment.

Section B

1. Microbiology and its possible role in solution of Environmental Challenges.
2. Air borne diseases and causal organisms.
3. Water borne diseases and causal organisms.
4. Role of microbes in metal recovery.
5. Role of microbes in pest control.
6. Degradation of pesticides in environment and soil.
7. Vermitechnology and waste treatment.

Section C

1. Software MS Word and its possible role in environmental challenges.
2. Software XP and environmental Challenges.
3. Role of Websites and internet in environmental conservation.
4. Wind rose formation and its application in environmental monitoring.

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Suggested readings:

- Allen, M.J. and Geldreich, E.F. 1975.Bacteriological criteria for groundwater. Groundwater .13: 45-52.
- Alvares, Claude, ed.1996. The Organic Farming Source book, Goa.The other India Press
- Annan, Kaffi, A. 2002. Towards a sustainable Future. 44(7): 10-15.
- Bonde, G.J.1977. Bacterial indicator of Water Pollution. Adv.Aqua.Microbial. 1: 273-364.
- Border, R. and Winter, J. 1978. Microbial methods for monitoring the environment – water and waste. USEPA, Cincinnati, USA
- Brown, C.M., old Camp bell, Priest, F.G. 1987.Introduction to Biotechnology, Blackwell Scientific Publishers, London.
- Cabelli, V.J. 1982. Microbial indicator systems for assessing water quality. Anton Von Leeuwenhock. 48: 613-618.
- Carson, Rachel.1962.Silent Spring. Indian Edition. Goa : Other Indian Press.
- Cass, A.E.G.1990. Biosensors: A practical approach, Oxford University Press, New York.
- Chakraverty, A.1989. Biotechnology and other Alternative Technologies. Oxford and IBH Publishing CO.Pvt. Ltd.New Delhi
- Chatterjee, A.K. and Alam, B .1998. Aquatic plants in heavy metal pollution abatement and monitoring .pp 191-205. In: Sood, P.P and Prakash .R. (eds). Heavy metal pollution, Toxication and Chelation. M.D.Publications, New Delhi.
- Chatterjee, D.K., Kellog, S.T., Furukawa, K., Kilbanes, J.J. and Chakraborty, A.M.1991. Genetic approach to the problems of toxic chemical pollution. PP: 199-212. Walton, A.G. (ed.). Recombination DNA. Elsevier.Amsterdam.
- Davis, B.D., Dulbecco, R., Einsen, H.N. and Ginnsberg, H.S. 1990. Microbiology. Harper and Row Publication. Singapore.
- FikSel, J. and Covello, V.T.1986. Biotechnology, Risk assessment. Pergamon Press, New York.
- Forsteb, C.F.1985. 1986. Biotechnology and Wastewater treatment. Cambridge University Press, London.
- Forster, C.F. and Warse, D.A.J.1987. Environmental Biotechnology. Ellis Horwood Ltd. U.K.
- Gandey, A.E. and Gandy, E.T.1981. Microbiology for Environmental Scientists and Engineers. McGraw – Hill, New York.

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- James, A. and Evison, L. 1979. Biological indicators of Water quality. John Wiley and sons.
- Lowries, P. and Wells, S. 1991. Microorganisms, Biotechnology and Disease, Cambridge University Press. Cambridge.
- Mc Carthy, J.F. and Roch, M. 1983. Biomarkers of Environmental Contamination.CRC Press, Boca Raton, California.
- Mitchell, R. 1974. Introduction to Environmental Biotechnology. Prentice – Hall, London.
- Prentis, S. 1984. Biotechnology. A new Industrial Revolution. Orbis Publishing, London.
- Primose, S.B. 1987. Modern Biotechnology. Blackwell Oxford.
- Rana, S.V.S.1986. Recent trends in Biotechnology and Biosciences.Pragati Press. Muzzafarnagar.
- Rehm, H.J. and Redd, G. 1986. Biotechnology, Vol I to B VCH Nemheim, FRG
- Sanunders, V.A. and sanders, J.R. 1987. Microbial Genetics applied to Biotechnology, Cromm, Helm, and London.
- Stoner, D. 1994. Biotechnology for the treatment of Hazardous wastes. Lewis Publishers. Boca Raton, California.
- Walker, J.M. and Ginford, E.B. 1985. Molecular Biology and Biotechnology Dorset Press, Dorset.
- Yoken, E. and Dimartino, V. 1989. Biotechnology in future Society Grower Publishing Co. USA.

Suggested Field and Laboratory Exercises

1. Estimation of SPM (Suspended Particulate Matter) from heavy traffic and busy areas.
2. Estimation of CO_2.
3. Estimation of SO_x.
4. Estimation of NO_x.
5. Preparation of pollution roses.
6. Estimation of Noise Levels from busy areas.
7. Estimation of Noise Levels from Silence zone (Hospital area, sanctuaries, National Parks)
8. Estimation of pH of water.
9. Estimation of EC of water.
10. Estimation of TDS of water.
11. Estimation of Chlorides.

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12. Visit to various water harvesting structures (traditional water harvesting structures), ponds, bawries, kunds, kacchatanka, puccatanka.
13. Collection of water from surface water sources, tankas etc.
14. Estimation of pH, EC, TDS, Chlorides, Oxygen, alkalinity etc. from surface water sources of different locations.
15. Estimation of pH, EC, TDS, Chlorides, Oxygen and fluoride determination of ground water collected from different sources.
16. Visit to sewerage treatment plants. Collection and analysis of water from sewerage plants.
17. E-coil count and other microbe identification.

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17.

17 BIO-TECHNOLOGY

Scheme :

Min. Pass Marks : 36 Max. Marks : 100

Paper-I 3 hrs.duration Max. Marks : 50

Paper-II 3 hrs.duration Max. Marks : 50

Practical Min.Marks: 18 5 hrs. duration Max. Marks : 50

Paper—I : Biophysics and Molecular Biology Max. Marks 50

Section – A

Energetics of living body sources of heat limits to temperature.

Heat dissipation and conservation.

Lambert-Bear law. Spectrophotometry and colorimetry Primary events in photosynthesis.

Strategies of light reception in microbes, plants and animals.

Correction of vision faults. Electrical properties of biological compartments. Electricity as a potential signal.

Generation and reception of sonic vibrations. Hearing aids.

Intra-and inter-molecular interactions in biological systems. Spatial and charge compatibility as determinant of such interactions.

Physical methods applied to find out molecular structure X-ray crystallography, and NMR.

General spectroscopy – UV-vis, fluoreseence, atomic absorption, IR, Raman spectra.

Physical method of imaging intact biological intact biological structure : Ultrasound, optical filters, X-ray, CAT scan, ECG, EEG, NMR imaging.

Section – B

Molecular basis of life, Structure of DNA, DNA replication both prokaryotes and eukaryotes.

DNA recombination molecular mechanisms in prokaryot and eukaryot.

Insertion elements and transpons.

Structure of prokaryotic genes.

Prokaryotic transcription.

Prokaryotic Translation.

Prokaryotic gene expression (lac, his, trap, catabolic repression)

Section – C

Structure of eukaryotic genes.

Eukaryotic transcription.

Eukaryotic Translation.

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Eukaryotic gene expression transcription factors etc.
Gene expression in yeast.
Gene expression in protozoan parasites.
Gene organization and expression in mitochondria and chloroplasts.
Post translation regulation of gene expression.
Development and environment regulation of gene expression.

B.Sc. Part II

Paper-II : Immunology Animal Cell Culture and Recombinant DNA Technology Max. Marks 50

Section – A

The Immune system and immunity along with historical perspective.
Antigen-antibody and their structure.
The organs and the cells of the immune system and their function.
Antigen-antibody interaction.
Humoral and cell mediated immunity (role of MHC and genetic restriction)
Origin of diversity in the immune system
Effectors mechanisms.
Immunity to infectious of diseases, vaccines.

Section – B

History developed of cell cultures. The natural surrounding of animal cells.
Metabolic capabilities of animal cells. Simulating natural condition for growing animal cell.
Importance of growth factors of the serum.
Primary cultures. Anchorage dependence of growth. Non anchorage dependent cells.
Secondary cultures. Transformed animal cells – Established/ continous cell lines.
Commonly used animal cell lines–their origin and characteristics.
Growth kinetics of cells in culture.
Application of animal cell culture for studies on gene expression.
Organ culture
Transfixion of animal cell : Selectable markers. HAT selection, Antibiotic resistance etc.
Cell fusion : Transplantation of cultured cells. Differentiation of cells.

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Section – C

What is gene cloning and why do we need to clone a gene?
Tools and techniques: plasmids and other vehicles genomic DNA, RNA, CDNA, RT
enzymes and other reagents technique, laboratory requirements.
Safety measures and regulations for recombinant DNA work.
Choice and selection of the tools and the techniques.
Vehicles : Plasmids and bacteriophages, available phagemids, cosmids, viruses.
Purification of DNA from bacteria, plant and animal cells.
Manipulation of purified DNA, Introduction of DNA into living cells. Cloning vector for E.coli. Cloning vectors for organisms other than E.coli, yeast, fungi, plants agrobact, plant virus animal viruses.
Application of cloning in gene analysis: How to obtain a clone of a specific gene,
studying gene location of structure, studying gene expression.
Gene cloning and expression of foreign genes in research and biotechnology, Production of protein from cloned gene.
Gene cloning in medicine : Pharmaceutical compounds, artifical insulin gene, recombinant vaccine, diagnostic reagents.
Practical -Bases on theory syllabus M.M. : 50.

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COMPUTER APPLICATION
(Common for B.A./B.Com./B.Sc.)

		Science	Com./Arts
Paper I	Data Base Management System	50	65
Paper II	Structured Programming and Computer Graphics	50	65
Practical	Programming Laboratory	50	70
	On-the-Job training (4 weeks)		

The duration of these papers will be 3 hours.

Paper I : Data Base Management System

Categorization of DBMS Systems. Network. Hierarchical and relational databases. Application of DBMS systems.

Relational data bases management system. Why to use them and where. Data Description Language. Data Manipulation Language and Data Control Language.

Introduction to DBASE, DBASE commands. Development of an application under DBASE using forms, screens and PRG. files.

Security considerations in database management systems. Performance improvement in databases.

Relational databases - advanced concepts. Introduction to ORACLE/INGRES or a similar RDBMS on a multiuser environment. Structured query language. Form design on a advanced RDBMS. Report generator, Query by example and Report by form. Accessing RDBMS using programming languages.

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COMPUTER APPLICATION (VOCATIONAL COURSE) FOR

B.A./B.Com/B.Sc. Part II

Paper-I

Paper Name : Operating System

Unit I

Concepts: Operating System & its need, Objectives of Operating System, Functions of Operating System, Types of OS: Simple Batch Systems, Multi-programmed Batch System, Time Sharing Systems, Parallel System, Distributed Systems and Real-Time Systems, Booting Process of OS, Operating System Structure.

Unit II

Process Management: Process Concept, Process States, Process Scheduling.
CPU Scheduling Algorithms: Basic Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multiple Feedback Queue, Multiple- Processor Scheduling.

Unit III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

Unit IV

Memory Management: Background, Why use memory management in OS, Logical versus Physical Address Space, Swapping, Contiguous Allocation (Fragmentation), Paging, Segmentation, Basic concept of Virtual Memory and Demand paging.
Introduction to File System : File Concepts(Operations and Attributes), Directory Structure, File System Structure

Unit V

Introduction of different Operating System(Linux, Unix, Windows Server), Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Input and Output, Inter Process Communication, network Structure, Security.

Recommended reference books:

1. A. Silbersachatz and P.Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.
2. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.
3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.
4. Peterson Richard, " The Complete Reference Linux " Tata McGraw Hill.
5. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6. Achyut S. Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.
7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001

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Paper-II

Paper Name : Database Management System

Unit I

Data, Data Processing, Merits and demerits of file organisation. Database Overview, Purpose of the Database system, File systems Vs. Database Systems, View of Data: Data Abstraction, Instances, Schema, Data Models: Overview of Network, Hierarchical, and Relational Model, Database Architecture and Administrators, Codd's Rules.

Unit II

ER Model: Basic Terminology, Entity, Entity sets, attributes and keys, Relation and Relationship sets, Entity-Relationship Diagram, Weak and Strong entity types, Features of E-R Model, Specialization, Generalization Aggregation, Creating table from ER diagram.

Unit III

Basic Concept of functional dependencies, loss less decomposition and dependency preservation. Normalization and its types: 1NF, 2NF, 3NF and BCNF. Introduction to transactions, Transaction States.

Unit IV

Query Languages: DDL, DML, DCL, Introduction to SQL, Data Types, Basic SQL commands like Create, Alter, Drop, Truncate, Insert, Update, Delete etc.

Unit V

Transaction management and Concurrency control, Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),database recovery management.

Recommended Books:

1. Korth H.F and Silberschatez A, System Concepts, Sixth Edition; McGraw Hill,2010
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4th Edn: BPB,2009
4. Navathe S.B. Elmasri R,; Fundamentals of Database Systems, 5th Edn, Pearson 2011.
5. Ramakrishan and Gharke, Database Management Systems, 3rd Ed, TMHI, 2007.
6. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

Paper-III

Paper Name : DBMS Lab
Content : Lab practical's based on paper II.

System management. User management Security considerations Practical.

Design of a database for a business application. Design of data entry forms and report layouts for this database. Creation of programs to access and manipulate database.

Development of a business application in RDBMS.

Paper-II : Structured Programming and Computer Graphics

Introduction. Need of structured programming. Methods of documentation. Methods of analyzing a program requirements. Data flow diagrams. Entity relationship. Flow charts.

Various categories of programming language (3GL, 4GL, etc.), introduction to C and COBOL. Program development in C using structured programming concepts.

Why Graphics. Various types of graphics programs. Drafting packages. DTP packages. Microsoft Windows. Various documentation cum DTP packages e.g. Wordperfect, Microsoft Word etc.

Introduction to a Pagemaker/Ventura or a similar package. Preparation of documents using DTP package. Formatting. Various fonts and characters set. Various type of printers used in DTP. Introduction to commercial DTP system available in market. Indian language fonts. Creation of Indian language fonts.

Practical

Development of a business application using C.

Preparation of a document and publishing it using a DTP System. Creation of fonts.

Managing a Microsoft Window session. Creating groups and program items under Window. Turning Windows for a computer system.

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SYLLABUS

B.Sc. PART-III

Examination-2025

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Scheme of Examination
B.Sc. (Pass Course) Part-III

The number of paper's and the maximum marks for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper. Wherever prescribed separately. Classification of successful candidates shall be as follows :

First Division 60%
Second Division 48%

} of the aggregate marks prescribed at (a) Part first Examination excluding those obtained in the compulsory subject (b) Part Second Examination (c) Part Third Examination taken together.

All the rest will be declared to have passed the Examination. If they obtain a minimum pass marks in each subject viz 36% No division shall be awarded at the Part First and Part Second Examinations:

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CONTENTS

	Optional Subjects :-	PAGE NO
1.	Physics	4 - 12
2.	Chemistry	13 - 18
3.	Zoology	19 - 27
4.	Botany	28 - 36
5.	Geology	37 - 39
6.	Mathematics	40 - 44
7.	Economics	45 - 49
8.	Geography	50 - 53
9.	Statistics	54 - 57
10.	Applied Statistics	58 - 59
11.	Psychology	60 - 63
12.	Electronics	64 - 68
13.	Environmental Science	69 - 73
Additional Optional Subjects ;		
1.	Textile Craft	74 - 75
2.	Garment Production and Export Management	76 - 79
3.	Geology and Mining	80 - 82
4.	Bio Technology	83 - 85

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PHYSICS

Scheme			
Paper I	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 33
Paper II	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 33
Paper III	Exam: 3 hours duration	Min Pass marks: 12	Max. Marks : 34
Practical	Exam: 4 hours duration	Min Pass marks: 18	Max. Marks : 50

Paper I: Quantum Mechanics and Spectroscopy

Work Load: Two hours Lecture per week

Scheme of Examination: First question will be of nine marks comprising of six short answer type parts each with answer not exceeding half a page. Remaining four questions will be set with one question from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

Unit – I : Evolution of quantum physics

1. Difficulties of classical mechanics to explain: the black-body emission spectrum, specific heat of solids. Plank quanta concept and radiation law, Photo electric effect and Einstein's explanations. Compton effect, De-Broglie hypothesis, diffraction and interference experiments of particle (Davisson-Germer experiment).

2. Uncertainty principle: position and momentum, angle and angular momentum, energy and time. Application of uncertainty principle: (i) Ground state energy of hydrogen atom, (ii) ground state energy of simple harmonic oscillator, (iii) Natural width of spectral lines, (iv) Non-existence of electron in nucleus.

3. Operators: linear operators, product of two operators, commuting and non-commuting operators, simultaneous eigen functions and eigen values, orthogonal wavefunctions. Hermitian operators, their eigenvalues, Hermitian adjoint operators.

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eigenvalues and eigenfunctions; expectation values of operators: position, momentum, energy; Ehrenfest theorem and complementarity, Concept of group and phase velocity, wave packet, Gaussian wave packet, bra-ket notation.

Unit – II : Schrödinger wave equation and its solutions

1. Schrödinger wave equation: general equation of wave propagation, propagation of matter waves, time dependent and time-independent Schrödinger equation, wavefunction representation (ψ), physical meaning of ψ, properties and conditions on ψ, postulates of wave mechanics, operators, observable and measurements; probability current density.

2. Time independent Schrödinger equation, stationary state solution, one dimensional problem: particle in one dimensional box, eigenfunctions and eigenvalues, discrete energy levels, generalization into three dimension and degeneracy of energy levels, concept of a potential well and barrier, step potential, penetration through rectangular barrier, reflection and transmission coefficients, barriers with special shapes (graphical representation), quantum mechanical tunneling (alpha decay).

Unit – III : Schrödinger equation solutions in special cases

1. Symmetric square well potential, reflection and transmission coefficients, resonant scattering; Bound state problems: particle in one dimensional infinite potential well and finite depth potential well, energy eigenvalues and eigenfunctions, transcendental equation and its solution; Simple harmonic oscillator, Schrödinger equation for simple harmonic oscillator and its solution, eigenfunction, eigenvalues, zero point energy, quantum and classical probability density, parity, symmetric and antisymmetric wave functions with graphical representation.

2. Schrödinger equation in spherical coordinates, Schrödinger equation for one electron atom in spherical coordinates, separation into radial and angular variables, solution of radial equation and angular equation, qualitative discussion of spherical harmonics, series solution and energy eigenvalues, stationary state wavefunction. Wave-functions of H-atom for ground and first

excited states, average radius of H-atom, Bohr correspondence principle, orbital angular momentum and its quantization, commutation relation, eigenvalues and eigenfunctions.

UNIT IV: H-atom, Atomic and Molecular spectroscopy

1. Energy level derivation for H-atom, quantum features of hydrogen spectra and hydrogen like spectra, Stern-Gerlach experiment, electron spin, spin magnetic

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moment, spin-orbit coupling, qualitative explanation of fine structure, Franck-Hertz experiment, Zeeman effect, normal Zeeman splitting, Qualitative understanding about Stark effect.

2. Absorption and emission spectroscopy, its block diagram, brief explanation about function of each elements and it's limitations; single beam spectrophotometer.

3. Molecular spectroscopy: concept of rigid rotator, rotational energy levels, rotational spectra, selection rules, intensity of spectral lines, isotopic effect; Vibrational energy levels, vibrational spectra, selection rules, isotopic effect, effect of anharmonicity in vibrational spectra, vibrational-rotational spectra of CO and HCl molecules.

Reference books

1. D.J. Griffiths, Introduction to Quantum Mechanics, 2nd edition.
2. R. Shankar, Principles of Quantum Mechanics, 2nd edition.
3. Arthur Beiser, Perspective of modern Physics, 6th edition.
4. AK Ghatak and S Lokanathan, Quantum Mechanics: Theory and application.
5. HS Mani, GK Mehta, Introduction to modern Physics.
6. C.N. Banwell and E.M. McCash, Fundamental of Molecular Spectroscopy, 4th edition.
7. H.E. White, Intoduction to atomic physics,

Paper II: Nuclear and Particle Physics

Work Load: Two hours Lecture per week

Scheme of Examination: First question will be of nine marks comprising of six short answer type parts each with answer not exceeding half a page. Remaining four questions will be set with one question from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

UNIT - I

Properties of Nucleus : Discovery of Nucleus, Rutherford Scattering. Constituents of the Nucleus, Mass, Charge, Size, Nuclear Density, Charge Distribution, Hofstadter's experimem.

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Nuclear Angular momentum, Nuclear Magnetic Dipole Moment, Electric Quadrupole Moment, Spin. . Isospin, Wave Mechanical Properties: Parity and Statistics, Classification of Nuclei:. Mass Defect and Binding Energy, Packing Fraction, Mass Spectrograph.

Nuclear Forces: Properties of Nuclear Forces. Yukawa Meson Theory, Nuclear Potential.

Nuclear Models: Segre Chart, Liquid Drop Model, Semi Empirical Mass Formula, Condition of Stability, Fermi Gas Model, Evidence for Nuclear Shell Structure, Nuclear Magic Numbers and Basic Assumptions of the Shell Model.

UNIT - 2

Radioactive Decays: Alpha Decay-Basics of α-Decay Processes, Theory of β-Emission Spectrum, Gammow Factor, Geiger Nuttal Law, Range of Alpha Particles,

Beta Decay-Energy Kinematics for β-Decay, β-Decay Spectrum, Positron Emission, Electron Capture, Pauli's Neutrino Hypothesis.

Gamma Decay- Gamma Ray Emission and Kinematics, Internal Conversion

Applications of Radioactivity

Nuclear Fission and Fusion: Nuclear Fission, Spontaneous Fission and Potential Barrier, its Explanation by Liquid Drop Model, Chain reaction, Controlled chain reaction, Four Factor Formula, Nuclear Reactors, Classification of Nuclear Reactor, Uncontrolled Chain Reaction, Nuclear Fusion. Energy released in Nuclear Fusion, Fusion in stars.

Nuclear Reactions: Types of Reactions, Conservation Laws, Kinematics of Reactions, Q-Value, Threshold Energy, Reaction Rate, Reaction Cross-Section.

UNIT - 3

Interaction of Nuclear Radiation with Matter: Energy Loss by Heavy Charged Particles in Matter , Interaction of Electrons with Matter, Range of Charged Particle, Bremsstrahlung, Cherenkov Radiation, Gamma Ray Interaction With Matter.

Radiation Detectors: Gas filled detector, Avalanche, Geiger Discharge, Ionization Chamber, Proportional Counter, Geiger Muller Counter, Current mode and Pulse Mode Operation of Detector.

Particle Accelerators: Ion source, Van-de-Graff Accelerator (Tandem Accelerator), Linear Accelerator, Cyclotron. Synchrocyclotron. Betatron, Proton Synchrotron

UNIT - 4

Elementary Particles: Necessity of high energy to discover elementary constituents. historical introduction to discovery of elementary particles (electron, positron, neutrinos,

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strange mesons, charm quark, intermediate vector bosons, bottom quark, top quark and Higgs boson) Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.), elementary particles included in the standard model.

Fundamental Interactions : Four types of fundamental forces. Symmetries and Conservation Laws. Diescrete symmetries C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction, CP violation.

Quark Model : Flavor symmetries, Gellmann-Nishijima formula, the eightfold way, Quark model, Octet Diagram for Mesons and Baryons, Concept of Quark model, the November Revolution, Baryon Decuplet, Color Quantum Number and Gluons.

Suggested Books:

1. Nuclear and Particle Physics, W. E. Burcham and M Jobes, Addison Wesley Longman Inc.
2. Nuclear and Particle Physics, Brian R Martin, John Wiley & Sons.
3. Introduction to Nuclear and Particle Physics, Das and Ferbal, World Scientific.
4. Elements of Nuclear Physics, Walter E. Meyerhof, McGraw-Hill Book Company.
5. Introductory Nuclear Physics, Kenneth S. Krane, John Wiley & Sons.
6. Introduction to Elementary Particles, David J. Griffiths, John Wiley & Sons.
7. Radiation Detection and Measurement, G.F. Knoll (John Wiley & Sons)
8. Introduction to Nuclear and Particle Physics, V. K. Mittal, R. C. Verma, S. C. Gupta, PHI
9. Concepts of Modern Physics, A. Beiser, McGraw-Hill Book Company.

Paper III: Solid State Physics

Two hours Lecture per week

Scheme of Examination: First question will be of ten marks comprising of five short answer type parts each with answer not exceeding half a page. Remaining four questions will be set with one question from each of the unit and will be of six marks each. Second to fifth question will have two parts namely (A) and (B) each carrying three marks. Part (A) of second to fifth question shall be compulsory and Part (B) of these questions will have internal choice.

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Unit I

Bonding in Solids and Crystal structure:

Force between atoms. Ionic bonds. Covalent and metallic bonds, Vander waal's and Hydrogen bonding. Periodicity in lattices, Basis, lattice point and space lattice, Translation vectors. Unit and primitive cell, Crystal systems, Packing fractions for Simple Cubic (SC), Body Centred Cubic (BCC), Face Centred Cubic (FCC) and Hexagonal lattice structures, Bravais space lattices.

Crystallography and Diffraction:

Direction, planes and miller indices in a crystal lattice, Reciprocal lattice and its significance, Conversion of SC and FCC structures in reciprocal lattice frame, Concept of crystalline, polycrystalline and amorphous materials, X-ray diffraction by solids: Laue and Braggs equation, Study of crystals by X-rays: FWHM, Sherrer formula and Lattice Constants (for simple cubic structure), Electron and Neutron diffraction (qualitative).

Unit II

Band theory of solids:

Formation of bands, Periodic potential and Bloch Theorem, Number of states in the bands, Kroning Penny model, Brilliuon zones, Crystal momentum and physical origin of effective mass, Negative Effective Mass and Holes, Energy dispersion relations: weak and tight binding.

Semiconductors:

Energy band Structures in Insulators, Conductors, Semiconductors, Concept of Direct and Indirect band gap in semiconductors, Generation and recombination of charge carriers, Mobility of charge carriers, Hall Effect in semiconductors: Hall coefficient, Mobility, Charge carrier concentration, Conductivity and Hall angle.

Unit III

Thermal properties of Materials:

Elastic waves, Phonon, Phonon dispersion relations in monoatomic and diatomic linear lattice, Lattice heat capacity, Classical theory of specific heat, Dulong-Petit's law, Einstein and Debye's theory of specific heat of solids and limitations of these models, concept of Thermoelectric Power.

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Electrical properties of Materials:

Drude-Lorentz theory. Sommerfeld's Model, Thermal conductivity, Electrical conductivity, Widemann-Franz relation, Thermionic Emission, Escape of electrons from metals, Hall Effect in Metals, Density of states.

Unit IV

Magnetic properties of Materials:

Classification of Magnetic Materials. Origin of Atomic Magnetism, Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum theory of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism. Concept of Domain Wall, Magnetostriction, Heisenberg's Exchange Interaction, Relation between Exchange Integral and Weiss Constant.

Superconductivity:

Experimental features of superconductivity: Critical Temperature, Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation); Cooper Pair and Coherence length. Josephson Effect (No derivation)

Reference Books

1. Introduction to Solid State Physics— Charles Kittel (Wiley Publication)
2. Elementary Solid state Physics-----M. Ali Omar (Pearson Education)
3. Elements of X-ray diffraction----B. D. Cullity (Prentice Hall)

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Teaching	Practicals	
	4 hrs/week	
Max. Marks	Duration	Min. Pass Marks
50	5 hrs.	18

Total number of experiments to be performed by the students during the session should be 16 selecting any 8 from each section

Section–A

1. Determination of Planck's constant by photo cell (retarding potential method using optical filters, preferably five wave length).
2. Determination of Planck's constant using solar cell.
3. Determination of Stefan's constant (Black body method)
4. Study of the temperature dependence of resistance of a semiconductor (four probe method).
5. Study of Iodine spectrum with the help of grating and spectrometer and ordinary bulb light.
6. Study of characteristics of a GM counter and verification of inverse square law for the same strength of a radioactive source.
7. Study of β-absorption in Al foil using GM Counter.
8. To find the magnetic susceptibility of a paramagnetic solution using Quinck's method. Also find the ionic molecular susceptibility of the ion and magnetic moment of the ion in terms of Bohr magneton.
9. Determination of coefficient of rigidity as a function of temperature using torsional oscillator (resonance method).
10. Study of polarization by reflection from a glass plate with the help of Nicliol's prism and photo cell and verification of Brewster law and law of Malus.
11. e/m measurement by helical Method.
12. Measurement of magnetic field using ballistic galvanometers and search coil. Study of variation of magnetic field of an electromagnet with current.
13. Measurement of electric charge by Millikan's oil drop method.

Section–B

1. Study of a R-C transmission line at 50 Hz
2. Study of a L-C transmission line
   (i) at fixed frequency.
   (ii) at variable frequency.
3. Study of resonance in an LCR circuit (using air core inductance and damping by metal plate)

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(i) at fixed frequency by varying C, and
(ii) by varying frequency.

4. Study of the characteristics of junction diode & Zener diode.
5. Study of
   (i) Recovery time of junction diode and point contact diode.
   (ii) Recovery time as a function of frequency of operation and switching current.
6. To design Zener regulated power supply and study the regulation with various loads.
7. To study the characteristics of a field effect transistor (FET) and design/study amplifier of finite gain (10).
8. To study the frequency response of a transistor amplifier and obtain the input and output impendence of the amplifier.
9. To design and study of an R-C phase shift oscillator and measure output impedence (frequency response with change of component of R and C).
10. To study a voltage multiplier circuit to generate high voltage D.C. from A.C.
11. Using discrete components, study OR, AND, NOT logic gates, compare with TTL integrated circuits (I.C.'s).
12. Application of operational amplifier (OP-AMP) as : Minimum two of the following exercises–(a) Buffer (for accurate voltage measurement) (b) Inverting amplifier (c) Non Inverting amplifier (d) Summing amplifier.

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2. CHEMISTRY
Scheme

Max Marks: 150

	Duration (hrs)	Max. Marks	Min. Pass Marks
Paper I	3	33	
Paper-II	3	33	36
Paper-III	3	34	
Practical	5	50	18

Note: Ten (10) questions are to be set taking two (02) questions from each unit. Candidates have to answer any 5 questions selecting at least one question from each unit.

CH-301 Paper-I : Inorganic Chemistry
(2 hrs or 3 periods/ week)

Unit-I

Hard and Soft Acids and Bases (HSAB):
Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Unit-II

Metal-ligand bonding in Transition Metal complexes:
Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal-field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

Magnetic properties of Transition Metal Complexes:
Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ_s, and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit-III

Electron spectra of Transition Metal Complexes:
Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d^1 and d^9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

Thermodynamic and Kinetic Aspects of Metal Complexes:
A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

Unit-IV

Organometallic Chemistry:
Definition, nomenclature and classification of organometallic compounds. Preparation,

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properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metalethylenic complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Unit-V

Bioinorganic Chemistry:
Essential and trace elements to Biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}. Nitrogen fixation.

Inorganic Polymers:
Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

CH-302 Paper-II : Organic Chemistry
(2 hrs or 3 periods/week)

Unit-I

Nuclear Magnetic Resonance (NMR) Spectroscopy:
Proton magnetic resonance (1H-NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals. Interpretation of NMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone. Problems pertaining to the structure elucidation of simple organic compounds using NMR data.

Organic Synthesis via Enolates: Acidity of α-hydrogens in reactive methylene compounds, alkylation of diethyl malonate and ethyl acetoacetate. Claisen condensation, Keto-enoltautomerism in ethyl acetoacetate. Synthetic applications of ethyl acetoacetate and malonic ester.

Unit-II

Heterocyclic Compounds
Introduction: Molecular orbital diagram and aromatic characteristics of pyrrole, furan, thiopheneand pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to condensed five- and six-membered heterocyles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher-indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

Unit—III

Carbohydrates
Classification and nomenclature, Monosaccharides, mechanism of osazone formation. Epimers, anomers and mutarotation. Interconversion of glucose and fructose, chain lengthening and chain

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shortening of aldoses. Erythro and threodiastereomers. Conversion of glucose into mannose. Configuration of monosaccharides. Determination of ring size of monosaccharides. Formation of glycosides, ethers and esters. Cyclic structure of D(+)-glucose and fructose. Structures of ribose and deoxyribose.

Nomenclature and structure of disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose); Glycosidic linkage.

Unit-IV

Amino Acids, Peptides, Proteins and Nucleic Acids

Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α-amino acids.

Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end-group analysis, selective hydrolysis of peptides. Classical peptide synthesis. Solid-phase peptide synthesis.

Nucleic acids – Introduction, constituents of nucleic acids - nucleosides and nucleotides.

Unit-V

Organosulphur Compounds : Nomenclature, structural features, methods of formation and chemical reactions of thiols, sulphonic acids, sulphonamides and Sulpha drugs: sulphaguanidine, sulphadiazine (sulphapyrimidine), sulphamethoxazole, sulphacetamide.

Synthetic Polymers : Addition or chain-growth polymerization. Free radical and ionic polymerization. Ziegler-Natta Catalyst Condensation or step-growth polymerization. Polyesters, polyamides, phenol-formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubber.

Synthetic Dyes : Colour and constitution (electronic concept). Classification of dyes. Chemistry and synthesis of methyl orange, congo red, malachite green, crystal violet, phenolphthalein, fluorescein, alizarin and indigo.

CH-303 Paper III: Physical Chemistry

(2 Hrs. or 3 periods/week)

UNIT-I

Elementary quantum Mechanics:

Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's mode of hydrogen atom (no derivation) and its defects. Compton effect.

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of

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the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

UNIT-II

Molecular orbital theory:
Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO-H_2^+ ion calculation of energy level from wave functions, physical picture of bonding and antibonding wave functions, concept of σ, σ^*, π, π^* orbitals and their characteristics. Hybrid orbitals - sp, sp^2, sp^3, calculation of coefficients of A.O.'s used in these hybrid orbitals.
Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.

UNIT-III

Spectroscopy
Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom.
Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.
Vibrational Spectrum: Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.
Raman Spectrum: Basic principles and applications, concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules.
Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle. Qualitative description of σ, π and n M.O. their energy levels and the respective transitions.

UNIT-IV

Photochemistry
Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Stark -Einstein law, Jablonski diagram depicting various processes occurring in the exited sate, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

Physical Properties and Molecular Structure
Optical activity, polymerization – (Clausius-Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties-paramagnetism, diamagnetism and ferromagnetic.

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UNIT-V

Solutions, Dilute Solutions and Colligative Properties:

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapor pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression in freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

Practical: CH-304: Laboratory Course – III

(6 hrs/week)

INORGANIC CHEMISTRY

Synthesis and Analysis of:

a) Potassium trioxalatoferrate (III), $K_3[Fe(C_2O_4)_3]$
b) Bis(dimethylglyoximato) nickel (II) complex, $[Ni(DMG)_2]$
c) Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4$
d) Potassium cis-diaquabis(oxalato)chromate (III) dihydrate, $K[cis\text{-}Cr(H_2O)_2(C_2O_4)_2].2H_2O$

Instrumentation

Calorimetry

(a) Job's
(b) Mole-ration method

Adulteration-Food stuffs

Effluent analysis water analysis

Solvent Extraction

Separation and estimation of Mg (II) and Fe (II)

Ion Exchange Method

Separation and estimation of Mg (II) and Fe (II)

ORGANIC CHEMISTRY

Laboratory Techniques

Steam Distillation

Naphthalene from its suspension in water
Clove oil from Clove
Separation of o- and p-nitrophenols

Column Chromatography

Separation of fluorescein and methylene blue
Separation of plant pigments from spinach leaves
Resolution of racemic mixture of (+) mendelic acid

Qualitative Analysis

Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, for separation and preparation of suitable derivatives.

Synthesis of Organic Compounds

(a) Acetylation of salicylic acid, aniline, glucose and hydroquinone.

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Benzoylation of aniline and phenol

(b) Aliphatic electrophilic substitution

Preparation of iodoform from ethanol and acetone

(c) Aromatic electrophilic substitution

Nitration

Preparation of m-dinitrobenzene

Preparation of p-nitroacetanilide

Halogenation

Preparation of p – bromoacetanilide

Preparation of 2, 4, 6 – tribromophenol

(d) Diazotizatoin / coupling

Preparation of methyl orange and methyl red

(e) Oxidation

Preparation of benzoic acid from toluene

(f) Reduction

Preparation of aniline from nitrobenzene

Preparation of m-nitroaniline from m-dinitrobenzene.

Stereochemical Study of Organic Compounds via Models

R and S configuration of optical isomers.

E, Z configuration of geometrical isomers.

Conformational analysis of cyclohexanes and substituted cyclohexanes.

PHYSICAL CHEMISTRY

Electrochemistry

(a) To determine the strength of the given acid condcutometrically using standard alkali solution.

(b) To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically.

(c) To study the saponification of ethyl acetate conductometrically.

(d) To determine the ionization constant of a weak acid conductometrically.

(e) To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMnO_4/K_2Cr_2O_7$ as titrant and calculate the redox potential of Fe^{++}/Fe^{+++} system on the hydrogen scale.

Refractometry, Polarimetry

(a) To verify the law of refraction of mixture (e.g. of glycerol and water) using Abbe's refractometer.

(b) To determine the specific rotation of a given optically active compound.

Molecular Weight Determination

(a) Determination of molecular weight of a non-volatile solute by Rast method/Beckmann freezing point method.

(b) Determination of the apparent degree of dissociation of an electrolyte (e.g. NaCl) in aqueous solution at different concentrations by ebullioscopy.

Colorimetry

(a) To verify Beer-Lambert law $KMnO_4/K_2Cr_2O_7$ and determined the concentration of the given solution of the substance.

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Syllabus: B.Sc. Part-III (Pass Course)

Zoology

(2022-2023)

Scheme:
Max. Marks: 100 Min. Pass Marks: 36

Paper I	**: 3 Hrs duration**	**33 Marks**
Paper II	: 3 Hrs duration	33 Marks
Paper III	: 3 Hrs duration	34 Marks
Practicals	: 4 Hrs. duration	50 Marks

NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, *i.e.*, three from each unit /section out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

PAPER –I: Z-301
STRUCTURE AND FUNCTIONS OF CHORDATE TYPES

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

Section – A

Chordates

1. Comparison of habit, external features and anatomy of *Herdmania* and *Branchiostoma* (excluding development).
2. Ascidian tadpole larva and its metamorphosis.
3. Affinities of Hemichordata, Urochordata and Cephlochordata
4. Habit, habitat and salient features of *Petromyzon*, Ammocoete larva.

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Section – B

Structure, organs and Systems: Brain, endoskeleton, Digestive, Circulatory, Respiratory, Excretory, Nervous & Reproductive

Pisces- Labeo
Amphibian-Frog
Reptile-Varanus
Aves-Pigeon
Mammal- Rat

Section – C

Chordate Adaptations

1. Pisces: Scales and fins, migration and parental care.
2. Amphibia: Parental care.
3. Reptilia: Poisonous and non poisonous snakes, poison apparatus.
4. Aves: Flight adaptations, types of feather, bird migration.
5. Mammals: Adaptive radiation, dentition.

PAPER –II: Z-302
ECOLOGY, ENVIRONMENTAL BIOLOGY AND EVOLUTION

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selection at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

Section – A

Ecology

1. Basic concepts in ecology, its meaning and history.
2. Concepts of limiting factors.
3. Ecosystem: Biotic and abiotic factors.
4. Ecosystem: Production, consumption and decomposition in an ecosystem: Concepts of food-chain, food web, trophic structure, ecological pyramids
5. Biogeochemical cycles of O_2, CO_2, H_2O, N, P and role of microbes.
6. Ecosystem: Homeostasis, functional aspects, productivity concepts and determination, ecotone, edge effects, niche.
7. Population ecology: Density and methods of its measurement, natality, mortality, age ratio and distribution, pyramids, fluctuations, biotic potential, dispersal, growth forms, population interactions and propagation, brief idea of demography.
8. Community ecology: Characteristics of natural communities, structure, composition, stratification.
9. Ecological succession: Types and patterns, concept of climax, details of xerosere and hydrosere successions.

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10. Habitat ecology: Brief account of fresh water, marine, terrestrial and estuarine water ecosystems.
11. Ecology and human future: Growth rate role of human kind in modifying natural communities in term of public health and welfare with respect to use of pesticides, conservation and pollution.

Section – B

Environmental Biology

1. Environment and its concepts, hydrosphere, lithosphere and atmosphere.
2. Natural resources: Conservation and management of natural resources: Renewable (forest, wildlife, water) and non renewable (soil, minerals and energy).
3. Environmental pollution: General outline and various types of pollution of water, air, and soil. Sources and remedies for noise, radiation.
4. Green House effect, Ozone layer depletion, EI-Nino and La I Nina effects.
5. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.
6. Impact of urbanization: Development and distribution of urban centers, factors, problems and solutions of urbanization, fauna of oriental region.
7. Wildlife conservation: Vanishing and threatened animals and plants with special reference in Rajasthan, Wildlife management efforts by Government and non Government organization.
8. Space ecology: Space ecosystem, space problems and their solutions, colonization.

Section - C

Evolution

1. Darwinism and Neo Darwinism, Lamarckism and Neo Lamarckism, natural Selection.
2. Variation, Isolation, Mutations.
3. Concept of Species and Speciation.
4. Adaptations (Desert, freshwater, Deep Sea and Flight), Mimicry.
5. Polymorphism: population genetics, Genetic drift and Hardy-Weinberg Law.
6. Evolution Man, Phylogeny of Horse.
7. Zoogeography: Principles and concepts of Parallelism, endemism etc. and factors influencing animal distribution.
8. Zoogeographical realms and faunal peculiarities, evolution of realms, plate tectonics and continental drifts and Island Zoogeography.

PAPER –III: Z-303
APPLIED ZOOLOGY, ETHNOLOGY AND BIOSTATISTICS

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
   Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

Section – A

Applied Zoology

Principles and Practices of the following:

1. Vermiculture.
2. Sericulture (including ericulture).
3. Lac culture.
4. Apiculture.
5. Prawn culture.
6. Poultry keeping.

Economic Importance of the following:

1. Protozoa.
2. Corals and coral reefs.
3. Helminthes.
4. Arthropods; Insects and their management
5. Mollusca: Outline idea of pearl culture.

Section – B

Ethology

1. Introduction and history of Ethology.
2. Concepts of Ethology : Fixed action pattern, sign stimulus, innate releasing mechanism, action specific energy, motivation imprinting and learning.
3. Pheromones and their role in alarm spreading
4. Societies: Characteristics and advantage with special reference to honey bee & deer.
5. Biological rhythms and biological clocks.
6. Methods of studying animal behavior.

Section – C

Biostatistics

1. Introduction, scope and application of Biostatistics.
2. Understanding the concepts of descriptive and inferential statistics.
3. Frequency distribution.
4. Graphical and tabular presentation of data.
5. Mean, median, mode and their significance.
6. Standard deviation, standard error and their significance.
7. Hypothesis: Null and alternative; Student's t- test.

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Syllabus: B.Sc. Part-III (Pass Course)
Zoology Practical
(2022-2023)

Min. Marks: 18 **4 Hrs. / Week** **Max. Marks: 50**

I. Anatomy:

Any edible fish (*Wallago, Labeo*): External features, general viscera, afferent and efferent branchial blood vessels, eye muscles and their innervations, brain, cranial nerves and internal ear.

II. Study of the following through Permanent Slide preparations:

Striped muscle fibers; Smooth muscle fibers, scales of edible fish, hair of man, bollod film of any vertebrate.

III. Study of Microscopic Slides: Whole mounts of oral hood, velum and pharyngeal wall of *Amphioxus*; T. S. of *Amphioxus* through various regions; tadpole larva of *Ascidia*; whole mounts of *Salpa, Doliolum* and *Oikopleura*, V. S. of skin of fish, T. S. body of fish through various regions, V. S. of skin of bird, V. S. mammalian skin, T. S. mammalian liver, kidney, stomach, intestine, bone, spinal cord, lung, duodenum, pancreas, testis and ovary.

IV. Study of Museum Specimens: *Ascidia, Ciona, Botryllus*, Ammocoete larva, *Petromyzon, Myxine* or *Bdellostoma, Zygaena* (*Sphyrna*), *Torpedo, Chimaera*; *Acipenser, Amia* or *Lepidosteus, Labeo, Clarias, Anguilla, Hippocampus, Exocoetus, Echeneis*, any flat-fish, Protopterus, *Icthyophis* or any blind-worm, *Proteus, Ambystoma*, Axolotl, Siren, *Alytes, Hyla, Testudo, Chelone*, and Fresh Water Tortoise, *Sphenodon, HemidactylusPhrynosoma, Draco,Chameleon*; *Eryx, Hydrophis, Naja,Viper,Crocodilus, Alligator, Archaeopteryx*, any Running Bird, *Pavo cristatus,Choriotis nigriceps,Ornithorhynchus, Tachyglossus, Didelphys, Macropus*, Bat, *Loris*, Scaly anteater.

V. Osteology: A comparative study of articulated and disarticulated bones of skull, vertebrae, limb bones and girdles of any amphibian, reptile, bird and mammal with the help of models/ charts/ artificial skeleton/bones.

VI. Environmental Biology:
Analysis of Environment:
1. Soil pH
2. Water analysis: pH, alkalinity, acidity, dissolved O_2 and free CO_2, Salinity (Chloride).
3. Qualitative estimation of zoo-plankton in given sample of water.

VII. Ethology:
1. Study of any stored insect pest (food preference and response to light)
2. Antennal grooming in cockroach.
3. Chemical communication: Ants/earthworm.
4. Visit to a Zoo/ Museum of Natural History /Wild life Sanctuary and/or Study of local faunal biodiversity (Candidates are expected to submit a detailed report of such visit).

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VIII. Biostatistics:

1. Construction of frequency table, bar diagram, line diagram, histogram, frequency polygon and pie chart.
2. Exercises on mean, median and mode (direct, short –cut and step-deviation methods).
3. Standard deviation and standard error.

B.Sc. Part - III
Scheme of Practical Examination and Distribution of Marks

Time: 4 Hrs. **Min Pass Marks: 18** **Max. Marks: 50**

		Regular	Ex. /N.C. Students
1.	Anatomy	6 (4+2)	7 (5+2)
2.	Permanent Preparation	5	6
3.	Environmental Biology	5	5
4.	Ethology	3	5
5.	Biostatistics	5	6
6.	Identification and comments on Spots (1 to 8)	16	16
7.	Viva Voce	5	5
8.	Class Record	5	-
		50	**50**

Notes:

1. With reference to anatomy and study of museum specimens, candidates must be well versed in the study of various systems with the help of charts/models/CD- ROMs, multimedia computer based simulations including computer assisted learning (CAL) and other softwares.
2. With reference to permanent preparations and microscopic slides, in case of non-availability, the exercise should be substituted with diagrams, photographs, models, charts, etc.
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

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Recommended Books:

1. Ahsan J and Sinha SP: A Hand book on Economic Zoology. 9th edition S. Chand & Co. Ltd., 1981.
2. Alcock J: Animal Behavior: An Evolutionary Approach. Sinauer Associates 2013.
3. Animal Societies and Evolution. Scientific American Publications.
4. Alexander R. M: The Chordates, Cambridge University Press. 1975.
5. Bailey NTJ: Statistical Methods in Biology. English Universities Press, 1964.
6. Breed MD and Moore J: Animal Behavior. Academic Press. 2015.
7. Grizimek's Encyclopedia of Ethology.
8. Gurumani N: An Introduction to Biostatistics. MJP Publishers, 2011.
9. Hand book of Ethological Method. Laharen Publications Garland STPM Press.
10. Kotpal RL: Modern Text Book of Zoology: Vertebrates. Global Media Publications 2010.
11. MacFarland D: Animal Behavior: Psychobiology, Ethology and Evolution 3rd edition Longman 1998.
12. Mahajan BK: Methods in Biostatistics. 7th edition Jaypee Publishers, 2010.
13. Manning A, Dawkins MS: An Introduction to Animal Behavior. Cambridge University Press 2012.
14. Mathur R: Animal Behavior. Rastogi Publications 2010.
15. Odum: Fundamentals of Ecology. Thomson Books/Cole 2005.
16. Odum: Ecology: A Bridge Between Science and Society Sinauer Associates 1997.
17. Prasad SN and Kashyap V: A Textbook of Vertebrate Zoology.13th edition Wiley Eastern Ltd. 2011.
18. Primrose S. B. and. Twyman R. M: Principles of Gene Manipulation and Genomics. John Wiley & Sons, 2013.
19. Rana S. V. S: Environmental Studies. 4th edition. Rastogi Publications 2012.
20. Rastogi VB Organic Evolution 6th edition Kedar Nath Ram Nath Publications,Meerut,Delhi. 1993.
21. Rastogi VB and Jayaraj MS Animal Ecology & Distribution of Animals Kedar Nath Ram Nath Publications, Meerut, Delhi, 1983.
22. Sharma P. D: Environmental Biology and Toxicology. 3rd edition RastogiPublications, 2013
23. Sunder Rao PSS and Richard J: Introduction to Biostatistics and Research Methods .PHI Publishers, 2012.
24. Sharma P. D: Ecology and Environment. 12th revised edition, Rastogi Publications 2014-2015.
25. Werlace RA: Animal Behavior. Good Year Publishing Co., Inc.
26. Young JZ: The Life of Mammals. Oxford University Press 1970.
27. Young JZ: The life of Vertebrates. 2nd edition Oxford University Press. London 1962.

BOTANY
B. Sc. Part III (Pass Course Syllabus)

Scheme

Min. Pass Marks : 36		**Max Marks: 100**
Paper I	3 hrs. duration	**Max. Marks 33**
Paper II	3 hrs. duration	**Max. Marks 33**
Paper III	3 hrs. duration	**Max. Marks34**
Practical Min.Marks: 18	4 hrs, duration	**Max. Marks 50**
		3 hours
		4 hours

Duration of examination of each theory paper-
Duration of examination of practicals-

Note:

1. There will be 5 questions in each paper. Allquestions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. will have 20 very short answer type Questions(not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one questionfrom each unit. These Q.No. 2 to 5 will have internal choice.

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Paper I

PLANT MORPHOLOGY AND ANATOMY

(2 hrs /week)

Unit-1

The basic body plan of flowering plant-modular type of growth. Diversity of Plant form in annuals, biennials and perennials;branching pattern; monopodialand sympodial growth; canopy architecture;meristematic, simple, complex and secretary tissues, tissue systems.

Unit-2

The Shoot system: The shoot apical meristem and its histological organization; vascularisation of primary shoot in monocotyledons and dicotyledons; cambium and its functions; formation of secondary xylem; a general account of wood structure growth rings; sapwood and heartwood; secondary phloem-structure and function; periderm. Anomalous secondary growth.

Unit-3

The Leaf; origin, development, arrangement and diversity in size and shape; Stomata-Structure and types, stomatal index, vascularisationof leaf-nodal structure and venation. Sensescence and abscission.

The root system: Root apical meristem; differentiation of primary and secondary tissues and their functions; structural modification for storage, respiration, reproduction and root- microbe interaction.

Unit-4

Morphology and anatomy of seed (monocotyledons and dicotyledons). Significance of seed-suspended animation; dispersal strategies. Vegetative propagation.

Suggested readings :

Cutter, E.G. 1969. Part I Cells and Tissues. Edward Arnold, London.

Cutter, E.G. 1971. Plant Anatomy : Experiment and interpretation, part-II, organs. Educated Arnold; London.

Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Wiley & Sons, New York.

Fahn, A. 1985. Plant Anatomy, Pergamon Press, Oxford.

Hartman, H.T. and Kestler, D.E. 1976. Plant Preparation : Principles and of India Pvt. Ltd., New Delhi.

Manseth, J.D. 1988. Plant Anatomy. The Benjamin/Cummings Publishing Co. Inc. Menlo Park, California, USA.

Roven, P.M. Evert, R.F. and Eichhien; S.E. 1999. Biology of Plants, W.H. Freeman and Co. Worth Publishers, New York.

Thomas, P. 2000. Trees Their National History. Cambridge University Press, Cambridge.

Suggested Laboratory Exercises:

1. Study of any commonly occurring dicotyledonous plant to understand the body plan and modular type of growth.
2. Life forms exhibited by flowering plants (by visit to a forest or a garden).
3. L.S. of shoot tip to study the organization of meristem and origin of leaf primordial.
4. Monopodial and sympodial types of branching in monocots & dicots.
5. Anatomy of primary and secondary growth in monocots and dicots using hand out sections of sunflower, maize, cucurbita stem and roots.
6. Anomalous secondary growth in stem: *Salvadora, Bignonia, Bougainvillia, Bauhinia, Nyctanthes, Leptadenia, Dracena.*
7. Study of diversity in leaf shape and size. Internal structure of leaf-Dorsiventral and isobilateral leaves; study of stomataltypes.
8. Examination of seed (monocot and dicot). Structure, seed viability test.
9. Specimen study of modifications of plant parts for Vegetative reproduction.

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Paper-II

Ecology & Economic Botany

(2 hrs /week)

Unit-1

Plants and Environment: Atmosphere (four distinct zone viz, stratosphere, troposphere, mesosphere and thermosphere).Adaptation (Morphological, anatomical and physiological responses) of plants to water (Hydrophytes and Xerophytes).

Light (global radiation, photosynthetically active radiation. Zonation in water body: littoral, limnetic and profoundal zones; photoperiodism, heliophytes and sciophytes)

Temperature (Raunkier's classification of plants: megatherm, mesotherm, microtherm, heikistotherm; themoperiodicity andvernalisation).

Soil (soil profile, development-weatheringand maturation). Soil texture, soil types, role of pH, organicmatter, soil water, soil nutrients. Interactions among organisms (neutralism, amensalism, allelopathy), competition,predation, parasitism,protocooperation, mutualism.Environmental protection act.

Unit-2

Community, Ecosystem and Phytogeography: Community characteristics: stratification, life forms and biological spectrum, frequency density and cover. Ecological succession: types(primary and secondary) mechanism nudation, migration,ecesis, reaction and climax: xerosere, hydrosere,

Ecosystems: Structure-abiotic and biotic components, trophic level,food chain, food web, ecological pyramids, energy flow(Box and Pipe model of Odum). Biogeochemical cyclesof carbon, and phosphorus, Vegetation types of Rajasthan,Endangered plants of Rajasthan.

Unit-3

Basic concept of center of origin of cultivated plants. Food plants-rice, wheat, maize, potato, sugarcane. Vegetables : General account with a note on radish, onion, garlic,cabbage, spinach, cauliflower. cucumber, tomato, lady finger and pea. Fruits: General account with a note on apple,banana, ber, mango, mulberry, jamun, watermelon, muskmelon, guava and orange. Vegetable oil: groundnut, mustard and coconut.

Unit-4

Spices: General account with an emphasis on those cultivated in Rajasthan

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(*Cumin, Capsicum, Coriander*). Beverages: Tea and coffee. Medicinal plants: General accounts with an emphasis on plant species cultivated inRajasthan (Senna, Isabgol, Safedmusli). Fibers: Cotton and jute. Wood: General account of sources of firewood, timber and bamboos; Rubber. Ethnobotany: a generalaccount.

Practical Exercises:

1. Study frequency and density, abundance of plant species of campus vegetation by quadrat method.
2. Variation in soil moisture in relation to depth.
3. To estimate bulk density of grassland and woodland soil.
4. To estimate the porosity of grassland and woodland soil sample.
5. To determine moisture content of grassland and wood land soil.
6. To measure dissolved oxygen content in polluted and unpolluted water samples.
7. To measure temperature of different water bodies.
8. Water holding capacity of the soil.
9. Find out pH of soil sample by Universal Indicator method.
10. Find out pH of water sample by pH meter.
11. Find out transparency of a waterbody by Sechhidisk.
12. Study morphology (external and internal) of hydrophytes (*Hydrilla* stem, *Typha*leaf and *Nymphaea*/*Eichhornia*petiole) and xerophytes (*Calotropis*, *Capparis*and *Casuarina*stem, *Nerium*leaf) with special reference to their adaptations.
13. Study following specimen with special reference to:
    1. Botany of the economically important part.
    2. Processing, if any involved.
    3. Specimen of cereals, pulses, spices beverage (tea & coffee)beans, sugar, oil seeds (mustard, groundnut).
14. Study of starch grain in potato and pea. Histochemical test Cellulose, lignin, starch, fat, proteinand tannin.
15. Submit 5 specimens of locally important medicinal plants.

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Paper-III

Angiosperm- Taxonomy and Embryology

(2 hrs /week)

Unit-1

Introduction of Taxonomy, Units of classification, Concept of genus and species. Botanical Nomenclature, International Code of Botanical Nomenclature.

Taxonomic literature: Floras, Gardens, Herbaria, Monographs, Icones, Library.

Types of systems of Classification: Bentham and Hooker's, Engler and Prantle's system.

Diversity of flowering plants illustrated by members and economic importance of the following families: Ranunculaceae, Brassicaceae, Papaveraceae, Malvaceae, Fabaceae, Caryophyllaceae and Apiaceae.

Unit-2

Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Acanthaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae, Arecaceae and Poaceae.

Unit-3

Ontogeny of the flower parts-development and variations. Structure of anther, microsporogenesis, Tapetum types and functions, development of male gametophyte, structure of pollen grains.

Types of ovule, Megasporogenesis, development of female gametophyte(Embryosac). Pollination, Pollination types, Fertilization, double fertilization, significance of double fertilization.

Unit-4

Development of dicot and monocot embryo. Formation of embryo. Types of Embryo. Endosperm, Types of Endosperm, Endosperm haustoria, Polyembrony, Induced polyembryony, Parthenocarpy, Apomixis and adventive embryony.

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Suggested Laboratory Exercises

(A) Taxonomy:

(I) The following genera are suitable for study of families:

1. Ranunculaceae-*Ranunculus*, *Delphinium*.
2. Fabaceae-*Pisumsativum*, *Cassia* and *Acacia*.
3. Apiaceae:*Coriandrum*
4. Convolvulaceae-*Ipomea*, *Jacqumontia*.
5. Apocynaceae-*Catharanthus*, *Thevetia*
6. - Asclepiadaceae-*Calotropis*.
7. Lamiaceae-*Ocimum*, *Salvia*.
8. Euphorbiaceae-*Euphorbiapulcherrima*, *Ricinus*.
9. Acanthaceae-*Adhatoda*.
10. Asteraceae-*Helianthus*
11. Rubiaceae-*Hamelia*
12. Poaceae-*Triticum*

(II) Types of Inflorescence and Fruits:

(III) Embryology

1. T. S. of anther, to study the wall layers and pollen sac with pollen grains.
2. Study the various types of ovule, draw the diagrams.
3. Study the various types of placentations.
4. Study the germination of pollen grain *in situ*and observe the path of pollen tube.
5. Study of various stages of embryo (*Raphanus*fruit)

Suggested Readings:

1. Taxonomy of Angiosperms-V.N. Nair (1995) TMH Publishing Company Limited, New Delhi

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2. Introduction to the Principles of Plant Taxonomy V.V.Sivarajan (1984) Oxford & IBH Publishing Co. Pvt.Ltd., New Delhi.
3. Plant Taxonomy-SushellaM.Das (2003) Dominant Publishers and Distributors, New Delhi.
4. Plant systematics. Gurcharan Singh (2001) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Trivedi, P.C.: N. Sharma and J.L. Sharma (2003) Structure, Development and Reproduction in Flowerine. Plants. Ramesh Book Depot, Jaipur.
6. Bhojwani, S.S. and Bhatnagar, S.P. (2000) The embryology of Angiosperms 4th Edition Vikas Publishing House, New Delhi.
7. An Introduction to the Embryology of Angiosperm. Maheshwari, P.(1950) New Delhi.
8. Recent Advances in the Embryology of Angiosperms. Ed. Maheshwirari, P.(1963) New Delhi.

BOTANY PRACTICAL EXAMINATION B.Sc PART-III

SKELETON PAPER

M.M. 50 **TIME: 4 Hours**

S.No.	Practical	Regular	Ex/NC
1	(a)Plant Taxonomy Describe vegetative and reproductive parts of flower in semi-technical language.Give floral diagram and floral formula and Identify the family giving reasons.	7	7
	(b)Comment on the embryological exercise.	3	3
2	(a). Anatomical exercise on anomalous secondary growth.	5	5
	(b). Anatomy of root/leaf/study of stomatal types	5	5
3	(a) Ecological exercise based on quadrate method/Exercise related to soil	3	3
	(b) Ecological Anatomy	4	4
	(c)Histochemical Test / Economic Botany	3	3
4	Comment upon spots (1-5).	10	15
5	Viva- Voce	5	5
6	Practical record	5	-
	TOTAL	50	50

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5. Geology

Scheme : Max. Marks : 100

Min. Pass Marks : 36

Paper-I : Stratigraphy and geology of India : Marks : 50

Paper-II : Economic Geology & Mineral Economics : Marks : 50

Practical Marks : 50

PAPER-I : Stratigraphy and Geology of India

Section–A

Stratigraphy and its relation with other branches, aims and principles of stratigraphy, environment of deposition facies, Lithology, Homotaxis and contemporaneity.

Standard stratigraphical scale.

Imperfection in geological records, principles of correlation.

Palaeogeography of India in Permo-carboniferous period, Physiographic subdivisions of India.

Stratigraphical divisions in India and their equivalents.

Section–B

Stratigraphy, distribution, lithology, structure, correlation and Mineral riches of the following: Archaeans, cuddaphs and the Vindhyans with special reference to Rajasthan.

Distribution, succession, climate, sedimentation, correlation, fossil content and mineral resources of the Gondwana Supergroup.

Section–C

Triassic Period : Triassic of Spiti–lithology, succession and fossil content.

Jurassic Period : Jurassic of Kachchh, Western Rajasthan–Bagh Beds and Lameta Ghat Series–lithology, succession and fossil content.

Deccan traps–origin, composition, distribution and age; Intertrappean beds-succession, lithology fossils content and distribution.

Tertiary Period : Subdivisions, lithology, distribution, sucesession, and fossils.

Siwalik Supergroup-distribution, lithology, depositional environment and fossils; typical vertebrate fossils.

Pleistocene of Assam. Peninsular India and Kashmir Pleistocene and Recent glaciation.

Tectonic frame work of India.

Practical

Neat drawing of the standard stratigraphical scale, showing against each division or division of the typical lithographic units, the type fossils, the faunal assemblages, their population and ranges etc.

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Neat drawings of the paleogeographical maps of India during Permo- Carboniferous period. Plotting of various geological formation in outline map of India.

Neat drawing of the structural and tectonic map of India.

Identification and description of the following rocks; Banded Hematite, Quartzite, Khondalite, Charnockite, Gondite, Vindhyan Sandstone, Products Limestone, Barakar Sandstone, Golden Oolite, Dhosa Oolite, Nummulitic Limestone, Fenestella Shale, Gondwana Shales with plant impressions.

PAPER-II : Economic Geology and Mineral Economics

Note : The paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all, selecting at least one question from each section.

Section–A

Economic Geology and its relationship with various branches of Geology, Magma and its relationship with mineral deposits; Ore and gangue minerals. Historical development of Economic Geology, Processes, of Mineral formation : Magmatic, Hydrothermal, Contact metasomatic, Evaporation, Oxidation and supergence enrichment, Sedimentation. Mechanical concentration, Residual concentration and Metamorphism.

Section–B

Classification of mineral deposits : outlines of Lindgren's and Bateman's classification, Important ores, Composition physical properties, mode of occurrence, association, origin, distribution in India & uses of the following metals, gold, silver, copper, lead iron, manganese, chromium and aluminum. Examples from Indian stratigraphic record. Environmental implications of exploitation of mineral resources.

Section–C

Important industrial minerals : Model of occurrence, physical properties, chemical composition and distribution in India–Refractory, Abrasives, Ceramics, Cement, Gemstones, Glass, Paint, and Fertilizers.

Coal, petroleum and radioactive minerals : their occurrences, distribution and origin-oil traps.

Building stones : characters, distribution and mode of occurrence.

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Mineral wealth of Rajasthan.

Strategic, Critical & essential minerals; National Mineral policy; Conservation and substitution.

Mineral concession rules; marine mineral resources; and Law of Sea.

Practical

Drawing of neat diagram depicting the following :

(a) Gossan Oxidation zone and supergene enrichment zone.

(b) Structural traps for oil accumulations.

(c) Stratigraphical trap for oil accumulation.

Systematic study, identification, description, mode of occurrences and uses of the following minerals -

Haematite, magnetite, limonite, siderite, pyrites, pyrrohtite, pyrolusite, psilomlance, chromite, ilmemte, wolframite, chalcophyrite, Cuprite, malachite, azurite, galena, sphalerite, cassiterite. Magnesite, bauxite, beryl, realgar, orpiment, stibnite, molybanite, cinabar, barite, Pitchbende, asbestos, muscovite, graphite, sillimanite, Kyanite, zircon, clays, garnet, corundum, gypsum, talc, apatite, rock phosphate, calcite, coal and its varieties.

In an outline map of India plotting of occurrence of the following minerals :

Coppef ore, Pb-Zn Ag ore, Chrome ore, Manganese ore, Aluminum ore, Atomic minerals, rock-phosphate, Mica, diamond, Iron, ore, coal, Gold :

Distribution of important minerals in the outline map in Rajasthan. Plane table and chain survey.

Field training : Field work for at least 10 days duration at the places of geological interest pertaining to the theory papers in the states of Rajasthan/Gujarat/Madhya Pradesh and report thereon along with the submission of field specimens.

Book Recommended :

1. Batman, A.M. : Introduction to economic mineral deposits.
2. Wadia, M.D. : Minerals of India, Book Trust of Publ.
3. Rao, T.C. and Gokhle, K.V.G.K. : Ore deposits of India, their distribution and processing.
4. Krishna Swamy, S. : India's Economic Oxford & I.B.H. Publishing Co., New Delhi.

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6. MATHEMATICS

B.Sc. Part III

Teaching : 3 Hours per Week per Theory Paper.

Examination Scheme :

	Min.Pass Marks		Max. Marks
	Science – 54		150
	Arts – 72		200
		Duration	**Max.Marks**
Paper – I	**Algebra**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – II	**Complex Analysis**	**3 hrs.**	**40 (Science)** **53 (Arts)**
Paper – III	**Mechanics**	**3 hrs.**	**40 (Science)** **54 (Arts)**
Practical		**2 hrs.**	**30 (Science)** **40 (Arts)**

Note:

1. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
2. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
3. An Internal/external examiner can conduct Practical Examination of not more than 100 (Hundred) Candidates (20 Candidates in one batch).
4. Each candidate has to pass in Theory and Practical examinations separately.

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Paper -I : Algebra

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53(Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE Question from each Unit. All questions carry equal marks.

Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

Unit 2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 3: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.

Unit 4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Reference Books:

1. Joseph A. Gallian, Contemporary Abstract Algebra (4th Edition), Narosa Publishing House, New Delhi, 1999.(IX Edition 2010).
2. S Lang, Introduction to Linear Algebra (2nd edition), Springer, 2005.
3. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.
4. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
5. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra 2nd Ed., Prentice-Hall Of India Pvt. Limited, 1971.

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Paper – II: Complex Analysis

Teaching : 3 Hours per Week
Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
53 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Complex plane. Connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereographic projection. Complex valued function – Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic functions, Construction of an analytic function.

Unit 2: Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville' theorem.

Unit 3: Taylor's theorem. Laurent's theorem. Maximum modulus theorem.
Power series – Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

Unit 4: Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.
Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

Unit 5: Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z)=\frac{1}{2}\left(z+\frac{1}{z}\right), z^2, e^z, \sin z, \cos z,$ and $\log z$.

Evaluation of a real definite integral by contour integration.

Analytic continuation. Power series method of analytic continuation.

Reference Books:

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw – Hill International Edition, 2009.
2. Joseph Bak and Donald J. Newman, Complex analysis (2nd Edition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

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Paper – III: Mechanics

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks:** **40 (Science)**
54 (Arts)

Note: This paper is divided into FIVE Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All questions carry equal marks.

Unit 1: Velocity and acceleration – along radial and transverse directions, along tangential and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical elastic strings.

Unit 2: Motion in resisting medium– Resistance varies as velocity and square of velocity. Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle. Projectile.

Unit 3: Central orbits – p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia – M.I. of rods, Circular rings, Circular disks, Solid and Hollow spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Product of inertia.

Unit 4: Equilibrium of coplanar force, moments and friction.

Unit-5: Virtual work and Catenary.

Reference Books :

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2009.
2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
3. S.L. Loney - An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Kalyani Publishers, New Delhi.
4. J.L. Synge & B.A. Griffith - Principles of Mechanics, Tata McGraw-Hill, 1959.

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Practical

Teaching: 2 hours per week per batch not more than 20 students.

Examination: **Duration: 2 Hours**

Scheme	**Science**	**Arts**
Max.Marks	30	40
Min.Pass Marks	11	15

Distribution of Marks:

Two Practicals one from each group

10 Marks each	=	20 Marks	(13 Marks each)	26
Practical Record	=	05 Marks		07
Viva-voce	=	05 Marks		07
Total Marks	=	30 Marks		40

The paper will contain TWO practicals. The candidates are required to attempt both practicals.

Practicals with Computer Programming in C Language.

Group A:

1. Solution of algebraic and transcendental equations by Bisection method, Regula-falsi method and Newton-Raphson method.
2. Solution of Initial value problems by Euler's method and Runga-Kutta(third and fourth order) method.

Group B:

1. Matrix operations: addition, subtraction, multiplication, Rank of a matrix, inverse of a matrix.
2. Solution of linear algebraic equations by Gauss elimination method, Matrix method, Gauss Jordan method.

Note:

1. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
2. Each Candidate has to pass in Practical and Theory examinations separately.

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7. ECONOMICS

B.Sc. Part III

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150
Paper-I	3 hours duration	Arts 100 Science75
Paper- II	3 hours duration	Arts 100 Science 75

Note:

1. There shall be two papers in each class. Each paper shall have 3 questions from every unit. In Addition to these nine questions (3 questions for each unit) there shall be one multiple choice\objective type/ short answer question in each of the two papers

   This question shall be compulsory.
2. The student shall be required to attempt five questions in all in each paper selecting atleast one question from each unit and one compulsory multiple choice/objective type/ short answer question
3. The multiple choice/ objective type\short answer questions shall consist of 20 questions in B.A. Examination and 15 questions in B. Sc. Examination of one mark each.

ECNOMICS

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No.1 consisting of very shot type –X (Ten) question. The candidate is required to answer each question in 20 words. Part –B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of part A and part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All question carry equal marks.

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Paper 1: Introduction To International Trade, Development And Public Economics

Section – A

Features of International Trade, Gains from Trade.Trade Theories: Adam Smith, Recardo, Harberler, Mill and H O Theory (Elementary treatment). Free Trade and Protaction, foreign Exchange Market and Exchange Rate. Balance of Trade And Finance of payment: Definition And Structure, International Monetary Fund, WTO scope and Impact.

Section –B

Economic Growth and Development: Factors affecting Economic Growth, Measures of Development , Lewis Theory of Unlimited Supply of Labor, Balanced V/S Unbalanced Growth Model, Harrod Domer and Solow Models, Concept of Poverty and Inequality. International Bank for Reconstruction and Development, Asian Development bank.

Section – C

Nature and Scope of Public Finance.Role of Government in the Economy.Public Goods and Private Goods.Theory of Maximum Social Advantage, Optimal Budgeting. Public Revenue: Canons of Taxation, Impact, Incidence and Shifting of Taxation. Direct and Indirect Taxation, GST, Public Expenditure: Canons of Public Expenditure, Classification and Effects on Production and Distribution. Public Debt: Meaning Objectives and Burden Theories. Fiscal Policy: Meaning, Objectives and Anti-Inflationary Policy.

Books Recommended :

1. R.N Musgrave and P.B Musgrave. Public Finance in Theory & Practice, McGraw Hill Publication.
2. S. Ganguly, Public Finance, The World Press Pvt. Ltd.
3. H.L. Bhatia, Public Finance, Vikas Publishing House Pvt. Ltd.
4. John Callas and Philip Jones, Public Finance and Public Choics, Oxford University Press.
5. D. salvatore: International Economics.
6. K.C RanaAnd K.N Verma: Internatinal Economics. (Hindi/English Edition)
7. B.O. Souderton & G. Reed: International Economics.
8. Michael P. Todaro, Economic decelpment, Macmillan.
9. A.P Thirlwal, Growth and Development, Macmillan.
10. Debraj Ray, Development Econmics, Oxford University Press.
11. S.k. Misraand V.K Puri, Ecomimics of Devlopement and Planning Theory Himalya Publishing House.

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Paper –II (a): Application of Mathematics in Economics

Section – A

Differential Calculus and integral Calculus: Application in Economics: Matrix and Determinants: Solution of Simultaneous Equations: Mixima and Minima: Convexity and Concavity.

Theory of Consumer Behaviour Nature of a Utility function: Properties of an Indifference Curve. Maximization of Utility. Demand Functions. Ordinary and Compensated, Price and Income Elasticity, Elasticity Relation in demand Analysis, Slusky Equation in two Commodity Case, Elasticity Form and Important Results: Income and Leisure – Derivation of Labour Supply Function and its Properties.

Section –B

Theory of firm: Production Function- Properties of a Well Behaved and Homogenous Production Functions- Cobb- Douglas and CES Production Functions: Product Curves: Output Elasticity of Factor input; Properties of an Isoquant; Elasticity of Substitution of a Homogeneous Production Function –Linearly Homogeneous and Cobb-Douglas Production Functions : Optimization Behaviour of a Firm – Constrained Cost Minimization, Constrained Output Maximization and Profit Maximization; Input Demand Functions Properties and Derivation of Producer's Input Demand functions ; Cost Functions- Properties and Derivation of Short Run and Long Run Cost functions; Consumer's and Producer's Surplus.

Section-C

Linear Programming: Graphical and Simplex Method (Maximization Problem Only): Input Output Analysis: Concepts of Static, Dynamic, Closed and Open Input – Output Models, Hawkins-Simon Conditions of Viability, Determination of Gross Output, and Value Added in Open Input –Output Model; Theory of Games: Two-person Constant Sum Games, Zero-Sum Game, Maximin and Minimax, Dominant Strategies and Saddle Point Solution; First Order Difference Equation- Cobweb Model.

Note: Use of Non-programmable Calculator is permitted

Books Recommended :

1. J.M. Henderson and R.L. Quandt: Micro Economic Theory: A Mathematical Approach, McGraw- Hill London.
2. RGD Allen. Mathematical Economics, McMillan
3. B.C. Mehta: Mathematical Economics: Micro Economic Models, Sultan Chand & Sons, New Delhi.
4. Alpha C Chiang: Fundamental Methods of Mathematical Economics. McGraw-Hill, Kagakusha. Tokyo.

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Paper- II (b): Environmental Economics

Section –A

Environmental Economics: An Introduction; Review of Microeconomics and Welfare Economics; The Theory of Externalities: Pareto Optimality and Market Failure in the Presence of Externalities; Property Rights and the Coase Theorem; Sustainable Development: Concepts and Measurement.

Section-B

Development and Environment: The Environment Kuznets Curve; Trade and Environment; Environmental Problems; Trans-boundary Environmental Problems: Global Warming and Climate Change; Methods of Environment Valuation: Hedonic Pricing, Contingent Valuation Method and Travel Cost Method.

Section-C

International Environmental Policy: Conventions and Treaties, UN Effort to Protect the Environment, Stockholm, Rio, Johansberg, Agenda 21, OECD Environmental Committee Report, Kyoto, Convention on Biodiversity, Paris Climatic Conventions; Environmental Governance in India; WTO and Environment.

Recommended Books:

1. Charles Kolstad, Intermediate Environmental Economics, Oxford University Press. 2nd Edition, 2010
2. Robert N. Stavins (ed.), Economics of the Environment: selected Readings, W.W.Norton, 5th edition, 2005.
3. Roger Perman, Yue Ma, James McGilvray and Michael Common, Natural Resource and Environmental Economics, Pearson Education/ Addison Wesley, 3rd edition, 2003.
4. Maureen L. Cropper and Wallace E. Oates, 1992, "Environmental Economics: A Survey", Journal of Economic Literature, Volume 30, pp. 675-740.

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Paper-II (C): Economy of Rajasthan

Section-A

Position of Rajasthan in Indian Economy: Population, Area, Agriculture, Industry and Infrastructure. Population: Size and Growth, District Wise Distribution of Rural and Urban Population, Demographic Features, Occupational Structure and Human Resource Development (Literacy, Health and Nutrition Indicators). Natural Resources Endowments: Land, Water, Livestock and Wild Life, Minerals and Mineral Policy of the State. State Domestic Product: trends and Composition. Agriculture: land Reforms, Land Utilization, Cropping Pattern, Production and Productivity, Agriculture Finance, Marketing and Insurance, Importance of Livestock and Animal Husbandry, Dairy Development Programmes, Famines and Droughts in Rajasthan.

Section-B

Infrastructure in the State (Irrigation, Power, Road), Industrial Development of the State (Agricultural and Mineral Based Industries, Small Scale and Cottage Industries, Export Based Units, Rajasthan Handicrafts). Growth Centresand Development of Industrial areas. Enterprises in Rajasthan. Role of Different Corporations in Industrial Development (RIICO, RFC & RAJSICO), Industrial Finance, Service Sector: Education, Health, Tourism Development in Rajasthan.

Section-C

Economic Planning and Development in Rajasthan. Constraints in The Economic Development of Rajasthan. Special Area Development Programmes in Rajasthan.Woman Empowerment and Child Development.Problems of Poverty and Unemployment in Rajasthan. PanchayatiRaj and Rural Development in Rajasthan. Budgetary Trends in Rajasthan. Centre State Financial Relations.

Books Recommended:

1. Economic Review, Directorate of Economics And Statistics, Department of Planning, Rajasthan Jaipur. (Hindi &English.)
2. Statistical Abstract Directorate Of Economics And Statistics. Department of Planning, Rajasthan Jaipur.
3. लक्ष्मीनारायण नाथूराम का राजस्थान की अर्थव्यवस्था, रमेश बुक डिपो, जयपुर।

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8. Geography.

Scheme of Examination

Faculty	Min. Pass Mars	Max. Marks
Arts/Social Science	72	200
Science	54	150
Paper I	World Regional Geography	Arts 75 Science 50
Paper II	Geography of India	Arts 75 Science 50
Practical	18	Arts 50 Science 50

Notes

1. Students are permitted to use the stencils, simple calculator and log tables wherever needed in both theory and practical examinations.
2. There will be a common paper for Arts and Science.
3. Q.1 will be compulsory and will cover the entire course of the paper.

   Q.No. 1 of 20% marks of the maximum marks be set in two parts.

   (a) Part (a) will have ten items for locating on a map (to be supplied by examination centre) carrying 10% marks of the maximum marks and candidates shall attempt any five items.

   (b) Part (b) will have 10 short answer questions carrying 10% marks of the maximum marks and candidates shall attempt any five items.
4. Remaining 9 questions carrying equal marks will be set with three questions from each section of the syllabus.
5. Candidate will attempt 5 questions in all including question No. 1 selecting at least one question from each section.
6. Practical examination will be conducted by the board of examiners.
7. The candidate will have to pass in theory and practical separately.
8. The non-collegiate candidates will have to attend a practical training camp of 48 hours at a college affiliated to the University of Rajasthan, Jaipur notified by the University from time to time in which Geography subject is taught on payment of fee fixed by the University. The candidates appearing at examination from any examination centre located in Jaipur City will attend the practical camp at the University Post Graduate Department on payment of fee fixed by the University. The candidate will procure Certificate of successful completion of practical training camp from the College/Department of Geography and produce the same at the time of practical examinations.

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Paper I: World Regional Geography

Section A

Asia: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General. Regional Study of South-East and South-West Asia.

Europe: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General ; Regional Study of British Isles, France and Germany.

Section B

North and South America: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of the Continent In General; Regional Study of New England and Brazil.

Section C

Australia and New Zealand: Terrain Pattern, Drainage, Climate, Natural Vegetation, Soils, Population and Economic Base of Australia and New Zealand In General.

Recommended Readings:

Cole, J., 1996. A Geography of the World's Major Regions, Routledge, London.

Deblij, H.J., 1994, Geography : Regions and Concepts, John Wiley, New York.

Dickenson, J.P. et al. 1996. The Geography of the Third World, Routledge, London.

Gourou, P., 1980. The Tropical World, Longman, London.

Jackson, R.H. and Hudman, L.E., 1991. World Regional Geography : Issues for Today, John Wiley, New York.

Kolb, A., 1977. East Asia - Geography of a Cultural Region, Mathuen, London.

Minshull, G.N., 1984 Western Europe, Hoddard & Stoughton, New York.

Patterson. J.H., 1985. Geography of Canada and the United States. Oxford University Press.

Songquiao, Z., 1994. Geography of China, John Wiley, New York.

Ward, P.W. and Miller, A. 1989. World Reginal Geography ; A Question of Place. John Wiley, New York.

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Paper II: Geography of India

Section A

India in the context of South and Southeast Asia, geological structure, physiographic divisions, climate: seasons, mechanism of Indian monsoon, major climatic regions; vegetation, major soils and regions, drainage system, water resources and irrigation projects; forests, mineral and power resources: their utilization policy and conservation strategies.

Section B

Agriculture: typology, major crops, changing pattern of crops, agricultural growth during pre-planned and green revolution, livestock resources and their development, industrial structure and development; industrial localization with reference to iron and steel, cotton textile, cement and chemical industries, industrial regions; population growth, distribution, problems, policy implication, trends of urbanization and human resource development.

Section C

Regional disparities in economic development, planning and economic regions of India, multilevel planning, problems and prospects of linking of rivers, environmental issues in India, transport development: rail, road, air and waterways, foreign trade: challenges and prospects.

Recommended Readings:

Gautam, Alka, 2010: Geography of India. Rastogi Publications, Meerut.

Gopal Krishnan, R. 2001 Geography of India, Jawaher Publishers & Distributions, New Delhi, 2nd Edition

Khullar, D.R. 2006. India a comprehensive Geography; Kalyani Publishers, New Delhi

गाबोरिया, सी. 1999: आधुनिक भारत का वृहत भूगोल। साहित्य भवन पब्लिकेशन्स, आगरा।

Sdasyuk, G. and Sengupta, 1968: Economic Regionalisation of India, Census of India Publication, New Delhi.

Singh, G. 1998: A Geography of India, Atma Ram & Sons, Delhi, Sixth Edition

Singh, R.L. (ed.) 1971: India: A Regional Geography, NGSI, Varanasi.

Spate, O.H.K. and Learmonth, A.T.A. 1967: India and Pakistan, Land, People and Economy, Methuen and Co., London.

Tirtha, R 2000: Geography of India, Rawat Publications, Jaipur 2nd Edition (India)

सिंघल, आर.एल. 2012: भारत का भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Practicals

Scheme of Examination

Min. Pass Marks: 18		Max. Marks 50
	Bifurcation of Marks	Time
Written test	24	3 hrs
Field survey and viva voce	10+04	2½ hrs
Record and viva voce	08+04	

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N.B. 1. There shall be 6 questions in written paper selecting at least two questions from each section. Candidates are required to attempt 3 questions selecting 1 question from each section. All question carry equal marks.

SYLLABUS

Section A

Definition, classification, uses and characteristic of map projection: (graphical constructions).

Conical projections:

1. with the one standard parallel
2. with two standard parallels
3. Bonne's
4. Polyconic

Cylindrical projections:

1. Equidistant
2. Equal Area
3. Mercator's, Universal Transverse Mercator (UTM)
4. Gall's Stereographic

Section B

Zenithal Projections: (Only Polar Case)

1. Equidistant
2. Equal Area
3. Gnomonic
4. Stereographic
5. Orthographic

Three dimensional diagrams: sphere, block pile, cube.

Section C

Plane table surveying: Equipments, procedure, traversing – open and closed traverse, methods- radial and intersection, concept of resectioning.

Height calculation using Indian pattern clinometer.

Recommended Readings:

चौहान, पी.आर. 2005: प्रायोगिक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Raisz, E. 1962: General Cartography. John Wiley and Sons, New York. 5th edition

Rampal, K.K. 1993: Mapping and Conflation: Methods and Techniques Concept Publishing Company, New Delhi (Reprint 2009)

Robinson, A.H. et al. 2004. Elements of Cartography. John Wiley & Sons, Inc., New York (Sixth Edition)

Singh, L.R. 2006: Practical Geography. Prayag Pustak Publisher, Allahabad U.P.

Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi (Reprint 2002)

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9. STATISTICS

Subject: Statistics

Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Sample Survey	50 mark	65 marks
Paper II	Design of Experiment and Computational Techniques	50 mark	65 marks
Paper III	Practical based on Paper I,II	50 mark	70 marks
	Total	150	200

Note:

In each Theory Question Papers , 10 (ten) questions will be set having 2 having 2(Two) from each unit. Candidates have 5 questions in all, taking not more than one from each unit.

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Subject: Statistics

Paper –I
(Sample Surveys)

(Also common with Subject- Applied Statistics)

Unit-I

Concepts of population and sample, need for sampling, census & Sample surveys. Advantages of sample survey over complete enumerations. Principle steps in a sample survey. Principles of sample survey, Sampling and non-sampling errors.

Unit-II

Probability and non-probability sampling: Methods of drawing a random sample from finite population, accuracy and precision of an estimator. Simple random sampling with and without replacement, probability of selecting any specified unit in the sample ,simple random sampling of attributes, size of simple random sample for a specified precision.

Unit-III

Stratified random sampling: Meaning and advantages of Stratified Random Sampling, Estimation of the population mean and its variance. Optimum and proportional allocation and their comparison with SRS & SRS WOR.

Unit-IV

Systematic Sampling: Meaning and sample selection procedures, advantage and disadvantages, variance of the estimated mean. Comparison of systematic with (i) SRSWOR and (ii) stratified random sampling. Cluster sampling (of equal size): Meaning, advantages and disadvantages, estimation of population mean.

Unit-V

Ratio Method of estimation (first approximation only): Meaning, bias of ratio estimators, variance, efficiency of ratio estimate with SRSWOR estimate. Regression method of estimation (first approximation): Meaning, Simple Regression Estimate, expected value and variance of simple regression estimate. Comparison with SRSWOR and ratio estimators.

REFERENCES:

1. Des Raj(2000) : Sample Survey Theory. Narosa Publishing House.
2. Murthy, M.N.(1967): Sampling Theory and Methods. Statistical Publishing Society, Calcutta.
3. Singh, Daroga and Chaudhary. F.S.(1989): Theory and Analysis of Sample Surveys Designs. Wiley Eastern Ltd.
4. Sukhatme et al .(1984): Sampling Theory of Surveys with Applications. Indian Society of Agricultural Statistics

Goon A.M, Gupta M.K Das Gupta B (1986) , Fundamentals of Statistics. Vol II World Press Kolkata

Gupta S.C , Kapoor V.K Fundamentals of Applied Statistics , Sultan Chand & Sons New Delhi

ADDITIONAL REFERENCES:

Sampath S. (2000) Sampling Theory and Methods Narora Publishing House

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Subject: Statistics

Paper II

Design Of Experiments and Computational Techniques

(Also common with Subject- Applied Statistics)

Unit-I

Analysis of Variance: Linear model & its different types (only introduction). Analysis of Variance technique. ANOVA for one-way and two-way classified data (with one observation per cell & fixed effects model) ; Least Square Estimates of Sum of squares, Effects of violations of basic assumptions of ANOVA; Transformations, Crtitical Difference.

Unit-II

Design of Experiments: Need for design of experiments, fundamental principles of design of experiments, Uniformity Trials, Choice of size and shape of plots , Basic designs (with one observation per cell & fixed effects model)-Completely randomized design(CRD), Randomised block design(RBD)- Their advantages and disadvatntages & usage. Efficiency of RBD over CRD.

Unit-III

Latin square design (LSD)- Analysis; least square estimates; expectation of sum of squares; efficiency of LSD over CRD & RBD, Missing plot technique- Estimation of single missing value in RBD & LSD . Factorial experiments-2^2 , 2^3 experiments, illustrations ,main effects, interaction effects & their analysis,.

Unit-IV

Computer Application and Data-Processing: Basics of Computer: Operations of a computer, Different units of a computer system like central processing unit, memory unit, arithmetic and logical unit, input unit, output unit etc. .Hardware including different types of input, output and peripheral devices, Software, system and application software, number systems, Operating systems, packages and utilities, Low and High level languages, Compiler, Assembler, Memory- RAM, ROM, unit of computer memory (bits, bytes, etc.).

Unit-V

Network – LAN, WAN, internet, intranet, basics of computer security, virus, antivirus, firewall, spyware, malware etc. Basics of Programming: Algorithm, Flowchart, Data, Information, Database, overview of different programming languages, frontend and backend of a project, variables, control structures, arrays and their usages, functions, modules, loops, conditional statements, exceptions, debugging and related concepts.

REFERENCES :

1. Das M.N. & Giri N.C (1986) :Design and Analysis of Experiments Springer Verlag
2. Goon A.M, Gupta M.K Das Gupta B (1986) , Fundamentals of Statistics, Vol-II World Press Kolkata
3. Gupta S.C., Kapoor V.K. Fundamentals of Applied Statistics , Sultan Chand & Sons , New Delhi
4. Nagpal D.P Computer Fundamentals , Wheeler Publishing New Delhi
5. Norton Peter Peter Norton's Introduction of Computers , Tata McGraw hills
6. Stallings. Operating Systems PHI

ADDITIONAL REFERENCES

1. Kaufthrone O.L.(1960) : The Design and Analysis of Experiments , Wiley Eastern
2. Cochran W.G. and Cox G.M. (1957) : Experimental Design , John Wiley and Sons

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Subject: Statistics

Paper III
Practical Paper

(Also Common with Subject- Applied Statistics)

1. To draw a SRS with and without replacement to obtain an estimate of the population total along with the estimates of their variances.. Comparing the efficiency of SRSWR with SRSWOR .Finding of confidence interval for the population mean.

2. To [illegible] the possible samples by SRS-technique and that to show that expected value of the sample mean equals the population mean to show expected value, $E(S^2) = S^2$ in SRSWOR.

3. Stratified sampling (i) estimate the sample sizes by (a) proportional allocation (b) Neyman optimum allocation (ii) estimate the mean to the population under the above scheme(iii) calculation of the sampling variance (iv) Comparison of efficiencies of the allocation scheme amongst themselves as well as with SRS.

4. Systematic sampling
5. Cluster sampling.
6. Ratio & Regression methods of estimation.
7. Analysis of one way classification (CRD).
8. Analysis o two way classification (RBD).
9. Analysis of LSD.
10. Efficiency of RBD over CRD.
11. Efficiency of LSD over CRD & RBD.
12. Analysis of 2^2 & 2^3 factorial design.
13. Construction of Flowcharts and Algorithms for Statistical Problems

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10. APPLIED STATISTICS

Subject: Applied Statistics

Marks Scheme

		Marks	
Paper	**Nomenclature**	**Science**	**Arts**
Paper I	Sample Survey	50 mark	65 marks
Paper II	Design of Experiment and Computational Techniques	50 mark	65 marks
Paper III	**Practical based on Paper I,II**	50 mark	70 marks
	Total	150	200

Note:

In each Theory Question Papers , 10 (ten) questions will be set having 2 having 2(Two) from each unit. Candidates have questions in all, taking not more than one from each unit

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Paper -I
(Sample Surveys)

(Course Contents are same as that of Subject- Statistics)

Paper II
Design Of Experiments and Computational Techniques

(Course Contents are same as that of Subject- Statistics)

Paper III
Practical Paper

(Course Contents are same as that of Subject- Statistics)

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11. Psychology

B.Sc. Part III

SCHEME OF EXAMINATION:

Faculty	Max. Marks	Min. Passing Marks
Arts	200	72 (Th.54 Pr.18)
Science	150	54 (Th.36 Pr.18)

Paper	Nomenclature	Duration	Max. Marks	
			Arts	Science
I	Positive Psychology	3 Hrs.	75	50
II	Psychological Testing and Assessment	3 Hrs.	75	50
	Practical	3 Hrs.	50	50

NOTE:-

1. There will be three papers in Psychology. Each paper will be of 3 hours. There will be a common paper for Arts and Science. In I and II Papers there will be 3 Sections A, B and C and will cover the entire course content of the paper.

Section-A Will contain 10 questions of 20 words each. Each question will be of 1.5 marks for Arts students and 1 mark for Science students. Thus, Part-A will be of 15 marks for Arts students and of 10 marks for Science students.

Section-B Will contain 7 questions of 50 words each, out of which students are required to attempt 5 questions. Each question will be of 3 marks for Arts students and of 2 marks for Science students. Thus, Part-B will be of 15 marks for Arts student and of 10 marks for Science students.

Section-C Will contain 3 long questions each with internal choice. Each question will be of 15 marks for Arts students and 10 marks for Science students. Thus, Part-C will be of 45 marks for Arts students and 30 marks for Science students.

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For clarification the distribution of marks is tabulated as below:-

Arts			
Section	No. of Questions	Marks	Total
A	10	1.5	15
B	5 (out of 7)	03	15
C	3 (with Internal Choice)	15	45
		Total marks	75
Science			
Section	No. of Question	Marks	Total
A	10	01	10
B	5 (Out of 7)	02	10
C	3 (with internal choice)	10	30
		Total Marks	50

2. Use of simple calculator will be allowed for statistical portions of all papers.

Paper I -Positive Psychology

Section A

1. Introduction : Definition, Goals and Assumptions of Positive Psychology; Relationship with other Branches of Psychology
2. Happiness: Meaning; Hedonic and Eudaemonic Viewpoint; Positive and Negative Affect; Theoretical Viewpoints; Determinants and Sources; Authentic Happiness; Enhancement of Happiness and Wellbeing.
3. Positive Cognitive States and Processes: Self-Efficacy, Optimism, Hope, Mindfulness, Flow and Spirituality.

Section B

4. Virtues and Strengths of Character: Classification and Measures of Human Strengths, Gallup's Clifton Strength Finder; VIA Classification; Identifying Personal Strengths.
5. Resilience: Meaning and Sources; Developmental and Clinical Perspective; Successful Aging and Growth through Trauma.
6. Self-Regulation and Self-Control: Meaning and Theories; Planning for Self-Regulation Success; Self-Regulation Problems – Goal Conflict, Goal Difficulty and Goal Disengagement.

Section C

7. Mental Health and Well-Being: Subjective Well-Being and Life Satisfaction, Social Well-Being and Psychological Well-Being, Complete State Model.
8. Emotional Intelligence: Meaning, Components and Theories; Enhancement of Emotional Intelligence.
9. Pro-Social Behavior: Empathy, Altruism, Gratitude and Forgiveness.

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Books Recommended:

- Snyder, C.R. & Lopez, S.J.(2007).*Positive Psychology*. New Delhi: Sage.
- Snyder, C.R. & Lopez, J.(2005). *Handbook of Positive Psychology*. New York: Oxford.
- Baumgardner, S. & Crothers, M. (2019). *Positive Psychology* . Noida: Pearson Education India.

Paper II - Psychological Testing and Assessment

Section-A

1. Psychological Testing and Assessment-: -Definition, Difference between Testing and Assessment , Tools of Psychological Assessment Interview, Case History Data, behavioral Observation, Computers as tools.
2. Psychological Test: Nature, Functionsand Uses of Psychological Test, Problem of test

   Administration, History of Psychological Testing, Characteristics of good Psychological test
3. Psychological Test Development:-Conceptualization, Test Construction, Item analysis.

Section-B

4. Reliability: Meaning, Types and Methods of Calculating Reliability.
5. Validity: Meaning, Types and Methods of Calculating Validity.
6. Norms: Meaning and Types of Norms.

Section-C

7. Types of Psychological Tests: Group and Individual, Verbal, Non-verbal and Performance Test, Self-Report Inventories, Projective Techniques, Ethical Consideration in Assessment
8. Application of Psychological Testing: Educational, Counseling and Guidance, Clinical and Organizational Setting.
9. Assessment of Personality- Big Five, 16 PF, MMPI, TAT and Rorschach. Test. Assessment of Intelligence- Binet, WAIS, SPM.

Books Recommended:

- Anastasi, A. (1997). *Psychological testing*. New York: MacMillan Co.
- Chadha, N.K. (2009). *Applied Psychometry*. New Delhi: Sage.
- K,aplan, R.M. & Saccuzzo, D.P. (2009). *Psychological Testing and Assessment*. New Delhi: Cengage Learning.
- Cohen, R.J, Swerdlik, M. & Struman, E.D. (2015). *Psychological Testing and Assessment*. New Delhi: McGraw Hill.
- अरुण कुमार सिंह (2002) : मनोविज्ञान में मापन एवं मूल्यांकन, नई दिल्ली मोतीलाल बनारसीदास।

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Practical

1. Measurement of Subjective Wellbeing
2. Measurement of Forgiveness
3. Measurement of Emotional Intelligence
4. Measurement of Hope
5. Measurement of Resilience
6. Measurement of Intelligence (SPM)
7. Personality Assessment through HSPQ
8. Reaction Time
9. Mullar Lyer Illusion
10. Measurement of Level of Aspiration

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12. ELECTRONICS

Scheme :
Min Pass. Marks : 36 Max. Marks-100

Paper-I	3 hrs.	33
Paper II	3 hrs.	33
Paper III	3 hrs.	34
Practical Min. Pass. Marks: 18	5 hrs.	50

Paper-I–Communication and Radio Electronics

Note: The paper will be divided into five units. Two questions will be set from each unit. Five questions are required to be attempted in all. The candidate is required to attempt one question from each unit.

Max.Marks : 33 Time : 3 hrs.

Unit–I

Modulation

Need of a carrier frequency, AM, FM, PM, AM side bands, power consideration, Collector and base modulations, SSB transmission FM by reactance variation using Semiconductor devices. The Armstrong FM system. Block diagram of AM and FM transmitters: Merits of FM transmission over AM transmission.

Unit–2

Demodulation:

Demodulation of AM signals, Square law demodulation. Linear envelope deduction AGC demolution of FM signals. Amplitude limiter. Foster seeley frequency discriminator and ratio detector.

Unit–3

Transmission lines and Associated distributive parameters

Propagation of voltage and current waves on the line (Differential equations and their solution). Characteristic impedance. Propagation constant and losses, Reflection coefficient, Standing wave ratio (SWR), resonant $\lambda/4$ and $\lambda/2$ lines

Unit–4

Impedence matching and Radiation of EM Waves

Single stub matching, Smith chart and its uses. Elementary idea of transmission of microwave signal and wave guides. Dipole antenna Radiation resistance and directivity of an antenna. Radiation from a quarter wave monopole or half wave dipole linear arrays. Propagation of EM wave in space. Types of wave propagation through ionosphere, Critical angle ground wave range. Skip distance and skip zone. Different layers in ionosphere

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Unit–5

Radio Receivers and Tape Recorders

AM radio receiving systems. Superheterodyne, FM receivers and their measurements. Stereo transmission and reception. Characteristics of various types of recording tapes. Recording head, Principles of recording playback and erasing tape transport system Hi-Fi and stereophony recording tune-table.

Reference Books suggested

1. Gorden J. King, The Hi-Fi and taperecorder handbook. N Butter- worths, London.
2. G.K. Mithal–Elements of Electronics, Khanna Publishers, Delhi.
3. Handbook of Electronics by Kumar & Gupta–Pragati Prakashan, Meerut.
4. Electromagnetic waves and radiative systems–E.L. Jordan.
5. Electron tube circuits–Sammuel Seeley.

Paper-II : Television Electronics

Note : The paper will be divided into five units. Two questions will be set from each unit. Five questions are required to be attempted in all. The candidate is required to attempt one question from each unit.

Max. Marks–33 **Time : 3 Hrs.**

Unit-1

Picture scanning, Broadcast channels, Frequency band and resolution, camera tubes, Block diagram of transmitter and explanation of each block, colour transmission.

Television receiver : Scanning sequence and interlacing, synchronization and blanking.

Unit-2

Block diagram of colour and monochrome receivers and explanation of each block.

Sound system, Transient response of TV receivers.

Mosaic, Exhaust and activation schedule performance tests. Theory of operation, characteristics of the Mosaic, potential distribution of the mosaic. The Mosaic under the influence of a height in age. The formation of the video signal. Line sensitivity.

Black spot performance of the Iconoscope. Limiting sensitivity.

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[redacted] of focus. Pick-ups for motion picture films. The type RCA. [redacted] Iconoscope.

Limiting sensitivity of pick-up devices. The two sided target. Low velocity scanning. The orthicon. The image iconoscope multistage. Image multiplier pick-up tubes, signal multiplication image orthicon. Performance of the image orthicon.

Unit-4

The Isocon. Photoconductive pick-up tubes. The storage tube. The monoscope. Conclusion.

Requirement of the Kinescope. Construction of the Kinescope bulbs, round glass tubes, metal tube-bulbs, rectangular tubes. The electron gun. The fluoresaent. Sereening procedure. Metal backing of Kinescope screens. Processing of the Kinescope. Tests and performance. Contrasts. Direct view Kinescope. Projection Kinescope.

Unit-5

Colour signals. Colour addition. Definition of colour TV signals. I, R- Y. and GY signal, desaturated colours, the transmitted chrominance signal. Matrix circuits. Colour subscarrier frequency. Colour synchronization. Colour pleased composite video signal waveforms. Vector addition of colour signals. Colour picture tubes.

Reference Books suggested

1. [redacted] M, Glasford : Fundamentals of television engineering.
2. M. Kive-Television simplified 6th edition.
3. B. Goobi–Basic television principles and servicing.

Paper-III-Electronic Instruments and Measurements.

Note : The paper will be divided into five units. Two questions will be set from each unit Five questions are required to be attempted in all. The candidate is required to attempt one question from each unit.

Max. Marks : 34 Time : 3 hrs.

Unit-1

Measuring and test instruments, Fabrication Technique

AC Voltmeter, ammeter, Ohm meter (Shunt and series type). Multimeter, Analog and digital voltmeter, Watt meter, Frequency meter, Q meter, C.R.O. as test instrument.

Fabrication of PN Junction Diode, PNP transistor, Fabrication of an I.C transistor. Equivalent circuit, integrated diode, Integrated capacitor, junction capacitor, thin film capacitor Integrated resistor, Thin film resistor. Three pin regulators. Timing concept and Timer 555.

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Unit-2

Electronics

Silicon controlled rectifier (SCR), working of SCR, Equivalent circuit of SCR, V-I characteristic of SCR, SCR Half wave and full wave rectifier. Applications of SCR. The triac, Triac construction and operation, Triac characteristics, Application of Triac, The Diac, Application of Diac, Unijunction Transistor (UJT). Equivalent circuit of UJT, Characteristics of UJT, Application of UJT.

Unit-3

Tape Recorder:

Mechanism of Recording, various head of the tape recorder, Record/Play back head, Erase head, High frequency erase head, low frequency erase, Bulk erase, Practical Tape recorder, Tape machines, Fault finding in the tape recorder, Care and maintenance.

Unit-4

Transducer

Classification, Strain gauge, Displacement transducers, capacitive transducers, Photoelectric, Piezolectric and temperative transducers, Self generating Inductive Transducer, Linear variable Differential Transformer (LVDT),

Unit-5

Thermal and optical transducer

Resistance thermometer. Thennocouple, thermistors and their applications.

Optical transducers–Vacuum phototube, Gasfilled phototube, Photomultiplier tube, Photoconductive cell, Photovoltic Cell. Various Types of Microphones.

Reference Books Suggested

1. Electronic Circuits–Discrete and Integrated, Shilling and Belon, McGraw Hill.
2. J. Glaser and J. Subak Sharpe, Integrated Circuit Engineering Addition Westley 1978.
3. Principle of Electronics, V.K. Mehta.
4. Basic Electronics & Solid State, B.L. Theraja.
5. Radio & Television, M.C. Goyal and S.K. Mukherjee.

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Experiments For Practical Work

Note : A candidate has to perform at least sixteen experiments including eight experiments from each section 'A' and 'B'. In practical examination, the candidate will be required to perform two experiments : one from section 'A' and the other from section 'B'. The distribution of Marks will be as follows -

Time duration–5:00 hrs Expts. (Two)–30 (15 for each expt.) marks
Viva Voce 10 marks
Practical record 10 Marks
Total 50 marks.
Max. Marks–50

Section–A

1. To design and study free running multivibrator (transistorised) of given frequencies.
2. To design active band pass filter of given cut off frequencies and study its frequency response.
3. To study regulated power supply using a Zener diode and an electronic SCR voltage regulator.
4. To design and study thyratron sawtooth wave generation.
5. To design and study single stage RC coupled transistor amplifier of given cutoff frequencies and mid frequency gain.
6. To design and study UJT sweep circuit.
7. To design and study Hartley oscillator (transistorised) of given frequencies.
8. To design and study pulse coincidence circuit using ICs.
9. To design and study a precision timer circuit using IC 555 chip.
10. To design and study clipping and clamping circuits.

Section–B

1. To study binary adder and subtractor.
2. To study AM signals.
3. To study Darlington pair.
4. To study fourier analysis of square and clipped size wave.
5. To study Variable reactance modulator.
6. To find out CMRR of differential amplifier.
7. To study the characteristics of SCR.
8. To design and study a precision linear gate using operational amplifier and FET.
9. To find out solutions of simple problems using analog computer
10. To design and study voltage comparator using operational amplifier.

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13. ENVIRONMENTAL SCIENCE
B.Sc. Part III

Scheme:
Theory

Max Marks: 100			Min. Marks:36
Paper 1	3 hours duration		Max Marks:50
Paper 2	3 hours duration		Max Marks:50
Practical	4 hours duration	Min. Marks:18	Max Marks:50

Note:

1. Two types of Question papers for each theory paper will be applicable. Total duration of 3 hours for each paper. One question paper will comprise of the objective questions and the other will be of descriptive type question.
2. Descriptive type question paper (to be given during 1st 2 hours of examination) will have 9 questions,3 from each section out of which a student is supposed to attempt 4 questions selection at least 1 from each section. This portion of the paper will carry maximum 30 marks. Each descriptive question will be of 7.5 marks.
3. The objective question paper will be given after 2 hours of commencement of descriptive type paper and will have 35 questions of the objective type. This portion of the paper will carry 20 marks. The objective type questions will be of the following types:

- Multiple choice type questions :20 questions of ½ marks each.
- Fill in the blanks/one word/true or false type questions:10 questions of ½ mark each.
- Very short answer type questions:5 questions of 1 mark each

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Paper –I Environmental Management and Planning

Section –A

1. Air Pollution Abatement; Study of metrological parameters.
2. Vertical motion of air, and atmospheric stability;
3. Wind direction, frequency, and lapse rates.
4. Temperature inversion
5. Dispersal of pollutants in the air
6. Air pollution with respect to distance from source of emissions of pollutants

Section-B

1. Types of pollutant sampling and measurement.
2. Ambient air sampling
3. Collection of Gaseous air pollutants
4. Collection of particulate pollutants
5. Stack sampling
6. Analysis of air pollutants,SOx, NOx, CO_2, CO and SPM.

Section-C

1. Control methods; source correction method
2. Cleaning of Gaseous effluents
3. Air pollution control equipments, Gravitational settling chambers, cyclone separators, Fabric filters, Electrostatic precipitators, wet samplers.
4. Control of gaseous air pollutants; SOx
5. Control of gaseous air pollutants; NOx and CO

Suggested Readings:

- Baldwin, J.H.1985.Environmetnal Planning and Management. International Book Distribution, Dehradun
- Bandhu, D. and Ramnath, N.L.1982.Education for Environmental Planning and observation. Natraj publishers, Dehradun.
- Cornwell, D.A and Davis, M.L.2000.Introduction to Environmental Engineering. McGraw Hill. International Edition.
- De Nevers, N.L.2000.Pollution Control Engineering. McGraw Hill. International Edition.Mexio.
- Environmental Management and Planning
- Liu, D.H.F. and Liptak, B.G.2000.Air Pollution. Lewis Publishers.Washington, D.C.
- Mohan, I, 1989.Environmental pollution and Management, Ashish Publishing House, New Delhi.

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- Pillai, K.M.1987, Water Management and Planning. Himalaya Publishing House, New Delhi.
- Reible, D.D.1998.Fundamentals of Environmental Engineering. Lewis Publishers. Washington, D.C.
- Sapru, R.K.1990.Environmental planning and Management in India. Ashish Publishing House, New Delhi.
- Singh, P.1985.Environmental pollution and Management .ChughPublications,Allahbad

Paper-II Environmental Impact Assessment and Sustainable Development

Section-A

1. Basic Concepts of Sustainable Development
2. Sustainable Industrialization.
3. Sustainable Agriculture
4. Sustainable Tourism
5. Sustainable Mining
6. Sustainable Transportation and Sustainable housing
7. Environmental awareness Programs
8. Role of National and International Organizations in Conservation of Environment
9. Role of Media in Environmental Conservation
10. Significance of International Conference on Human Environment, Stockholm, 1972; Earth Summit, Rio de Janerio, 1992; EarthSummit – II, Johannesburg, 2002; Earth Summit-III-2012.

Section-B

1. Environmental Impact Assessment, Processes in different developing and Developed Countries.
2. Environmental Impact Assessment: Methods; Adhoc, Simple Checklists, Overlays, Matrices, Networks.
3. Environmental Economics
4. Environmental Management Systems (EMS)
5. Environmental Policy of India
6. Environmental policy of Rajasthan.

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Section-C

1. Concept of Environmental Audit
2. Setting up of an Audit programme.
3. Environmental Audit process.
4. Benefits of Environmental audit
5. Various methods of Environmental audit
6. Environmental Laws- Indian Forest Act,1927, (The air prevention and control of pollution) Act, 1981, The Water (prevention and control of pollution) Act, 1974, The Wildlife Protection Act, 1972, Forest Conservation Act, 1980, The Environmental (Protection) Act, 1986, The Biodiversity Act, 2002.

Suggested Readings:

- Canter, L.W.1997. Environmental Impact Assessment. McGraw Hill, New York
- Clarck, B.D., Biset, R. and Wathern, P.1980. Environmental Impact Assessment,Mansell, London.
- Davies, G.S. and Mueller, F.G.1983.A handbook on Environmental Impact Assessment for use in developing countries.UNEP, Nairobi. WCESD.1987.Our Common Future oxford university press. Oxford U.K.Archibugi,F and Nijkamp.P.1989.Economy and Ecology; Towards Sustainable Development.Kluwer Academic Publishers.London.
- Shashtri, S., Bakre, P.P.and Khan, T.I.1996. Industry, Environment and Law,RBSApublishers,Jaipur
- Wathersn, P.1998.Environmental Impact Assessment Theory and Practice.UnwinHyman.London.

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Suggested field and laboratory exercises :

It will be divisible into two parts:

Part A – 25 Marks – Field Report

Part B – 25 Marks – Experiments

Part – A: A candidate is supposed to write a field reports on some environmental problems based upon his/her personal observation. It may be a case study of river, mining, deforestation, and desertification, suffering of human beings due to local environmental pollution, textile or some other Industries. Report is to be written on the basis of analysis carried out in laboratories and personal observations. A presentation will be made on the day of practical examination.

Part- B: Industrial Pollution based experiments:

1. Estimation of SPM around Industries.
2. Estimation of SOx around
3. Estimation of NOx
4. Estimation of CO and CO_2.
5. Impact of air pollutants from Industries on Soil.
6. Impact of air pollutants from Industries on vegetation.

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1. TEXTILE CRAFT

B.Sc. Part III

SCHEME: BA/B.Com PART-III

			Duration	Max mark	Min mark
1.	**Theory:**	Paper-I	3Hrs	30	
		Paper -II	3Hrs	30	22
2.	**Practical:**	Paper -I	3Hrs	35	
		Paper-II	3Hrs	35	25
3.	**Submission:**	Paper -I		35	
		Paper-II		35	25

Paper-I : Weaving Theory II

UNIT-I

1. Types of Spinning: Mechanical and Chemical
   Mechanical spinning process: picking, ginning, combing/carding, drawing etc. Types of chemical spinning-melt spinning, dry spinning and wet spinning.
2. Types of Yarns: Simple and Fancy
   Simple yarn: single and double/plied/folded yarn
3. Calculation of resultant count for folded yarn

UNIT-II

1. Manmade and Synthetic fibres
   Man-made fibres: Basic methods of producing rayon fibre, Different types of man-made fibres
   Synthetic fibres: Different types of synthetic/chemical fibre, method of their production, properties of polyester fibre, nylon fibre, glass fibre.
2. Silk and Wool
   Production, spinning, properties and uses of silk, different types of silk
   Classification of wool, wool spinning process, difference between woollen and worsted fabric
3. Concept of Mixing and Blending, Basic difference between mixing and blending. Concept of Staple and Filament fibre; difference between staple fibre and filament fibre

UNIT-III

1 Derivatives of Twill weave: Broken weave, Herringbone weave and Diamond weave

2 Towel weaves: Huckaback and Honeycomb; quality of yarn and weave selected for towels

3 Concept of shedding mechanism; Dobby and Jacquard shedding mechanism

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Paper-II: Dyeing Theory II

UNIT-I

1. Dye molecule; Concept and Importance of Chromophores and Auxochrome in a dye
2. Objectives of Fabric finishes; different mechanical and chemical fabric finishes; Determinants of finishes
3. Different types of natural and synthetic dyes.

UNIT-II

4. Method of direct printing: Screen printing; colour preparation and screen preparation
5. Discharge and Resist printing; different styles of discharge and resist printing
6. Factors affecting colour fastness: composition of fibre, chemical structure of dye, techniques of dyeing/printing, addition of other useful additives

UNIT-III

7. Importance of fabric finishes
8. Different types of chemical finishes- crease resistant finish, water proof finish, fire proof finish, moth proofing finish and absorbency finish.
9. Determinants of fabric finishes.

Practical (Paper-I)

1. Concept of yarn twist(S twist and Z twist) and plied yarn(single and double yarn)
2. Calculation of Ends and Picks per inch in given piece of fabric
3. Towel weaves preparation using paper strips

Practical (Paper-II)

1. Screen preparation (simple tracing method)
2. Table cover preparation by screen printing

Submission (paper-I)

1. Assessment of yarn and fabric samples 2. Assessment of weave samples

Submission (paper-II)

1. Assessment of samples 2. Any one article using screen printing

Practical Examination Scheme:

Major Problem: 20 Marks Minor Problem: 15 Marks

Reference books:

Booth, J.E. (1996) Principles of Textile Testing, 1st edition, CBS publishers & distributors PVT.Ltd. New delhi

Sahnai, V.A. (1980) Technology of Dyeing, Sevak publications. Mumbai

Sahnai, V.A. (1979) Technology of printing, Sevak publications. Mumbai

Sahnai, V.A. (1999) Technology of finishing, Sevak publications. Mumbai

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4. GARMENT PRODUCTION & EXPORT MANAGEMENT

B.Sc. Part III

PAPER – 1 : APPAREL TECHNOLOGY

B.A./B.Com. – M.M 40 **B.Sc.- M.M. 50** **Hrs. – 3**

OBJECTIVES:

1. To create awareness on the basics of Fashion
2. To study the psychological effects of clothing on the individual in social situation.
3. To develop understanding of manufacturing technology of the garment Industry.
4. To understand the fundamental concepts of dyeing and printing.

SECTION-A : INTRODCUTION TO FASHION

1. Fashion terminology, sources of fashion, factors influencing fashion.
2. Fashion forecasting and fashion cycle.
3. India and international fashion designers (five each).
4. Sociological and psychological significance of clothing.

SECTION-B : MANUFACTURING TECHNOLOGY

5. Product development, design development, developing a sample garment.
6. Apparel production
   - I. Costing a garment
   - II. Purchasing pattern making
   - III. Production scheduling
   - IV. Spreading and cutting procedure
   - V. Contracting
   - VI. Garment assembly
7. Introduction to industrial machines-
   - I. cutting : round , straight and band
   - II. fusing: collars, facing
   - III. sewing: chain stitch, lock stitch, button hole, blind stitching
8. Use of components and trims –
   - (i) Performance and properties of components and trims.
   - (ii) labels and motifs
   - (iii) linings and interlinings
   - (iv) face, braids, elastics
   - (v) fasteners; loops
   - (vi) seam binding and tapes
   - (vii) shoulder pads, eyelets

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SECTION –C : DYEING AND PRINTING

Application of design:

7. i. Printing methods – block, screen, stencil, roller.
   ii. Styles of printing – direct, discharge and resist.
8. Dyeing – introduction to natural and synthetic dyes (acid, basic, sulphur, vat, reactive and direct dyes)
9. Stages of dyeing : Fiber, yarn and fabric

References:

1. Rouse Blizabeth, 1999, Understanding Fashion, Blackwell science.
2. Carr Harold and John pomerory, 1996. Fashion design and product development. Blackwell science.
3. Jain Ruby and Rathore Girja, Design, Fashion and Garment Production, CBH publication Jaipur 2019.

PAPER- II : INTERNATIONAL MARKETING

B.A./ B.Com.- M.M. 40 **B.Sc. – M.M. 50** **Hrs. -3**

OBJECTIVES:

1. To study the importance of marketing to the global economy
2. To develop insight into the development of marketing strategies for international markets
3. To Identify business opportunities in an international business environment

SECTION –A

1. International Marketing: nature and scope of international marketing.
2. International marketing v/s domestic marketing.
3. Importance of international marketing.
4. Problems and challenges of international marketing.
5. Selection of agents.

SECTION – B

6. Identification of markets for readymade garments.
7. Market entry conditions.
8. Channels of distribution.
9. Direct and indirect export
10. Trade fair and Exhibitions.

SECTION – C

11. Pricing, role of price and non price factors, factors influencing pricing, price quotation, information needed for export pricing.
12. Role of trading and export houses.

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13. Institutional segments and packaging for exports: packing material, boxing and pressing department, machinery and equipments used in packaging department.
14. Quality control
15. Labeling and consumer protection meaning and its role.

References :

1. R. K. Kothari, B. S. Rathore, P. C. Jain (2009) International Marketing (2009) I[st] ed. Ramesh Book Depot, Jaipur, New Delhi
2. R. Kothari and P. C Jain (2009) International Management 1[st] ed. Ramesh Book Depot, Jaipur, New Delhi
3. M. J. Methew International Marketing (Procedures and practices) 1[st] ed. RBSA publishers, Jaipur

PRACTICAL – 1 : APPAREL PRODUCTION

B.A/B.Com.-M.M.60 **B.Sc.-M.M. 25** **Hrs.- 4**

OBJECTIVES :

1. To develop basic adult drafts of bodice, sleeve and collar.
2. To develop various patterns of textile techniques
3. Guidance for preparation of portfolio

CONTENT

1. Prepare an adult's bodice and sleeve block.
2. Sketching and designing of men/women garments (5 each)
3. To prepare with specific details of necklines and sari blouses. (20)
4. To identify patterns and its application for women designer dress on fashion figures:
5. Types of patterns include –
   - I. Structural
   - II. Geometrical
   - III. Stripes and plaids
   - IV. Floral
6. Design and prepare an adult dress for fashion shows.

Examination Scheme:

B.A.\B.Com. -Max Marks:-60
1.Major Problems :-30
2.Minor Problems:-20
Internal :-10

B.Sc:-Max Marks:-25
1.Major Problems :-10
2.Minor Problems:-10
Internal :-5

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PRACTICAL – II : DYEING AND PRINTING

B.A/B.Com.-M.M. 60 **B.Sc.- M.M. 25** **Hrs.- 4**

OBJECTIVES:

1. To learn the various types of skills in dyeing
2. To develop various textile printing techniques
3. Guidance of practical knowledge of export houses

Contents

1. Prepare and article of each: Tie and dye, stencil printing, block printing and batik
2. Field trips to Export houses and mass production centers.
3. Exhibition ;

References:

1. Bhargava, Ritu, 2005, fashion illustration and rendering, Jain Publications Pvt. Ltd. New Delhi.
2. Ireland, fashion designing drawing and presentation.
3. Prayag: Technology of textile printing.
4. Shenai: Technology of dyeing

Examination Scheme :

B.A.\B.COM:-Max Marks:-60

1.Major Problems :-30

2.Minor Problems:-20

Internal :-10

B.SC:-Max Marks:-25

1.Major Problems :-10

2.Minor Problems:-10

Internal :-5

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3 Geology and Mining

Scheme:

Theory: Max Marks 100 Minimum Pass marks: 36

Paper I: Mineral Resources	3 hrs duration	Max Marks 50
Paper II: Mineral Exploration & Mining Geology	3 hrs duration	Max Marks 50
Practical (one)	4 hrs duration	Max Marks 50

Paper I: Mineral Resources

Note: The paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all, selecting at least one question from each section.

Section –A

Economic Geology: Definition; Magma and its relationship with mineral deposits. Ore and gangue minerals. Processes of Mineral formation: Magmatic, Hydrothermal, Contact metasomatic, Evaporation, Oxidation and supergene enrichment, Sedimentation.

Section –B

Classification of mineral deposits: outline of Lindgren's and Bateman's classification, Important ores, Composition physical properties, mode of occurrence ,association, origin, distribution in India & uses of the following metals: copper, lead, iron, manganese, and aluminum.

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Section –C

Important industrial minerals: Mode of occurrence, Physical properties, chemical composition and distribution in India-Refractory, Abrasives, Ceramics, cement and Fertilizers.
Coal, petroleum and radioactive minerals: their occurrences & distribution in India and origin.

Paper II: Mineral Exploration & Mining Geology

Note: The paper will contain nine questions having three questions in each section. Candidates are required to attempt five questions in all, selecting at least one question from each section.

Section-A

Ore reserves and resources: definition and outline of classification of mineral reserves and resources. Methods of ore reserve estimation; concept of sampling, Assaying, bore hole drilling

Section-B

Outline of geophysical and geochemical exploration. Explosives: types, storage and precautions in handling of explosives; blasting: various patterns of blast holes and methods of their charging and blasting.

Section-C

Elements of mining: Factors controlling selection of open cast and underground mining. Alluvial and opencast Mining methods. Underground mining methods

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with special referees to sub -level stoping Coal mining methods: room and pillar method, long wall method.

Practical

Systematic study, identification, description, mode of occurrence and uses of the following minerals: haematite, magnetite, limonite, siderite, pyrite, pyrrohtite, pyrolusite. Psilomelane, chromite, ilmenite, wolframite, chalcopyrite, cuprite, malachite, galena, sphelerite, magnesite, bauxite, realgar, orpiment, stibnite, cinnabar, asbestos, graphite and other important industrial minerals.

In an outline map of India plotting of occurrence of important ore minerals
Plane table and prismatic compass survey

Geological field work and collection of samples. Visit of at least one open cast mine.

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(4.) BIO-TECHNOLOGY

14. Bio Technology

Paper – I : Animal Cell Biotechnology & Environmental Biotchnology — Max. Marks–50

Section – A

General metabolism
Special secondary metabolites/products (Insulin, Growth hormone, Interferon, tplasminogen activator, factor VIII etc.)
Expressing cloned proteins in animal cells. Over production and processing of chosen protein.
The need to express in animal cells
Production of vaccines in animal cells
Production of monoclonal antibodies
Growth factors promoting proliferation of animal cells (EGF, FGF, PDGF, IL-1 IL-2, NGF, erythropietin etc.)
Bioreactors for large-scale culture of cells.
Transplanting cultures cells.

Section – B

Renewable and no-renewable resources
What is renewable should be bioassimilable/biodegradable
Major consumer items: Food, fuel and fibres
Conventional fuels and their environmental impacts;
- Firewood
- Plant and animal
- Coal
- Gas
- Animal oils

Modern fuels and their environmental impacts:
- Methogenic bacteria and biogas
- Microbial hydrogen production
- Conversion of sugars to ethanol. The gasohol experiment.
- Solar energy converters—Hopes from the photosynthetic pigments

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- Plant based petroleum industry?
- Cellulose degradation for combustible fuel

Section – C

Biotechnological inputs in producing good quality natural fibres
Transgenic sheep and transgenic plants
Microbiological quality of food and water
Treatment of municipal waste and industries effluents
Degradation of pesticides and other toxic chemicals by micro-organisms
Thuringiensis toxin as a natural pesticide
Biological control of other insects swarming the agricultural fields
Enrichment of ores by microorganisms
Biofertilizers, Nitrogen fixing microorganisms enrich the soil with assimilable nitrogen.

Paper—II : Plant Biotechnology Max.Marks—50

Section—A

Introduction to in vitro methods. Terms and definitions. Use of growth regulators.
Beginning in-vitro cultures in our country (Over and ovule culture, in vitro-pollination and fertilization.
Embryo culture, embryo rescue after wide hybridization and its applications
Introduction to the processes of embryogenesis and organogenesis and their practical applications.
Clonal multiplication of lite species (Micropropagation) exillary bud, shoot-tip and meristem culture.

Section –B

Haploids and their applications, Somaclonal variations and applications (Treasure your exceptions).
Endosperm culture and production of triploids.
Practical applications of tissue and organ culture (summarizing the practical applications of all above mentioned techniques).
Single-cell suspension cultures and their applications in selec-

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tion of variants/mutants with or without nutagen treatment (of haploid culture preferably).
Introduction to protoplast isolation: Principles and applications.
Testing of viability of isolated protoplasts.
Various steps in the regeneration of protoplasts.
Somatic hybridization-an introduction.

Section –C

Various methods for fusing protoplasts. Chemical, electrical.
Use of markers for selection of hybrid cells.
Practical applications of somatic hybridization (hybrids vs cybrids)
Use of plant cell, protoplasts and tissue culture for genetic manipulation of plants. Introduction to A. tumefaciens.
Tumor formation on plants using A. tumefaciens (Monocots vs Dicots).
Root-formation using A. rhizogenes.
Practical application of genetic transformation.

Practical-Based on theory syllabus Max.Marks-50

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GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Master of Arts (Hindi)

Duration – 2 Years

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Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn about Hindi literature and grammar and they will also improve their reading, writing, and speaking skills.

PEO2: Students will learn to read and analyze both classical and modern works and they will think carefully about their meaning and understand them in a clear and critical way.

PEO3: Students will develop their writing, speaking, and communication skills and this will help them use Hindi effectively for studies and professional work.

PEO4: Students will learn about the cultural, social, and historical background of Hindi literature and they will use this knowledge to better understand society and its values.

PEO5: Students will be encouraged to keep learning throughout their lives and they will also work to preserve and promote the Hindi language and its literature.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will practice creative writing in poetry, stories, and plays, and also learn research, analysis, and interpretation skills to understand Hindi texts and study society.

PO2: Students will always follow honesty and safety in their work, respect society, and keep high values in research and profession.

PO3: Students will learn translation skills to connect Hindi with other languages and take part in community programs to promote Hindi.

PO4: Students will study regional and folk literature to understand and preserve local traditions and cultural heritage.

PO5: Students will learn to analyze literature carefully to understand social issues and problems shown in stories, poems, and plays.

PSO1: Students will gain in-depth knowledge of classical, modern, and contemporary Hindi literature and develop advance skills in critical analysis.

PSO2: Students will enhance advanced writing, speaking, and communication skills for academic, professional, and creative purposes.

PSO3: Students will study the history, society, and culture behind literature to understand human values and how society works.

PSO4: Students will learn creative writing in poetry, short stories, drama, and essays and they will use these skills for studies, projects, and professional work, helping them express their ideas clearly and creatively.

PSO5: Students will learn to translate and interpret both classical and modern Hindi texts and this will help them communicate ideas across different languages and cultures.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

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SYLLABUS

M.A. Hindi

(Semester Scheme)

I & II Semester 2024-25
III & IV Semester 2024-25

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एम.ए (हिन्दी) – प्रथम सेमेस्टर
कम्पलसरी कोर कोर्स
HIN-101 : प्राचीन काव्य

समय : 3 घण्टे पूर्णांक : 100

निर्धारित पाठ –

1. संक्षिप्त पृथ्वीराम रासो चन्दबरदाई	– सं. हजारी प्रसाद द्विवेदी	– शशिव्रता विवाह प्रस्ताव आरम्भिक 50 छन्द
2. विद्यापति	– सं. शिवप्रसाद सिंह	– पद संख्या 8,10,11,16,19,26, 36,40,47,48
3. ढोला मारूरादूहा : कुशल लाभ	– सं. डॉ. शम्भूसिंह मनोहर	– दोहा संख्या 1 से 25 तक
4. गोरखवाणी : गोरखनाथ	– सं. पीताम्बर दत्त बड़थ्वाल	– सबदी खण्ड के आरम्भिक– 15 छन्द पद खण्ड से आरम्भिक 5 छन्द

अंक विभाजन–

चार व्याख्या – प्रत्येक इकाई से एक (आन्तरिक विकल्प देय) $10 \times 4 = 40$

चार आलोचनात्मक प्रश्न – प्रत्येक इकाई से एक (आन्तरिक विकल्प देय) $15 \times 4 = 60$

अनुशंसित ग्रंथ–

1. हिन्दी साहित्य का आदिकाल – हजारी प्रसाद द्विवेदी
2. हिन्दी साहित्य की भूमिका – हजारी प्रसाद द्विवेदी
3. आदिकालीन हिन्दी साहित्य – डॉ. शम्भूनाथ पाण्डेय
4. चंदबरदाई – शांता सिंह
5. पृथ्वीराज रासो : भाषा और साहित्य – डॉ. नामवर सिंह
6. पृथ्वीराज रासउ – सं. माताप्रसाद गुप्त
7. विद्यापति – डॉ. शिवप्रसाद सिंह
8. विद्यापति – डॉ. आनन्द प्रकाश दीक्षित
9. गोरखनाथ – नागेन्द्रनाथ उपाध्याय

अधिगम उद्देश्य

1. हिन्दी साहित्य के आदिकाल के काव्य से परिचित होना।
2. पृथ्वीराज रासो के पाठ के जरिए रासो काव्य की विशेषता आदि का अध्ययन करना।
3. विद्यापति के काव्य की विशेषताओं का अध्ययन करना।
4. ढोलामारू रा दूहा के चयनित पाठ से आदिकाल के लोक काव्य की विशेषताओं का अध्ययन।
5. गोरखवाणी के अध्ययन से निर्गुण संत काव्य की आधारभूमि का ज्ञान प्रकरण।

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पाठ्यक्रम प्रतिफल

1. हिन्दी साहित्य के आदिकाल के काव्य से विद्यार्थी परिचित हो सकेगें।
2. रासो काव्य की प्रमुख विशेषताओं का अध्ययन विद्यार्थी पृथ्वीराज रासो के चयनित पाठ के आधार पर कर सकेंगे।
3. विद्यापति पदावली के चयनित पाठ से विद्यार्थी विद्यापति की काव्यगत विशेषताओं का परिचय प्राप्त कर सकेंगे
4. आदिकाल के लोक काव्य की विशेषताओं का अध्ययन 'ढोला मारू रा दूहा के चयनित अंश से किया जा सकेगा।
5. गोरखवाणी के अध्ययन से विद्यार्थी गोरखनाथ की साधना विचार और पद्धति के साथ–साथ निर्गुण संत काव्य की आधारभूमि को समझ सकेंगे।

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एम.ए (हिन्दी) – प्रथम सेमेस्टर

कम्पलसरी कोर कोर्स

HIN-102 : हिन्दी साहित्य का इतिहास – आदिकाल

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. साहित्य का इतिहास दर्शन, साहित्येतिहास और साहित्यालोचन, हिन्दी साहित्येतिहास लेखन की परम्परा, हिन्दी साहित्येतिहास लेखन की समस्याएं

इकाई 2. हिन्दी साहित्य का आदिकाल – सीमांकन, नामकरण, परिवेश
आदिकाल के अध्ययन की समस्याएं – साहित्यिकता, भाषा एवं प्रामाणिकता के प्रश्न

इकाई 3. आदिकालीन साहित्य की प्रमुख धाराएं
क. सिद्ध साहित्य
ख. नाथ साहित्य
ग. जैन साहित्य
घ. रासो साहित्य

इकाई 4. आदिकालीन साहित्य के अन्य पक्ष
क. लौकिक साहित्य
ख. गद्य साहित्य
ग. आदिकाल की उपलब्धियां (भाषा रूप और सम्प्रेषण क्षमता, कथ्य और शिल्प)

अंक विभाजन–

कुल पाँच प्रश्न
प्रत्येक इकाई से एक प्रश्न – चार प्रश्न (आन्तरिक विकल्प देय) $20 \times 4 = 80$
अंतिम प्रश्न टिप्पणीपरक होगा – सामाजिक, सांस्कृतिक एवं साहित्यिक वैशिष्ट्य केन्द्रित
दो टिप्पणियाँ (आन्तरिक विकल्प देय) $10 \times 2 = 20$

अनुशंसित ग्रंथ–

1. राम चन्द्र शुक्ल – हिन्दी साहित्य का इतिहासा, नागरी प्रचारिणी सभा, काशी
2. हजारी प्रसाद द्विवेदी – हिन्दी साहित्य की भूमिका, राजकमल प्रकाशन, दिल्ली
3. हजारी प्रसाद द्विवेदी – हिन्दी साहित्यः उद्‌भव और विकास, राजकमल प्रकाशन, दिल्ली
4. हजारी प्रसाद द्विवेदी – हिन्दी साहित्य का आदिकाल, वाणी प्रकाशन, दिल्ली
5. विश्वनाथ प्रसाद मिश्र – हिन्दी साहित्य का अतीत – भाग 1. वाणी प्रकाशन, दिल्ली
6. नगेन्द्र (सं.) – हिन्दी साहित्य का इतिहास, नेशनल पब्लिशिंग हाउस, दिल्ली
7. रामस्वरूप चतुर्वेदी – हिन्दी साहित्य और संवेदना का विकास, लोकभारती, प्रकाशन इलाहाबाद
8. नलिन विलोचन शर्मा – साहित्य का इतिहास दर्शन, बिहार राष्ट्रभाषा परिषद्, पटना
9. बच्चन सिंह – हिन्दी साहित्य कर दूसरा इतिहास, राधाकृष्ण प्रकाशन, दिल्ली
10. शंभुनाथ पाण्डेय – आदिकालीन हिन्दी साहित्य
11. नागेन्द्रनाथ उपाध्याय – गोरखनाथ : नाथ सम्प्रदाय के परिप्रेक्ष्य में
12. नागेन्द्रनाथ उपाध्याय – बौद्ध कापालिक साधना और साहित्य

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अधिगम उद्देश्यः–

1. इतिहास के आदिकाल के राजनीतिक, सामाजिक, धार्मिक, सांस्कृतिक परिवेश का ज्ञान करना।
2. आदिकाल के साहित्यिक काव्य रूपों को जानना।
3. आदिकाल की साहित्यिक धाराओं का सामान्य ज्ञान प्राप्त करना।
4. हिन्दी साहित्य के इतिहास के प्रारम्भ को समझाना।

पाठ्यक्रम प्रतिफलः–

1. साहित्येतिहासिक दर्शन, परम्परा और चुनौतियों को जान सकेंगे।
2. हिन्दी साहित्य के आदिकाल के अध्ययन के प्रमुख बिन्दुओं को समझ सकेंगे
3. आदिकाल की प्रमुख धाराओ ंका परिचय प्राप्त कर सकेगें।
4. आदिकाल के गद्य और लोक साहित्य को जान सकेंगे।

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एम.ए (हिन्दी) – प्रथम सेमेस्टर

कम्पलसरी कोर कोर्स

HIN-103 : भाषा विज्ञान एवं हिन्दी भाषा

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. क. भाषा : परिभाषा, विशेषताएँ, भाषा और बोली, भाषा परिवर्तन के कारण
ख. भाषाविज्ञान : परिभाषा, अंग, भाषा विज्ञान का ज्ञान की अन्य शाखाओं के संबंध

इकाई 2. क. स्वनिमविज्ञान : स्वन की परिभाषा वागीन्द्रियाँ, स्वनों का वर्गीकरण – स्थान और प्रयत्न के आधार पर, स्वन परिवर्तन के कारण एवं दिशाएँ
ख. रूपमिविज्ञान : शब्द और रूप (पद), पद विभाग – नाम, आख्यात, उपसर्ग और निपात व्याकरणिक कोटियाँ – लिंग, वचन, पुरुष, कारक, पद परिवर्तन के कारण

इकाई 3. क. वाक्यविज्ञान : वाक्य की परिभाषा, वाक्य के अनिवार्य तत्व, वाक्य के प्रकार, वाक्य परिवर्तन के कारण
ख. अर्थविज्ञान : शब्द और अर्थ का संबंध, अर्थ परिवर्तन के कारण और दिशाऐं

इकाई 4. क. हिन्दी भाषा का उद्‌भव और विकास
ख. हिन्दी की उपभाषाएं एवं बोलियां
घ. राष्ट्रभाषा, राजभाषा एवं सम्पर्क भाषा के रूप में हिन्दी
ग. देवनागरी लिपि की विशेषताएं और मानकीरण, हिन्दी की मानक वर्गमाला

अंक विभाजन–

कुल पाँच प्रश्न

प्रत्येक इकाई से एक प्रश्न – चार प्रश्न (आन्तरिक विकल्प देय) $20 \times 4 = 80$

अंतिम प्रश्न टिप्पणीपरक होगा – दो टिप्पणियाँ (आन्तरिक विकल्प देय) $10 \times 2 = 20$

अनुशंसित ग्रंथ–

1. भाषाविज्ञान की भुमिका – देवेन्द्र नाथ शर्मा, राधाकृष्णन प्रकाशन, दिल्ली
2. भाषाविज्ञान – भोलानाथ तिवारी, किताब महल, इलाहाबाद
3. सामान्य भाषाविज्ञान बाबूराम सक्सेना, हिन्दी साहित्य सम्मेलन, प्रयाग
4. हिन्दी भाषा का उद्‌गम और विकास – उदयनारायण तिवारी, लोकभारती प्रकाशन, इलाहाबाद
5. भाषा और समाज – रामविलास शर्मा, राजकमल प्रकाशन, दिल्ली
6. पुरानी हिन्दी – चन्द्रधर शर्मा गुलेरी, काशी नागरी प्रचारिणी सभा, वाराणसी
7. हिन्दी शब्दानुशासन – किशोरीदास वाजपेयी, काशी नागरी प्रचारिणी सभा, वाराणसी
8. भारतीय आर्य भाषा और हिन्दी – सुनीति कुमार चटर्जी, राजकमल प्रकाशन, दिल्ली
9. भाषाविज्ञान एवं भाषा शास्त्र – कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी
10. हिन्दी भाषा विकास और स्वरूप – कैलाश चन्द्र भाटिया, ग्रंथ अकादमी, नई दिल्ली

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अधिगम उद्देश्यः–

1. भाषा विज्ञान व उसके विविध अंगों और शाखाओं को स्पष्ट करना।
2. भाषा–व्यवस्था, संरचना, भाषिक प्रकार्य तथा उसकी विशेषताओं को स्पष्ट करना।
3. स्वनिमविज्ञान, रूपविज्ञान, वाक्यविज्ञान एवं अर्थविज्ञान की परिभाषा व उनके भेदों को स्पष्ट करना।
4. हिन्दी भाषा का उद्भव और विकास हिन्दी की उपभाषाएँ एवं बोलियाँ, राजभाषा, राष्ट्रभाषा एवं संपर्क भाषा तथा देवनागरी लिपि का मानकीकरण एवं मानक वर्णमाला का परिचय कराना।

पाठ्यक्रम प्रतिफलः–

1. विद्यार्थी भाषा, भाषा व्यवस्था, संरचना, भाषिक प्रकार्य तथा उसकी विशेषताओं की सामान्य जानकारी प्राप्त कर सकेंगे
2. विद्यार्थी भाषाविज्ञान की परिभाषा उसके प्रमुख अंग ओर भाषाविज्ञान की ज्ञान की अन्य शाखाओं से संबंध को समझ सकेंगे।
3. विद्यार्थीं हिन्दी की ध्वनियों तथा वर्गीकरण और ध्वनि परिवर्तन के कारणों को समझ सकेंगे
4. रूपिमविज्ञान वाक्यविज्ञान एवं अर्थविज्ञान की परिभाषा एवं उनकी उपयोगिता का ज्ञान प्राप्त करेंगे।
5. विद्यार्थीं हिन्दी भाषा के उद्भव और विकास हिन्दी की उपभाषाएँ, बोलियाँ, राष्ट्रभाषा, राजभाषा, संषर्क भाषा एवं देवनागरी लिपि एवं हिन्दी की मानक वर्णमाला का ज्ञान प्राप्त कर सकेंगे

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
HIN-A01 : अपभ्रंश भाषा और साहित्य

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. अपभ्रंश भाषा का विकास तथा उसकी विशेषताएँ, अपभ्रंश, अवहट्ट और पुरानी हिन्दी
इकाई 2. अपभ्रंश साहित्य का इतिहास
इकाई 3. अपभ्रंश साहित्य की सामान्य विशेषताएँ
इकाई 4. निर्धारित पाठ–

क. अपभ्रंश काव्य सौरभ – सं. कमल चंद सोगानी, (पउम चरिउ – स्वयंभू)
पाठ – 3, 27/14 से 28/2 तक

ख. हिन्दी काव्यधारा – सं. राहुल सांकृत्यायन, (पाखण्ड खण्डन – रामसिंह)
कुल 17 दोहे

ग. हिन्दी काव्यधारा – सं. राहुल सांकृत्यायन, (प्रोषित पतिका का संदेश)
आरम्भिक 10 छंद

घ. कीर्तिलता : द्वितीय पल्लव

अंक विभाजन–

कुल पाँच प्रश्न

निर्धारित पाठ्य खण्ड से कुल चार व्याख्या – प्रत्येक से एक (आन्तरिक विकल्प देय)

$10 \times 4 = 40$

तीन आलोचनात्मक प्रश्न – प्रथम तीन इकाइयों में प्रत्येक से एक (आन्तरिक विकल्प देय)

$20 \times 3 = 60$

अनुशंसित ग्रंथ–

1. हिन्दी काव्यधारा – राहुल सांकृत्यायन
2. हिन्दी के विकास में अपभ्रंश का योग – डॉ. नामवर सिंह, लोकभारती प्रकाशन, इलाहाबाद
3. अपभ्रंश भाषा का अध्ययन – डॉ. वीरेन्द्र श्रीवास्तव
4. अपभ्रंश साहित्य – हरिवंश कोछड़
5. प्राकृत और अपभ्रंश साहित्य तथा उनका हिन्दी साहित्य पर प्रभाव – डॉ. रामसिंह तोमर, हिन्दी परिषद् प्रकाशन, इलाहाबाद
6. अपभ्रंश भाषा और साहित्य – राजमणि शर्मा, भारतीय ज्ञानपीठ, नई दिल्ली
7. अपभ्रंश और अवहट्ठ : एक अन्तर्यात्रा – शम्भुनाथ पाण्डेय
8. अपभ्रंश भाषा साहित्य की शोध–प्रवृत्तियाँ – देवेन्द्र कुमार, भारतीय ज्ञानपीठ, नई दिल्ली

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अधिगम उद्देश्यः–

1. अपभ्रंश भाषा एवं साहित्य की विशेषता एवं महत्ता को स्पष्ट करना।
2. अपभ्रंश साहित्य के प्रमुख कवियों स्वयंभू रामसिंह अब्दुर्रहमान विद्यापति के पाठ को समझाना।
3. अपभ्रंश साहित्य से हिन्दी के विकास को स्पष्ट करना।

पाठ्यक्रम प्रतिफलः–

1. विद्यार्थी अपभ्रंश भाषा के उद्भव एवं विकास को समझ सकेंगे।
2. विद्यार्थी अपभ्रंश भाषा के कवियों स्वयंभू के पउम चरिउ, रामसिंह के पाहुड़ दोहा– पाखंड खंडन तथा अब्दुर्रहमान के संदेश राशक के प्रोसित पत्रिका का संदेश पाठ् को समझ सकेंगे।
3. विद्यार्थी अपभ्रंश साहित्य के अन्य कवियों के पाठ एवं योगदान को समझ सकेंगे।

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एम.ए (हिन्दी) – प्रथम सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
HIN-A02 : सूफी साहित्य

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. सूफी मत का उद्‌भव और विकास, सूफी मत का सैद्वान्तिक विश्लेषण
इकाई 2. भारत में सूफी मत का विकास एवं विविध सम्प्रदाय
इकाई 3. हिन्दी का सूफी साहित्य – सामान्य विशेषताएं
इकाई 4. निर्धारित पाठ–
क. जायसी ग्रंथावली – सं. रामचन्द्र शुक्ल, (पद्‌मावत – नागमती वियोग खण्ड)
ख. मधुमालती (मंझन) – सं. माता प्रसाद गुप्त, 316 से 330 तक
ग. अमीर खुसरो – सं. भोलानाथ तिवारी

गीत –
1. मेरा जोवना नवेलरा भयां है गुलाल.....
2. बहुत रही बाबुल कर दुलहिन, चल तेरे पी ने बुलाई
3. दईया री मोहें भिजोकारी
4. अम्मा मेरे बाबा को भेजो कि सावन आया
5. जो पिया सावन कह गये अजहुँ न आए स्वामी हो

कव्वाली –
1. छापा तिलक तज दीन्ही रे तो से नैना मिला के
2. बहुत दिन बीते पिया को देखे

सूफी दोहे –
1. गोरी सोवे सेज पर मुख पर.....
2. श्याम सेत गोरी लिये जनमत भई अतीत.....
3. खुसरो रैन सुहाग की जागी पी के संग.....
4. वो गए बालम वो गये नदियां पार.....
5. देख मैं अपने हाल को रोउ जार–ओ–जार.....
6. चकवा चकवी दो जाने उनको मारे न कोय .....
7. सेज सूनी देख के रोउ दिन रैन.....
8. ताजी खूटा देश में कब से पड़ी पुकार.....

अंक विभाजन–
आरम्भिक तीन इकाईयों से एक–एक आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) 20×3=60
चतुर्थ इकाई से 4 व्याख्याएं – प्रत्येक से न्यूनतम एक (आन्तरिक विकल्प देय) 10×4=40

अनुशंसित ग्रंथ–

1. जायसी ग्रंथावली – सं. रामचन्द्र शुक्ल
2. पद्‌मावत – सं. वासुदेवशरण अग्रवाल
3. जायसी – विजयदेवनारायण साही
4. मधुमालती – डॉ. शिवगोपाल मिश्र
5. हिन्दी सूफी काव्य की भूमिका – रामपूजन तिवारी
6. जायसी परवती हिन्दी सूफी कवि और काव्य – डॉ. सरला शुक्ल
7. सूफी मत – डॉ. कन्हैया सिंह
8. मध्ययुगीन प्रेमाख्यान – डॉ. श्याम मनोहर पाण्डेय
9. अमीर खुसरो का हिन्दी काव्य – गोपीचन्द नारंग
10. सूफी मत और हिन्दी सूफी काव्य – डॉ. नरेश

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अधिगम उद्देश्यः–

1. सूफी मत के उदय और विकास का परिचय
2. सूफी सिद्धान्तों का सामान्य परिचय
3. भारत में सूफी मत के विभिन्न संप्रदायों का परिचय
4. हिन्दी के सूफी साहित्य के विकास विशेषताओं का परिचय
5. जायसी मंझन और अमीर खुसरों के काव्य का अवबोध (सूफी साहितय के प्रतिनिधि रचनाकारों के रूप में)

पाठ्यक्रम प्रतिफलः–

1. विद्यार्थी सूफी मत के उदय और विकास का परिचय प्राप्त कर सकेंगे।
2. विद्यार्थी सूफी सिव्द्धान्तों का परिचय प्राप्त कर सूफी साहित्य की समझ को बेहतर बना सकेगें।
3. भारत में सूफ़ीमत के विकास और विभिन्न संप्रदायों का परिचय प्राप्त कर विद्यार्थी भक्तिकाल की निर्गुण प्रेममार्गी काव्यधारा को समझ सकेंगे।
4. हिन्दी के सूफ़ी साहित्य की विशेषताओं का ज्ञान प्राप्त कर उनके प्रतिनिधि कवियों के रूप में जायसी, मंझन और अमीर खुसरों के काव्य से परिचित हो सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

HIN-A03 : लोक साहित्य

इकाई 1. लोक संस्कृति की अवधारणा
लोक संस्कृति और साहित्य
लोक संस्कृति का अन्य सामाजिक विज्ञानों से संबंध
लोक संस्कृति के अध्ययन की समस्याएं

इकाई 2. लोक साहित्य के प्रमुख रूपों का वर्गीकरण
लोकगीत – संस्कारगीत, व्रतगीत, श्रमगीत, ऋतुगीत
लोकगाथा एवं लोककथा
लोकनृत्य एवं लोकनाट्य

इकाई 3. लोकनाट्य – रामलीला, रासलीला, कीर्तनियां, स्वांग, यक्षगान, विदेशिया, भांड, तमाशा, नौंटंकी

इकाई 4. हिन्दी लोक नाट्य की परम्परा
हिन्दी नाटक एवं रंगमंच पर लोक नाट्यों का प्रभाव

अंक विभाजन–

कुल पाँच प्रश्न

प्रत्येक इकाई से एक प्रश्न – चार प्रश्न (आन्तरिक विकल्प देय) $20 \times 4 = 80$

अंतिम प्रश्न टिप्पणीपरक होगा – दो टिप्पणियाँ (आन्तरिक विकल्प देय) $10 \times 2 = 20$

अनुशंसित ग्रंथ–

1. बद्रीनारायण – लोकसंस्कृति में राष्ट्रवाद, राधाकृष्ण, प्रकाशन , नई दिल्ली
2. श्यामचरण दुबे – परम्परा, इतिहास बोध और संस्कृति, राधाकृष्णन, नई दिल्ली संक्रमण की पीड़ा वाणी प्रकाशन नई दिल्ली
3. डॉ. सत्येन्द्र – लोक साहित्य विज्ञान, राजस्थानी ग्रंथागार, जोधपुर
4. अर्नाल्ड हाउजर – कला का इतिहास दर्शन, ग्रंथ शिल्पी, नई दिल्ली
5. कुंदनलाल उप्रेती – लाक साहित्य के प्रतिमान, भारत प्रकाशन मंदिर अलीगढ़
6. डॉ. श्रीराम शर्मा – लोक साहित्य सिंद्धान्त प्रयोग, विनोद पुस्तक मंदिर आगरा
7. डॉ. रवीन्द्र भ्रमर – लोक साहित्य की भूमिका, साहित्य सदन कानपुर
8. डॉ. दुर्गा भागवत – भारतीय लोक साहित्य की रूपरेखा, विभु प्रकाशन दिल्ली
9. दिनेश्वर प्रसाद – लोक साहित्य और संस्कृति, लोकभारती इलाहाबाद
10. लोकावलोकन – विजय वर्मा, राजस्थानी ग्रंथागार, जोधपुर
11. सम्मेलन पत्रिका – लोक संस्कृति विशेषांक, हिन्दी साहित्य सम्मेलन, इलाहाबाद
12. सापेक्ष – लोक साहित्य विशेषांक, सं. महावीर अग्रवाल, दुर्ग

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अधिगम उद्देश्यः–

1. लोक साहित्य और लोक संस्कृति की अवधारणा का परिचय देना।
2. लोक साहित्य का अन्य सामाजिक विज्ञान से संबंध का अध्ययन।
3. लोक साहित्य के अध्ययन की समस्याओं को जानना।
4. लोक साहित्य के प्रमुख रूपों का वर्गीकरण और परिचय
5. लोकनाट्य का परिचय एवं हिन्दी की लोकनाट्य परम्परा का अध्ययन
6. हिन्दी नाट्य एवं रंगमंच पर लोकनाट्यों के प्रभाव का अध्ययन करना।

पाठ्यक्रम प्रतिफलः–

1. विद्यार्थी लोक साहित्य और लोक संस्कृति की अवधारणा का परिचय प्राप्त कर सकेंगे
2. विद्यार्थी लोकसाहित्य का अन्य सामाजिक विज्ञानों से सम्बन्ध का अध्ययन कर सकेंगे
3. लोकसाहितय के अध्ययन की समस्याओं से विद्यार्थी परिचित हो सकेंगे
4. लोक साहित्य के प्रमुख रूपों का वर्गीकरण और परिचय प्राप्त कर सकेंगे
5. विद्यार्थी लोक नाट्यों एवं हिन्दी की लोकनाट्य परम्परा का परिचय प्राप्त कर सकेंगे
6. विद्यार्थी हिन्दी नाटक एवं रंगमंच पर लोकनाट्यों के प्रभाव का अध्ययन कर सकेंगे

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HIN A01 – A06 में से किन्हीं 3 का चयन करें
HIN-A04 : हिन्दी भाषा और व्याकरण

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. क. हिन्दी भाषा का उद्‌भव और विकास, 'हिन्दी' नाम और उसके विभिन्न रूप– हिंदवी, हिन्दुस्तानी, रेख्ता, दक्खिनी

ख. हिन्दी भाषा का आधुनिक स्वरूप – जनभाषा, राजभाषा राष्ट्रभाषा, सम्पर्क भाषा

इकाई 2. क. देवनागरी लिपि और उसका विकास, देवनागरी लिपि का मानकीकरण

ख. हिन्दी की मानक वर्णमाला एव ंध्वनियाँ

इकाई 3. क. भाषा और व्याकरण का संबंध
व्याकरण और भाषा विज्ञान

ख. भारत में व्याकरण का विकास एवं प्रमुख वैयाकरण – पाणिनी, हेमचन्द, कामताप्र गुरू, किशोरीदास वाजपेयी

इकाई 4. क. हिन्दी में शब्द निर्माण की प्रक्रिया और रूपों का विकास
(i) संज्ञा, सर्वनाम, क्रिया, विशेषण, क्रिया विशेषण
(ii) उपसर्ग और प्रत्यय
(iii) संधि और समास
(iv) तत्सम्, तद्‌भव, देशज, विदेशज शब्द

ख. वाक्य रचना और उसके विभिन्न आयाम

अंक विभाजन–

कुल पाँच प्रश्न

प्रत्येक इकाई से एक–एक प्रश्न – चार प्रश्न (आन्तरिक विकल्प देय) $20 \times 4 = 80$

एक प्रश्न टिप्पणीपरक होगा (चतुर्थ इकाई से संबंधित होगा) दो टिप्पणियाँ (आन्तरिक विकल्प देय) $10 \times 2 = 20$

अनुशंसित ग्रंथ–

1. हिन्दी भाषा – महावीर प्रसाद द्विवेदी
2. हिन्दी शब्दानुशासन – किशोरी दास वाजपेयी
3. हिन्दी की वर्तनी और शब्द विश्लेषण – किशोरी दास वाजपेयी
4. अच्छी हिन्दी – रामचन्द्र वर्मा
5. हिन्दी भाषा का उद्‌भव और विकास – धीरेन्द्र वर्मा
6. हिन्दी व्याकरण – कामताप्रसाद गुरू
7. हिन्दी भाषा का उद्‌भव और विकास – उदयनारायण तिवारी
8. हिन्दी व्याकरण मीमांसा – काशीराम वर्मा
9. हिन्दी भाषा की संरचना – भोलानाथ तिवारी

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अधिगम उद्देश्यः–

1. हिन्दी व्याकरण की महत्ता एवं उपयोगिता को स्पष्ट करना।
2. हिन्दी भाषा के उद्भव विकास को स्पष्ट करना।
3. देवनागरी लिपि, मानक हिंदी की वर्णमाला, ध्वनियाँ तथा भाषा और व्याकरा के संबंध को स्पष्ट करना।
4. हिन्दी में शब्द निर्माण की प्रक्रिया को स्पष्ट करना।

पाठ्यक्रम प्रतिफलः–

1. विद्यार्थी हिन्दी भाषा के उद्भव एवं विकास को जिसमें हिन्दी, हिन्दुस्तानी, रेढ़ता, दक्खिनी का ज्ञान प्राप्त कर सकेंगे।
2. विद्यार्थी देवनागरी लिपि के विकास व हिन्दी की मानक वर्णमाला को समझ सकेंगे।
3. विद्यार्थी भाषा एवं व्याकरण के संबंध को समझ सकेंगे तथा प्रमुख वैयाकरणों से परिचित हो सकेगें।
4. विद्यार्थी हिन्दी शब्द निर्माण की प्रक्रिया जिसमें तत्सम तद्भव, देशज, विदेशज शब्दों के निर्माण एवं उपयोगिता को समझ सकेंगे।

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HIN A01 – A06 में से किन्हीं 3 का चयन करें

HIN-A05 : राजस्थानी भाषा और साहित्य

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. क. राजस्थानी भाषा : उद्‌भव और विकास
ख. राजस्थानी भाषा की व्याकरणिक विशेषताएँ
ग. राजस्थानी भाषा की बोलियाँ

इकाई 2. क. राजस्थानी साहित्य का इतिहास
ख. राजस्थानी साहित्य की प्रमुख विधाएं एवं प्रवृतियाँ
ग. राजस्थानी के प्रमुख रचनाकार एवं रचनाएँ

इकाई 3. क. राजस्थानी गद्य चयनिका –सं. ब्रजनारायण पुरोहित, श्याम प्रकाशन, जयपुर
ख. अंचलदास खींची री वचनिका –सं. भूपतिराम साकरिया, पंचशील प्रकाशन, जयपुर

इकाई 4. क. वेलि क्रिसन रूकमणी री – पृथ्वीराम राठौड़ – सं. नरोत्तमदास स्वामी
(100 से 150 छंद तक)
ख. राजस्थानी रसधारा – डॉ. शम्भूसिंह मनोहर, श्याम प्रकाशन, जयपुर

अंक विभाजन–

इकाई 3 एवं इकाई 4 के खण्ड क एवं ख प्रत्येक से एक व्याख्या – कुल चार (आन्तरिक विकल्प देय) $20 \times 4 = 80$

प्रत्येक इकाई से एक आलोचनात्मक प्रश्न – कुल चार (आन्तरिक विकल्प देय) $10 \times 2 = 20$

अनुशंसित ग्रंथ–

1. डॉ. तेसीतोरी (अनु. डॉ. नागवर सिंह) : पुरानी राजस्थानी, नागरी प्रथारणी सभा, वाराणसी
2. सीताराम लालस : राजस्थानी व्याकरण, राजस्थानी ग्रन्थागार, जोधपुर
3. डॉ. नरोत्तमस्वामी : संक्षिप्त राजस्थानी व्याकरण, सार्दुल राजस्थानी रिसर्च इन्सटीट्यूट, बीकानेर
4. डॉ. मोतीलाल मेनारिया : राजस्थानी भाषा और साहित्य, हिन्दी साहित्य सम्मेलन, प्रयाग
5. ग्रियर्सन : राजस्थान भाषा सर्वेक्षण (अनु. डॉ. आत्माराम जाडोरिया) राजस्थान भाषा प्रचार सभा, जयपुर
6. हीरालाल माहेश्वरी : राजस्थानी भाषा और साहित्य का इतिहास
7. डॉ. भूपतिराम साकरिया तथा बद्री प्रसाद साकरिया : राजस्थानी हिन्दी – भाषा कोष भाग–2, पंचशील प्रकाशन, जयपुर
8. डॉ. कृष्णबिहारी सहल : ढोला मारू रा दूहा – एक अध्ययन, आत्माराम एंड संस दिल्ली
9. डॉ. शिवस्वरूप शर्मा (संपा.) : राजस्थानी गद्य – उद्‌गम और विकास, सार्दुल राजस्थानी रिसर्ज इन्स्टीट्यूट, बीकानेर
10. डॉ. किरण नाहटा : आधुनिक राजस्थानी साहित्यः प्रेरणास्त्रोत और प्रवृतियाँ

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अधिगम उद्देश्यः–

1. राजस्थान प्रदेश की भाषाओं और साहित्य की समझ विकसित करना।
2. राजस्थान की सांस्कृतिक उपलब्धियों की साहित्यिक अभिव्यक्ति समझना।
3. राजस्थान गद्य और काव्य का विकास क्रम समझना।
4. राजस्थानी साहित्य की सामान्य प्रवृत्तियों का ज्ञान करना।

पाठ्यक्रम प्रतिफलः–

1. राजस्थानी भाषा के उद्भव और विकास को समझ सकेंगे
2. राजस्थान के प्रमुख रचनाकारों और साहित्य का अध्ययन कर सकेंगे
3. राजस्थानी जनमानस के सामान्य मनोविज्ञान की झलक पा सकेंगे
4. राजस्थानी भाषा की व्याकरणिय विशेषताएँ जान सकेंगे

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

HIN-A06 : तुलसीदास

समय : 3 घण्टे पूर्णांक : 100

इकाई 1. श्री रामचरितमानस अयोध्याकाण्ड (दोहा संख्या 67 से 90 तक) गीताप्रेस, गोरखपुर

इकाई 2. कवितावली (उत्तर काण्ड 15 छंद) छंद संख्या – 119, 122, 126, 132, 134, 136, 140, 141, 146, 153, 155, 161, 165, 182, 229 गीताप्रेस, गोरखपुर

इकाई 3. गीतावली (बालकाण्ड 20 पद) पद संख्या – 7, 8, 9, 10, 24, 26, 31, 33, 36, 44, 73, 95, 97, 101, 104, 105, 106, 107, 110 गीताप्रेस, गोरखपुर

इकाई 4. विनय पत्रिका (20 पद) पद संख्या – 1, 3, 17, 30, 36, 41, 45, 72, 78, 79, 85, 89, 90, 94, 100, 101, 102, 103, 104 = 20 पद गीताप्रेस, गोरखपुर

अंक विभाजन–

चार व्याख्याएँ – प्रत्येक इकाई से एक (आन्तरिक विकल्प देय) $10 \times 4 = 40$

तुलसीदास की भक्ति, दर्शन, जीवन दृष्टि, काव्य कला आदि के वैशिष्ट्य पर केन्द्रित तीन आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) $20 \times 3 = 60$

अनुशंसित ग्रंथ–

1. गोस्वामी तुलसीदास – रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, काशी
2. मानस दर्शन – डॉ. श्रीकृष्णलाल, आनन्द पुस्तक भवन, काशी
3. तुलसी और उनका युग – डॉ. राजपति दीक्षित, ज्ञानमण्डल, काशी
4. रामकथा का विकास – कामिल बुल्के, हिन्दी परिषद्, प्रयाग
5. तुलसी : आधुनिक वातायन से – रमेश कुंतल मेघ, राजकमल प्रकाशन, नई दिल्ली
6. परम्परा का मूल्याकन – रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली
7. तुलसी काव्य मीमांसा – उदयभानु सिंह, राधाकृष्ण प्रकाशन, नई दिल्ली
8. लोकवादी तुलसीदास – विश्वनाथ त्रिपाठी, राधाकृष्ण प्रकाशन, नई दिल्ली
9. भक्तिकाल में भारतीय रहस्यवाद – राधेश्याम दुबे, संजय बुक सेन्टर, वाराणसी
10. तुलसी : एक पुनर्मूल्यांकन – सं. अजय तिवारी, आधार प्रकाशन, पंचकूला
11. मध्ययुगीन काव्य साधना – रामचन्द्र तिवारी, विश्वविद्यालय प्रकाशन, वाराणसी

अधिगम उद्देश्यः–

1. मध्यकालीन हिन्दी साहित्य के राम केन्द्रित साहित्य का ज्ञान करना।
2. रामकाव्य धारा के सामंत विरोधी मूल्यों को समझना।
3. तुलसीदास के अवदान को रेखांकित करना।
4. अवधी भाषा की साहित्यिक उपलब्धि को समझना।

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पाठ्यक्रम प्रतिफलः–

1. तुलसी के सांस्कृतिक अवदान विशेषतः समन्वय को समझ सकेंगे
2. मध्यकाल के विभिन्न काव्य रूपों को जान सकेंगे
3. राम की मानवीय उदारता और अन्याय प्रतिरोध को समझ सकेंगे
4. भक्ति और प्रेम की मनुष्य केन्द्रियता जान सकेंगे

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कम्पलसरी कोर कोर्स

प्रथम प्रश्न पत्र : हिन्दी साहित्य का इतिहास (भक्तिकाल)

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

भक्ति आन्दोलन : सामाजिक–सांस्कृतिक पृष्ठभूमि, भक्ति आन्दोलन और लोक जागरण, भक्ति साहित्य एवं सामाजिक समरसता, प्रमुख निर्गुण कवि, प्रमुख सगुण कवि, निर्गुण एवं सगुण भक्ति की प्रमुख धाराएँ एवं उनकी शाखाएँ, भक्तिकाल की सामान्य विशेषताएँ

भारत में सूफीमत का उदय और विकास, सूफीमत के सिद्धान्त, हिन्दी के प्रमुख सूफी कवि और काव्य ग्रंथ, सूफी काव्यधारा की सामान्य विशेषताएँ।

अंक विभाजन–

आलोचनात्मक प्रश्न – कुल पाँच (20 × 4 = 80 अंक)
अन्तिम प्रश्न टिप्पणीपरक होगा। (10 × 2 = 20 अंक)
सभी प्रश्नों के आन्तरिक विकल्प देय।

अनुशंसित ग्रंथ–

1. रामचन्द्र शुक्ल – हिन्दी साहित्य का इतिहास, नागरी प्रचारिणी सभा, काशी
2. हजारी प्रसाद द्विवेदी – हिन्दी साहित्य : उद्‌भव और विकास, राजकमल प्रकाशन, दिल्ली
3. विश्वनाथ प्रसाद मिश्र – हिन्दी साहित्य का अतीत (भाग–एक), वाणी वितान, ब्रहमनाल, वाराणसी
4. रामस्वरूप चतुर्वेदी – हिन्दी साहित्य और संवेदना का विकास, लोकभारती, इलाहाबाद
5. नलिन विलोचन शर्मा – साहित्य का इतिहास दर्शन, बिहारी राष्ट्रभाषा परिषद्, पटना
6. बच्चन सिंह – हिन्दी साहित्य का दूसरा इतिहास, नेशनल पब्लिशिंग हाउस, दिल्ली
7. मैनेजर पाण्डेय – साहित्य और इतिहास दृष्टि, पिपुल्स लिटरेसी, दिल्ली
8. त्रिभुवन सिंह – साहित्यिक निबंध
9. भक्ति काव्य और लोक जीवन – शिवकुमार मिश्र
10. भक्ति काव्य की भूमिका – प्रेमशंकर
11. नाथपंथ और संत साहित्य – डॉ. नागेन्द्रनाथ उपाध्याय
12. हिन्दी काव्य की निर्गुण धारा में भक्ति – डॉ. श्याम सुन्दर शुक्ल
13. कबीर वाड्यम : सबद, साखी, रमैनी – डॉ. जयदेव सिंह, डॉ. वासुदेव सिंह
14. भये कबीर कबीर – डॉ. शुकदेव सिंह
15. कबीर एक नई दृष्टि – रघुवंश

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अधिगम उद्देश्य

1. भारत के मध्यकाल की सांस्कृतिक उपलब्धियों का उद्घाटन करना।
2. हिन्दी साहित्य के स्वर्णकाल के सामाजिक–सांस्कृतिक आधार को समझना।
3. भक्ति आन्दोलन की विविध धाराओं की पहचान करना।
4. भारत के सूफीमतों का परिचय प्राप्त करना।

पाठ्यक्रम प्रतिफल

1. भक्ति आन्दोलन के सामाजिक आधारों का विश्लेषण कर सकेंगे
2. आधुनिक भारत के उदार एवं मानवीय मूल्यों के स्रोतों की पहचान कर सकेंगे
3. प्रमुख संत–भक्त–सूफी कवियों की सामाजिक संस्कृति के विकास में भूमिका की पहचान कर सकेंगे
4. लोकसाहित्य एवं शिष्ट साहित्य के अन्तर्संबंधों को समझ सकेंगे

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कम्पलसरी कोर कोर्स

द्वितीय प्रश्न पत्र : भक्तिकाव्य

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

1. कबीर : कबीर ग्रंथावली – सं. श्याम सुन्दरदास

   साखी – गुरूदेव कौ अंग – 6, 7, 8, 12, 26

   सुमिरण कौ अंग – 3, 4, 10, 12, 18

   विरह कौ अंग – 10, 11, 13, 27, 28

   मन कौ अंग – 6, 7, 9, 10, 11

   पद – 23, 24, 39, 55, 72

2. सूरदास : सूरसागर – सं. डॉ धीरेन्द्र वर्मा, साहित्य भवन, इलाहाबाद

   गोकुल लीला –34, 42

   वृन्दावन लाली – 11, 16, 78

   राधा कृष्ण – 62, 70, 111

   मथुरा गमन – 10, 38, 51

   उद्धव संदेश – 9, 19, 66, 75, 77, 84, 102, 130, 132, 141, 143, 156, 186, 187

3. तुलसीदास : विनय पत्रिका, गीता प्रेस गोरखपुर

   पद – 6, 73, 84, 87, 88, 90, 91, 102, 105, 111, 115, 124, 158, 159, 162, 171, 174, 185, 188, 198, 199, 201, 202, 245

4. रहीम : ग्रंथावली – सं. विद्यानिवास मिश्र, गोविन्द रजनीश, वाणी प्रकाशन दिल्ली

   दोहावली – 4, 9, 15, 25, 28, 30, 58, 79, 89, 105

   बरवै गायिका भेद – 11, 15, 17, 38, 48, 96, 97, 107, 112, 115

   फुटकर पद – 3, 5, 7, 12, 13

अंक विभाजन–

व्याख्या – कुल चार $(10 \times 4 = 40$ अंक)

आन्तरिक विकल्प देय

आलोचनात्मक प्रश्न कुल चार $(15 \times 4 = 60$ अंक)

आन्तरिक विकल्प देय

व्याख्या और प्रश्न प्रत्येक इकाई से पूछा जाना अपेक्षित है

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अनुशंसित ग्रंथ–

1. रामचन्द्र शुक्ल – हिन्दी साहित्य का इतिहास, नागरी प्रचारिणी सभा, काशी

2. हजारी प्रसाद द्विवेदी – हिन्दी साहित्य उद्‌भव और विकास, राजकमल प्रकाशन, दिल्ली

3. विश्वनाथ प्रसाद मिश्र – हिन्दी साहित्य का अतीत (भाग–एक), वाणी वितान, ब्रहमनाल, वाराणसी

4. रामस्वरूप चतुर्वेदी – हिन्दी साहित्य और संवेदना का विकास, लोकभारती, इलाहाबाद

5. बच्चन सिंह – हिन्दी साहित्य का दूसरा इतिहास, नेशनल पब्लिशिंग हाउस

6. मैनेजर पाण्डेय – साहित्य और इतिहास दृष्टि, पिपुल्स लिटरेसी, दिल्ली

7. त्रिभुवन सिंह – साहित्यिक निबंध

8. भक्ति काव्य और लोक जीवन – शिवकुमार मिश्र

9. भक्ति काव्य की भूमिका – प्रेमशंकर

10. नाथपंथ और संत साहित्य – डॉ. नागेन्द्रनाथ उपाध्याय

11. हिन्दी काव्य की निर्गुण धारा में भक्ति – डॉ. श्याम सुन्दर शुक्ल

12. कबीर वाड्‌यम : सयबद, साखी, रमैनी – डॉ. जयदेव सिंह, डॉ. वासुदेव सिंह

13. भये कबीर कबीर – डॉ. शुकदेव सिंह

14. कबीर एक नई दृष्टि – रघुवंश

अधिगम उद्‌देश्य

1. भक्ति आन्दोलन की निर्गुण–सगुण धाराओं का विस्तृत अध्ययन करना।
2. संत मत की प्रमुख विशेषताओं को समझना।
3. ब्रजभाषा की काव्य धाराओं के योगदान को रेखंकित करना।
4. रहीम व अन्य कवियों के परवर्ती साहित्य पर प्रभाव को समझना।

पाठ्‌यक्रम प्रतिफल

1. कबीर साहित्य का विस्तृत अध्ययन कर सकेंगे।
2. सूरदास की कविता के माध्यम से लीलाओं की महत्ता का आंकलन कर सकेगे।
3. राम केन्द्रित साहित्य का भारतीय समाज के लिए योगदान को समझ सकेगे।
4. भक्ति की लोक में उपस्थिति को चिह्नित कर सकेंगे

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द्वितीय सत्र

HIN-203

कम्पलसरी कोर कोर्स

तृतीय प्रश्न पत्र : भारतीय काव्यशास्त्र

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

1. काव्यशास्त्र का इतिहास – सामान्य परिचय
2. काव्य लक्षण, काव्य हेतु एवं काव्य प्रयोजन
3. रस सिद्धान्त – रस की अवधारणा, रस निष्पत्ति और साधारणीकरण
4. ध्वनि सिद्धान्त – ध्वनि की अवधारणा, ध्वनि का विचार स्रोत, ध्वनि का वर्गीकरण, ध्वनि सिद्धान्त का महत्व
5. अलंकार सिद्धान्त – अलंकार की अवधारणा, अलंकार और अलंकार्य, अलंकारों का वर्गीकरण, अलंकार सिद्धान्त एवं अन्य सम्प्रदाय
6. रीति सिद्धान्त – रीति की अवधारणा, रीति एवं गुण, रीति का वर्गीकरण
7. वक्रोक्ति सिद्धान्त – वक्रोक्ति की अवधारणा, वक्रोक्ति का वर्गीकरण, वक्रोक्ति एवं अनिव्यंजनवाद, वक्रोक्ति का महत्व
8. औचित्व सिद्धान्त – औचित्य की अवधारणा, औचित्य का महत्व

अंक विभाजन–

कुल पाँच प्रश्न $(20 \times 4 = 80$ अंक)

अंतिम प्रश्न टिप्पणी परक होगा। $(10 \times 2 = 20$ अंक)

सभी प्रश्नों के आन्तरिक विकल्प देय।

अनुशंसित ग्रंथ–

1. भारतीय साहित्यशास्त्र : गणेश त्र्यंबक देशपांडे, पापुलर बुक डिपो, पूना
2. रसमीमांसा : रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, काशी
3. संस्कृत आलोचना : बलदेव उपाध्याय
4. रस प्रक्रिया : शंकरदेव अवतरे, दिल्ली
5. हिस्ट्री आफ संस्कृत पोएटिक्स : पी.बी. काणे, मोतीलाल बनारसीदास, दिल्ली
6. काव्याशास्त्र की भूमिका : डॉ. नगेन्द्र नेशनल पब्लिशिंग हाउस, दिल्ली
7. भारतीय काव्याशास्त्र के नये क्षितिज : राममूर्ति त्रिपाठी, राजकमल प्रकाशन, दिल्ली
8. ध्वनि सम्प्रदाय और उनके सिद्धान्त : भोलाशंकंर व्यास, चौखंभा, वाराणसी
9. काव्याशास्त्र : भागीरथ मिश्र, विश्वविद्यालय प्रकाशन वाराणसी
10. भारतीय काव्य विमर्श : राममूर्ति त्रिपाठी, वाणी प्रकाशन, दिल्ली
11. भारतीय काव्याशास्त्र की आचार्य परम्परा : डॉ. राधावल्लभ त्रिपाठी
12. ध्वन्यालोक : आचार्य चण्डिका प्रसाद शुक्ल

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अधिगम उद्देश्य

1. आलोचना के प्रारम्भिक भारतीय स्रोतों को जानना।
2. काव्य–आलोचना के सिद्धान्तों के परिवेश को जानना।
3. आलोचना के आदि आचार्यों के अवदान की पड़ताल करना।
4. वाद–विवाद–संवाद की परम्परा का ज्ञान।

पाठ्यक्रम प्रतिफल

1. भारतीय आलोचनाशास्त्र का इतिहास जान सकेंगे
2. काव्यांगों का विवेचन कर सकेंगे
3. विभिन्न सम्प्रदायों का परिचय प्राप्त कर सकेंगे
4. काव्यास्वाद की प्रक्रिया समझ सकेंगे

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एम.ए (हिन्दी) – द्वितीय सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
6 में से हिन्दी 3 का चयन करें
HIN-A01 : राजस्थान के प्रमुख संत कवि

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

1. जाम्भोजी : भारतीय साहित्य के निर्माता : हीरा लाल माहेश्वरी, साहित्य अकादमी, दिल्ली
   अध्याय 1 : पद – 1, 2, 4
   अध्याय 2 : पद – 2
   अध्याय 3 : पद – 2, 8, 13, 14, 26, 39
   संत काव्य : आयार्च परशुराम चतुर्वेदी, किताब महल, इलाहाबाद से निम्नांकित पाठ्यांश
2. दादूदयाल : पद – 1, 2, 3, 4, 5, 7 साखी – 1 से 10
3. सुन्दरदास : पद 1 से 4, साखी – 1 से 10
4. सहजो बाई : सम्पूर्ण

अंक विभाजन–

व्याख्या – कुल चार $(10 \times 4 = 40$ अंक)

आन्तरिक विकल्प देय

आलोचनात्मक प्रश्न कुल चार $(15 \times 4 = 60$ अंक)
आन्तरिक विकल्प देय

व्याख्या और प्रश्न प्रत्येक इकाई से पूछा जाना अपेक्षित है

अनुशंसित ग्रंथ–

1. हिन्दी काव्य की निर्गुण धारा में भक्ति : डॉ. श्याम सुन्दर शुक्ल
2. हिन्दी काव्य में निर्गुण सम्प्रदाय : पीताम्बर दत्त बड़थ्वाल
3. उत्तरी भारत की संत परम्परा : परशुराम चतुर्वेदी
4. संत अंक (कल्याण) : गीता प्रेस, गोरखपुर
5. सहजो बाई का सहज प्रकाश : वेलवेडियर, प्रेस प्रयाग
6. सुन्दर ग्रंथावली : सं. हरिनारायण शर्मा

अधिगम उद्देश्य

1. राजस्थान के मध्यकाल की पड़ताल करना।
2. राजस्थान की सांस्कृतिक–साहित्यिक उपलब्धियों का ज्ञान करना।
3. राजस्थान के मध्यकालीन हिन्दी साहित्य का अध्ययन करना।
4. राजस्थान में सामासिक संस्कृति के साहित्य का अध्ययन करना।

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पाठ्यक्रम प्रतिफल

1. राजस्थान में निर्गुण संत काव्य धारा का ज्ञान प्राप्त कर सकेगे।
2. विभिन्न संतों की कविता और कबीर की अन्तर्धारा को समझ सकेंगे
3. निर्गुण धारा के सामाजिक आधार को जान सकेंगे
4. मीरां के अतिरिक्त राजस्थान के मध्यकाल में स्त्री स्वर का अध्ययन कर सकेंगे

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6 में से किन्हीं 3 का चयन करें
HIN-A02 : रसखान

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

रसखान रचनावली : सं. विद्या निवास मिश्र, सत्यदेव मिश्र, वाणी प्रकाशन दिल्ली से निम्नांकित पाठ्यांश

1. सुजान रसखान : पद 3, 5, 7, 10, 13, 26, 29, 31, 37, 41, 56, 61, 67, 82, 85, 99, 103, 124, 129, 130, 140, 145, 155, 159, 169, 174, 191, 225, 248
2. प्रेम वाटिका : पद 10 से 19 तथा 33 से 42

अंक विभाजन–

व्याख्या – कुल चार $(10 \times 4 = 40$ अंक)

आन्तरिक विकल्प देय

आलोचनात्मक प्रश्न कुल चार $(15 \times 4 = 60$ अंक)

आन्तरिक विकल्प देय

व्याख्या और प्रश्न प्रत्येक इकाई से पूछा जाना अपेक्षित है

अनुशंसित ग्रंथ–

1. हिन्दी साहित्य का इतिहास – रामचन्द्र शुक्ल
2. हिन्दी साहित्य का आलोचनात्मक इतिहास – रामकुमार वर्मा
3. हिन्दी के मुसलमान कवियों का प्रेम काव्य – गुरूदेव प्रसाद वर्मा
4. रसखान और उनका काव्य – चन्द्रशेखर पाण्डेय
5. रसखान : जीवन और कृतित्व – देवेन्द्र प्रताप उपाध्याय
6. रसखान ग्रंथावली – आचार्य विश्वनाथ प्रसाद मिश्र
7. रसखान : काव्य और भक्ति भावन – डॉ. माजरा असद
8. रसखान पदावली –सं. प्रभुदत्त ब्रहमचारी

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अधिगम उद्देश्य

1. भक्ति साहित्य के विस्तृत फलक का अध्ययन करना।
2. कृष्ण की सांस्कृतिक छवि को समझना।
3. ब्रजभाषा की रसात्मक विशेषता का विश्लेषण करना।
4. भक्ति के पदों का जनसाधारण चरित्र समझना।

पाठ्यक्रम प्रतिफल

1. भक्ति आन्दोलन की धर्मनिरपेक्ष प्रकृति को जान सकेंगे।
2. रसखान को सामाजिक प्रतीक के रूप में समझ सकेंगे।
3. प्रेम की सामाजिकता को जान सकेंगे।
4. मध्यकालीन काव्य की लोकोन्मुखता समझ सकेंगे।

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6 में से किन्हीं 3 का चयन करें
HIN-A03 : साहित्य और सिनेमा

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

इकाई 1. सिनेमा का उदय और अवाक् सिनेमा
सवाक् सिनेमा का आरम्भ
सिनेमा और साहित्य का अन्त : संबंध
नाटक और पटकथा – सिनेमा के संदर्भ में

इकाई 2. सिनेमा और भारतीय समाज का संबंध
पौराणिक फिल्मों का दौर
ऐतिहासिक फिल्मों का दौर
सामाजिक फिल्मों का दौर
भारत की सामाजिक समस्याएं और हिन्दी सिनेमा

इकाई 3. हिन्दी सिनेमा ओर साहित्यकार (गद्यकार)
उर्दू साहित्याकार – मण्टों, कृष्णचन्दर, राजेन्द्र सिंह बेदी
हिन्दी के साहित्याकार – प्रेमचंद, अमृतलाल नागर, भगवती चरण वर्मा, फणीश्वर नाथरेणु सिनेमा और साहित्याकार के संबंध

इकाई 4. हिन्दी सिनेमा और साहित्याकार (पद्यकार)
संगीत और सिनेमा
हिन्दी गीत और सिनेमा – नरेन्द्र शर्मा, नीरज, रामवतार त्यागी, राजेन्द्र कृष्ण आदि
हिन्दी गीत की की सिनेमा में उपस्थिति : सार्थकता और आवश्यकता

इकाई 5. सिनेमा और समाज का अन्तःसंबंध
दर्शक की प्रतिक्रिया और सिनेमा
सिनेमा की कलात्मकता
सिनेमा में विम्ब विधान
सिनेमा में प्रतीक विधान

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अंक विभाजन–

कुल पांच प्रश्न	(20 × 4 = 80 अंक)
अंतिम प्रश्न टिप्पणी परक होगा।	(10 × 2 = 20 अंक)
सभी प्रश्नों के आन्तरिक विकल्प देय।	

अनुशंसित ग्रंथ–

1. जवरीमल्ल पारख, जनसंचार माध्यमों का राजनीतिक चरित्र, अनामिका पब्लिशर्स।
2. रामअवतार अग्निहोत्री, आधुनिक हिन्दी सिनेमा का सामाजिक व राजनीतिक अध्ययन, कामनवेल्थ पब्लिशर्स
3. जवरीमल्ल पारख, लोकप्रिय सिनेमा और सामाजिक यथार्थ, अनामिका पब्लिशर्स।
4. विजय अग्रवाल, आज का सिनेमा, नीलकंठ प्रकाशन
5. जवरीमल्ल पारख, हिन्दी सिनेमा का समाजशास्त्र, ग्रंथ शिल्पी प्रकाशन
6. विनोद दास, भारतीय सिनेमा का अंतःकरण, मेधा बुक्स
7. विजय अग्रवाल, सिनेमा और समाज, सत्साहित्य प्रकाशन
8. विनोद भारद्वाज, नया सिनेमा रूपा एंड कम्पनी
9. विजय अग्रवाल, सिनेमा की संवदेना, प्रतिमा प्रतिष्ठान
10. विजय अग्रवाल, सिनेमा समाज, सत्साहित्य प्रकाशन दिल्ली
11. प्रहलाद अग्रवाल, आधी हकीकत आधा फसाना, राजकमल प्रकाशन प्रा. लि. नई दिल्ली
12. विष्णु खरे, सिनेमा पढ़ने के तरीके, प्रवीण प्रकाशन नई दिल्ली
13. चिदानन्द दास गुप्ता, सत्यजीत राय का सिनेमा, नेशनल बुक ट्रस्ट, नई दिल्ली
14. विनोद दास, भारतीय सिनेमा का अंतःकरण, मेधा बुक्स, दिल्ली
15. तारकोवस्की, अनंत में फैलते बिंब, संवाद प्रकाशन, मुम्बई : मेरठ
16. जवरीमल्ल पारख, जनसंचार माध्यमों का सामाजिक चरित्र : अनामिका पब्लिशर्स दिल्ली
17. जगदीश्वर चतुर्वेदी, जनमाध्यम और मास कल्चर : सारांश प्रकाशन नई दिल्ली

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अधिगम उद्देश्य

1. समाज अध्ययन के लिए सिनेमा को महत्वपूर्ण अनुशासन के रूप में समझना।
2. आधुनिकता और सिनेमा के विकास में अन्तर्संबंध को जानना।
3. सिनेमा के माध्यम से उपनिवेशवाद विरोध का अध्ययन करना।
4. सिनेमाई रचनात्मकता पर प्रकाश डालना।

पाठ्यक्रम प्रतिफल

1. भारत में सिनेमा के उदय की चुनौतियों को समझ सकेंगे।
2. पौराणिक–ऐतिहासिक फिल्मों की सामाजिकता को समझ सकेंगे।
3. साहित्यकारों के सिनेमा में योगदान को रेखांकित कर सकेंगे।
4. समाज, समय और कला के अन्तर्संबंध को जान सकेंगे।

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6 में से किन्हीं 3 का चयन करें

HIN-A04 : अनुवाद : सिद्धान्त और प्रविधि

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

1. अनुवाद का अर्थ, स्वरूप एवं प्रकृति। अनुवाद कार्य की आवश्यकता एवं महत्व। बहुभाषी समाज में, परिवर्तन तथा बौद्धिक–सांस्कृतिक आदान–प्रदान में अनुवाद कार्य की भूमिका।
2. अनुवाद के प्रकार : शाब्दिक अनुवाद, भावानुवाद, छायानुवाद एवं सारानुवाद। अनुवाद–प्रक्रिया के तीन चरण – विश्लेषण, अंतरण एवं पुनर्गठन। अनुवाद की भूमिका के तीन पक्ष–पाठक की भूमिका (अर्थग्रहण की) प्रक्रिया द्विभाषिक की भूमिका (अर्थातंरण की प्रक्रिया) एवं रचयिता की भूमिका (अर्थसम्प्रेषण की प्रक्रिया)
3. सर्जनात्मक साहित्य के अनुवाद की अपेक्षाएं। सर्जनात्मक साहित्य के अनुवाद और तकनीकी अनुवाद में अन्तर। गद्यानुवाद एवं काव्यानुवाद में संरचनात्मक भेद। किन्हीं दो अनुदित कृतियों का समीक्षात्मक अध्ययन।
4. कार्यलयीन अनुवाद : राजभाषा नीति के अनुपालना में धारा 3(3) के अन्तर्गत निर्धारित दस्तावेज का अनुवाद। शासकीय पत्र/ अर्धशासकीय पत्र/ परिपत्र (सर्कुलर)/ ज्ञापन (प्रजेंटेशन)/कार्यालय आदेश/ अधिसूचना/ संकल्प–प्रस्ताव (रेज्योलूशन)/ निविदा–संविदा/ विज्ञापन आदि के संबंधित तकनीकीपरक पारिभाषिक शब्दावली।

अंक विभाजन–

कुल पाँच प्रश्न $(20 \times 4 = 80$ अंक)

अंतिम प्रश्न टिप्पणी परक होगा। $(10 \times 2 = 20$ अंक)

सभी प्रश्नों के आन्तरिक विकल्प देय।

अनुशंसित ग्रंथ–

1. अनुवाद सिद्धान्त एवं समस्याएं : रवीन्द्रनाथ श्रीवास्तव एवं कृष्णकुमार गोस्वामी, आलेख प्रकाशन दिल्ली।
2. अनुवाद विज्ञान एवं संप्रेषण : हरिमोहन, तक्षशिला प्रकाशन नई दिल्ली
3. अनुवाद सिद्धान्त : डॉ. भोलानाथ तिवारी, साहित्य सहकार दिल्ली
4. अनुवाद शिल्प समकालीन संदर्भ : डॉ. कुसुम अग्रवाल, साहित्य सहकार दिल्ली
5. प्रयोजनमूलक हिन्दी सिद्धान्त और व्यवहार : रघुनन्दन प्रसाद शर्मा वि.वि. प्रकाशन, वाराणसी
6. अनुवाद सिद्धान्त एवं रूपरेखा : डॉ. सुरेश कुमार वाणी, प्रकाशर दिल्ली
7. अनुवाद सिद्धान्त एवं प्रयोग : जी. गोपीनाथ लोकभारती, इलाहाबाद
8. अनुवाद विज्ञान सिद्धान्त तथा अनुप्रयोग : डॉ. नगेन्द्र, दिल्ली
9. अनुवाद की सामाजिक भूमिका : सीताराम पालीवाल, सचिन प्रकाशन, दिल्ली

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अधिगम उद्देश्य

1. अनुवाद के सैद्धान्तिक आधार बताना।
2. सर्जनात्मक अनुवाद का महत्व स्पष्ट करना।
3. अनुवाद की जरूरत को समझना।
4. अनुवाद की चुनौतियाँ एवं समाधान पर ध्यान देना।

पाठ्यक्रम प्रतिफल

1. अनुवाद के सही अर्थ, स्वरूप और प्रकृति की समझ विकसित कर सकेंगे।
2. दो भिन्न भाषाओं, संस्कृतियों को एक–दूसरे के निकट आने में अनुवाद की भूमिका को समझ सकेंगे।
3. विभिन्न कार्यालयी जरूरतों के लिए अनुवाद को जान सकेंगे।
4. अनुवाद के विभिन्न प्रारूपों को सीख सकेंगे।

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एम.ए (हिन्दी) – द्वितीय सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
6 में से किन्हीं 3 का चयन करें
HIN-A05 : पत्रकारिता और जनसंचार

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

पत्रकारिता की परिभाषा, प्रकृति, उद्देश्य एवं महत्त्व, पत्रकारिता का इतिहास

पत्रकारिता की विधाएं–प्रिंट एवं इलेक्ट्रोनिक मीडिया

मुक्त प्रेस की अवधारणा, प्रेस कानून और आचार–संहिता। लोकतंत्र का चतुर्थ स्तंभः पत्रकारिता

जनसंचार :

जनसंचार – परिभाषा, प्रकृति, उद्देश्य एवं महत्त्व

संचार – परिभाषा, प्रकृति, महत्व एवं प्रकार, जनसंचार के सिद्धान्त

जनसंचार के माध्यम–प्रिंट मीडिया, इलेक्ट्रोनिक मीडिया, परम्परागत माध्यम जनसंचार एवं विकास

रिर्पोटिंग और सम्पादन :

समाचार पत्र संगठन की संरचना (संपादकीय, प्रबंधन व प्रसार की रूपरेखा)

रिर्पोटिंग – परिभाषा, प्रकृति, उद्देश्य एवं महत्व, रिपोर्टर के गुण, कार्य एवं दायित्व

संपादन – परिभाषा, प्रकृति, उद्देश्य एवं महत्व, सम्पादक एवं उपसंपादक के कार्य एवं दायित्व

समाचार पत्र के सम्पादन में बरती जाने वाली सावधानियाँ

जनसम्पर्क एवं विज्ञापन :

जनसम्पर्क – परिभाषा, प्रकृति, उद्देश्य एवं महत्त्व, सरकारी एवं गैरसरकरी क्षेत्रों में जनसम्पर्क, जनमत निर्माण

विज्ञापन – परिभाषा, प्रकृति, उद्देश्य एवं महत्त्व, विज्ञापन के विभिन्न प्रकार

अंक विभाजन–

कुल पांच प्रश्न	(20 × 4 = 80 अंक)
अंतिम प्रश्न टिप्पणी परक होगा।	(10 × 2 = 20 अंक)
सभी प्रश्नों के आन्तरिक विकल्प देय।	

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अनुशंसित ग्रंथ–

1. हिन्दी पत्रकारिता का वृहद् इतिहास : अर्जुन तिवारी
2. पत्रकारिता एवं संपादन कला : एन.सी. पंत
3. हिन्दी पत्रकारिता : डॉ. धीरेन्द्र नाथ सिंह
4. समकालीन पत्रकारिता : मूल्यांकन और मुद्दे – राजकिशोर
5. जनसम्पर्क एवं विज्ञापन :संतोष गोयल
6. पत्रकारिता की चुनौतियां : गणेश मंत्री
7. रूपक लेखन : ब्रजभूषण सिंह

अधिगम उद्देश्य

1. पत्रकारिता एवं जनसंचार के महत्त्व को जानना।
2. पत्रकारिता के कौशल को विकसित करना।
3. पत्रकारिता के नए क्षेत्रों का परिचय करना।
4. जनसंपर्क और विज्ञापन के महत्व को जानना।

पाठ्यक्रम प्रतिफल

1. हिन्दी पत्रकारिता के इतिहास को जान सकेंगे।
2. लोकतंत्र में पत्रकारिता की भूमिका समझ सकेंगे।
3. जनसंपर्क और विज्ञापन कौशल में दक्ष हो सकेंगे।
4. नागरिक जिम्मेदारियों के प्रति सचेत हो सकेंगे।

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एम.ए (हिन्दी) – द्वितीय सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
6 में से किन्हीं 3 का चयन करें
HIN-A06 : मीरा

समय : 3 घण्टे पूर्णांक : 100

पाठ्यांश :

मीरा पदावली : सं. डॉ. शम्भुसिंह मनोहर, रिसर्च पब्लिकेशन जयपुर से निम्नांकित पाठ्यांश पद – 01 से 100 तक

अंक विभाजन–

व्याख्या : कुल चार $(10 \times 4 = 40$ अंक)
आन्तरिक विकल्प देय।
आलोचनात्मक प्रश्न कुल चार $(15 \times 4 = 60$ अंक)
आन्तरिक विकल्प देय।

अनुशंसित ग्रंथ–

1. उत्तर भारत की संत परंपरा : परशुराम चतुर्वेदी
2. मीराँ –मंदाकिनी : नरोत्तमदास स्वामी
3. मीराँ–माधुरी : ब्रजरत्नदास
4. मीराँ : एक अध्ययन – पद्मावती शबनम
5. मीराँ का काव्य – विश्वनाथ त्रिपाठी
6. मीराँ, सहजो और दयाबाई : वियोगी हरि
7. मीराँ – पदावली – परशुराम चतुर्वेदी
8. मीराँ वृहत–पद–संग्रह – पद्मावती शबनम
9. मीराँ की प्रेम साधना – भुवनेश्वर 'मिश्र' माधव
10. पचरंग चोला पहन सखी री : माधव हाड़ा
11. राजस्थानी भाषा और साहित्य – डॉ. मोतीलाल मेनारिया
12. राजस्थानी भाषा और साहत्य – डॉ. हीरालाल माहेश्वरी
13. मध्यकालीन हिन्दी कवयित्रियाँ – सावित्री सिन्हा
14. हिन्दी साहित्य का आधा इतिहास – डॉ. सुमन राजे

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अधिगम उद्देश्य

1. भक्ति आन्दोलन में लैंगिक अभिव्यक्ति का अध्ययन करना।
2. सामंतवाद की चुनौतियों को समझना।
3. राजस्थान के परिवेश का ज्ञान करना।
4. स्त्री रचनाकारों की कविता का शिल्प समझना।

पाठ्यक्रम प्रतिफल

1. सामन्तवाद और स्त्री विषय की अभिव्यक्ति का ज्ञान कर सकेंगे।
2. मीराँ की कविता का अध्ययन कर सकेंगे।
3. स्त्री मन और प्रकृति की पड़ताल कर सकेंगे।
4. रैदास, नाथपंथ और मीराँ की कविता के अन्तर्सबंध को समझ सकेंगे।

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कम्पलसरी कोर कोर्स

HIN-301 : हिन्दी साहित्य का इतिहास – रीतिकाल

इकाई 1. रीतिकाल – नामकरण एवं सीमांकन
रीतिकाल की तत्कालीन परिस्थितियां (राजनीतिक, सामाजिक, सांस्कृतिक एवं साहित्यिक)
'रीति' शब्द की व्याख्या और रीतिकाव्य का लक्षण – शास्त्रीय और साहित्यिक पृष्ठाधार

इकाई 2. रीतिकाव्य की मूल प्रवृतियाँ
रीतिकाव्य की प्रमुख धाराएँ –
* रीतिबद्ध काव्य – सामान्य विशेषताएं एवं प्रमुख कवि
* रीतिसिद्ध काव्य – सामान्य विशेषताएं एवं प्रमुख कवि
* रीतिमुक्त काव्य – सामान्य विशेषताएं एवं प्रमुख कवि

इकाई 3. रीतिकाल की अन्य प्रवृत्तियाँ – भक्तिकाव्य, वीरकाव्य, नीतिकाव्य
रीतिकाल का गद्य साहित्य
रीतिकाल की उपलब्धियाँ

इकाई 4. काव्य के अंग – रस, छंद, अलंकार
काव्य गुण, काव्य दोष, शब्द–शक्ति

अंक विभाजन–

चार आलोचनात्मक प्रश्न – इकाई 1,2 एवं 3 से (आन्तरिक विकल्प देय)	$(20 \times 4 = 80)$
एक टिप्पणीपरक प्रश्न इकाई 4 से (आन्तरिक विकल्प देय)	$(10 \times 2 = 20)$

अनुशंसित ग्रंथ–

1. हिन्दी रीति साहित्य – भगीरथ मिश्र, राजकमल प्रकाशन, नई दिल्ली
2. रीति काव्य की भूमिका – डॉ. नगेन्द्र, नेशनल पब्लिशिंग हाउस, नई दिल्ली
3. हिन्दी साहित्य का अतीत, भाग 1 – विश्वनाथ प्रसाद मिश्र, वाणी प्रकाशन, नई दिल्ली
4. रीतिकवियों की मौलिक देन – किशोरीलाल, साहित्य भवन प्रा. लि., इलाहाबाद
5. रीतिकाव्य – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
6. केशवदास – विजयपाल सिंह, लोकभारती प्रकाशन, इलाहाबाद
7. बिहारी का नया मूल्यांकन – बच्चन सिंह, लोकभारती प्रकाशन, इलाहाबाद
8. रीति काव्य : मूल्यांकन के नये आयाम – सं. प्रभाकर सिंह, लोकभारती प्रकाशन, इलाहाबाद
9. काव्यशास्त्र विमर्श – कृष्णनारायण प्रसाद 'मागध', वाणी प्रकाशन, नई दिल्ली
10. रीति काव्य की इतिहास दृष्टि – सुधीन्द्र कुमार, वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. रीतिकाल के नामकरण, सीमांकन और तत्कालीन परिस्थितियों का ज्ञान कराना।
2. 'रीति' शब्द की व्याख्या और रीति काव्य की विभिन्न धाराओं का बोध कराना।
3. रीतिकाल की विभिन्न प्रवृत्तियों का परिचय कराना।
4. काव्य गुण, काव्य दोष, शब्द–शक्ति, रस, छंद, अलंकार आदि को स्पष्ट करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी 'रीति' शब्द का अर्थ–ग्रहण कर रीतिकाल के नामकरण की युक्तिसंगतता को समझ सकेंगे।
2. विद्यार्थी रीतिकालीन परिस्थितियों को समझकर साहित्य पर पड़े प्रभावों का आकलन कर सकेंगे।
3. विद्यार्थी रीतिकालीन साहित्य की विभिन्न प्रवृत्तियों की व्याख्या कर सकेंगे।
4. विद्यार्थी काव्य के स्वरूप, रस, छंद, अलंकार, काव्य गुण, काव्य दोष शब्द शक्ति आदि को समझकर साहित्यिक मूल्यांकन कर सकेंगे।
5. विद्यार्थी रीतिकाल की विविध धाराओं के परस्पर अंतर को समझ सकेंगे।

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कम्पलसरी कोर कोर्स

HIN-302 : रीति काव्य

इकाई 1. केशवदास : रामचन्द्रिका – लक्ष्मण परशुराम संवाद, अंगद रावण संवाद

इकाई 2. बिहारी – बिहारी रत्नाकर (सं. जगन्नाथदास रत्नाकर) – प्रथम 50 दोहे

इकाई 3. भूषण – भूषण ग्रंथावली (सं. विश्वनाथ प्रसाद मिश्र) – प्रथम 20 छंद

इकाई 4. घनानंद कवित (सं. विश्वनाथ प्रसाद मिश्र) – प्रथम 20 छंद

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय) $(10 \times 4 = 40)$

चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) $(15 \times 4 = 60)$

प्रत्येक इकाई से व्याख्या और प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. रीतिकाव्य – नंदकिशोर नवल
2. केशवदास – विजयपाल सिंह
3. घनानन्द का काव्य – रामदेव शुक्ल
4. बिहारी की काव्यभूमि – विश्वनाथ प्रसाद मिश्र
5. बिहारी का नया मूल्यांकन – बच्चन सिंह
6. घनानन्द – मनोहर लाल गौड़

अधिगम उद्देश्य

1. रीतिकाल की प्रमुख कृतियों और कवियों का परिचय कराना।
2. प्रमुख साहित्यिक रचनाओं के साहित्यिक–सौष्ठव का बोध कराना।
3. साहित्यिक कृतियों का मूल्यांकन कर उनका स्थान निर्धारण करने की क्षमता विकसित करना।
4. प्रमुख काव्य–रचनाओं में प्रयुक्त भाषिक–कौशल, छंद–विधान, गति, यति आदि की पहचान कराना।

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पाठ्यक्रम प्रतिफल

1. विद्यार्थी केशवदास की 'रामचंद्रिका' के साहित्यिक सौष्ठव को अभिव्यक्त कर सकेंगे।
2. विद्यार्थी बिहारी के काव्य–कौशल पर टिप्पणी कर सकेंगे।
3. विद्यार्थी भूषण की रचनाओं में निहित तत्कालीन सामाजिक और राजनीतिक घटनाओं पर परिचर्चा कर सकेंगे।
4. विद्यार्थी घनानंद की कविताओं के रसात्मक बोध को अनुभूत कर अन्य कवियों से तुलना कर सकेंगे।

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एम.ए (हिन्दी) – तृतीय सेमेस्टर
कम्पलसरी कोर कोर्स
HIN-303 : पाश्चात्य साहित्यशास्त्र

इकाई 1. प्लेटो – काव्य चिंतन
अरस्तू – अनुकरण एवं त्रासदी सिद्धान्त
लोंजाइनस – काव्य में उदात्त तत्व

इकाई 2. कॉलरिज – कल्पना तथा फेंटेसी
वड्र्सवर्थ – काव्य भाषा सिद्धान्त
क्रोचे – अभिव्यंजनावाद

इकाई 3. टी.एस. इलियट – परम्परा तथा वैयक्तिक प्रतिभा, निर्वेयक्तिता का सिद्धान्त
आई.ए. रिचड्र्स – मूल्य सिद्धान्त, संप्रेषण सिद्धान्त
नई समीक्षा

इकाई 4. मार्क्सवाद, मनोविश्लेषणवाद, यथार्थवाद, आधुनिकता, उत्तर आधुनिकता, संरचनावाद विखण्डनवाद, शैली विज्ञान

अंक विभाजन–

चार आलोचनात्मक प्रश्न – इकाई 1, 2, 3 से (आन्तरिक विकल्प देय) $(20 \times 4 = 80)$

एक टिप्पणीपरक प्रश्न (दो टिप्पणियां) – इकाई 4 से (विकल्प देय) $(10 \times 2 = 20)$

अनुशंसित ग्रंथ–

1. काव्य चिंतन की पश्चिमची परम्परा – निर्मला जैन, वाणी प्रकाशन, नई दिल्ली
2. पाश्चात्य काव्यशास्त्र – भगीरथ मिश्र, विश्वविद्यालय प्रकाशन, वाराणसी
3. पाश्चात्य काव्यशास्त्र का इतिहास – तारकनाथ बाली, किताबघर प्रकाशन, नई दिल्ली
4. पाश्चात्य काव्यशास्त्र : अधुनातन संदर्भ – सत्यदेव मिश्र, लोकभारती प्रकाशन, इलाहाबाद
5. पाश्चात्य काव्यशास्त्र – विजय बहादुर सिंह, प्रकाशन संस्थान, नई दिल्ली
6. संरचनावाद, उत्तर संरचनावाद और प्राच्यवाद – गोपीचन्द नारंग, साहित्य अकादमी, नई दिल्ली
7. पाश्चात्य काव्यशास्त्र : नई प्रवृत्तियां – राजनाथ राजकमल प्रकाशन, नई दिल्ली
8. हिन्दी आलोचना की पारिभाषिक शब्दावली – अमरनाथ, राजकमल प्रकाशन, नई दिल्ली
9. प्लेटो के काव्य सिद्धान्त – निर्मला जैन, वाणी प्रकाशन, नई दिल्ली
10. पाश्चात्य साहित्य चिंतन – करूणाशंकर उपाध्याय, राधाकृष्णन प्रकाशन, नई दिल्ली

अधिगम उद्देश्य

1. पाश्चात्य साहित्यशास्त्र के प्रमुख सिद्धांतों और अवधारणाओं से परिचय कराना।
2. प्रमुख आलोचकों और चिंतकों के सिद्धांतों में निहित अन्तर को स्पष्ट करना।
3. साहित्यिक कृतियों के मूल्यांकन में पाश्चात्य साहित्य सिद्धान्तों का अनुप्रयोग सिखाना।
4. पाश्चात्य साहित्य–चिंतन की नवीनतम अवधारणाओं और आलोचना–पद्धतियों का बोध कराना।

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पाठ्यक्रम प्रतिफल

1. विद्यार्थी प्लेटो, अरस्तू, कॉलरिज, वर्डसवर्थ, क्रोचे, इलियट, रिचर्ड्स के साहित्य–सिद्धान्तों को समझ सकेंगे।
2. विद्यार्थी पाश्चात्य–साहित्य चिंतन में प्रचलित आधुनिक आलोचना पद्धतियों से सुपरिचित हो सकेंगे।
3. विद्यार्थी पाश्चात्य साहित्य–सिद्धान्तों और अवधारणाओं के आधार पर किसी भी साहित्यिक रचना का मूल्यांकन कर सकेंगे।
4. विद्यार्थी पाश्चात्य साहित्य–सिद्धान्तों से भारतीय साहित्य–सिद्धांत की तुलना कर सकेंगे

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HIN A01 – A06 में से किन्हीं 3 का चयन करें

A01 : हिन्दी कहानी

समय : 3 घण्टे पूर्णांक : 100

* हिन्दी कहानी का उद्‌गम और विकास

* निर्धारित पाठ–

1. कफन – प्रेमचंद
2. नीलम देश की राजकन्या – जैनेन्द्र कुमार
3. हीलीबोन की बत्तखें – अज्ञेय
4. लंदन की एक रात – निर्मल वर्मा
5. डिप्टी कलक्टरी – अमरकांत
6. लाल पान की बेगम – फणीश्वरनाथ रेणु
7. खोई हुई दिशाएं – कमलेश्वर
8. सिक्का बदल गया – कृष्णा सोबती
9. बहिर्गमन – ज्ञानरंजन
10. लकड़बग्घा – चित्रा मुद्‌गल
11. टेपचू – उदय प्रकाश
12. सलीब पर सांस – आलम शाह खान

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय) $(10 \times 4 = 40)$
एक कहानी से एक ही व्याख्या पूछी जायेगी
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) $(15 \times 4 = 60)$
कहानी, कहानीकार एवं कहानी के इतिहास से संबंधित प्रश्न पूछे जायेंगे।

अनुशंसित ग्रंथ–

1. हिन्दी कहानी का विकास – मधुरेश, लोकभारती प्रकाशन, इलाहाबाद
2. हिन्दी कहानी का इतिहास : भाग 1,2,3 – गोपाल राय, राजकमल प्रकाशन, नई दिल्ली
3. कहानी : नई कहानी – नामवर सिंह, लोकभारती प्रकाशन, इलाहाबाद
4. कहानी की रचना प्रक्रिया – परमानंद श्रीवासस्त्व, लोकभारती प्रकाशन, इलाहाबाद
5. हिन्दी कहानी : प्रक्रिया और पाठ – सुरेन्द्र चौधरी, राधाकृष्णन प्रकाशन, नई दिल्ली
6. कथा समय – विजयमोहन सिंह, राधाकृष्णन प्रकाशन, नई दिल्ली
7. एक दुनिया समानान्तर – सं. राजेन्द्र यादव, राधाकृष्णन प्रकाशन, नई दिल्ली
8. हिन्दी की प्रतिनिधि कहानियां ' जयंती प्रसाद नौटियाल, किताबघर प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी कहानी के उद्भव और विकास को स्पष्ट करना।
2. हिन्दी कहानी की विभिन्न धाराओं और प्रवृत्तियों का ज्ञान कराना।
3. हिन्दी कहानी की विकास–यात्रा के विविध पड़ावों को सुस्पष्ट करना।
4. प्रमुख कहानीकारों की प्रतिनिधि कहानियों के साहित्यिक–सौष्ठव का बोध कराना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी कहानी की विकास–यात्रा और विविध–शैलियों से सुपरिचित हो सकेंगे।
2. विद्यार्थी प्रतिनिधि कहानीकारों के महत्व को समझ सकेंगे
3. विद्यार्थी कहानी के कहन–कौशल, भाषिक–विधान और उनमें निहित उद्देश्य की पहचान कर सकेंगे।
4. विद्यार्थी विभिन्न कहानियों के अध्ययन–विश्लेषण के द्वारा कहानियों का मूल्यांकन करने का कौशल विकसित कर सकेंगे।

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HIN A01 – A06 में से किन्हीं 3 का चयन करें

A02 : हिन्दी नाटक एवं रंगमंच

* हिन्दी नाटक का उद्‌भव और विकास
* हिन्दी रंगमंच की परम्परा और प्रयोग
* निर्धारित पाठ–

1. अंधेर नगरी – भारतेन्दु हरिश्चन्द्र
2. स्कन्दगुप्त – जयशंकर प्रसाद
3. आषाढ़ का एक दिन – मोहन राकेश
4. बकरी – सर्वेश्वरदयाल सक्सेना

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय) $(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) $(15 \times 4 = 60)$
नाटक, नाटककार एवं नाटक–रंगमंच के इतिहास से संबंधित प्रश्न पूछे जायेंगे।

अनुशंसित ग्रंथ–

1. हिन्दी नाटक : उद्‌भव और विकास – दशरथ ओझा, राजपाल एण्ड संस, दिल्ली
2. हिन्दी नाटक का आत्मसंघर्ष – गिरीश रस्तोगी, लोकभारती प्रकाशन, इलाहाबाद
3. नाटककार भारतेन्दु : नये संदर्भ, नये विमर्श – सं. रमेश गौतम, नई किताब, दिल्ली
4. मोहन राकेश और उनके नाटक – गिरीश रस्तोगी, लोकभारती प्रकाशन, इलाहाबाद
5. प्रसाद के नाटकों का शास्त्रीय अध्ययन – जगन्नाथ प्रसाद शर्मा, वाणी प्रकाशन, नई दिल्ली
6. जयंशकर प्रसाद : रंगसृष्टि, भाग 1,2 – महेश आनन्द, राष्ट्रीय नाट्य विद्यालय नई दिल्ली
7. रंगमंच के सिद्धान्त – महेश आनन्द, देवेन्द्रराज अंकुर, राजकमल प्रकाशन, नई दिल्ली
8. रंगमंच का सौन्दर्यशास्त्र – देवेन्द्रराज अंकुर, राजकमल प्रकाशन, नई दिल्ली
9. हिन्दी नाट्यशास्त्र का स्वरूप – डॉ. नर्मदेश्वर राय, हिन्दी ग्रंथ कुटीर, पटना
10. बीसवीं सदी में हिन्दी नाटक और रंगमंच – गिरीश रस्तोगी, भारतीय ज्ञानपीठ, नई दिल्ली

अधिगम उद्‌देश्य

1. हिन्दी नाटक और रंगमंच के उद्‌भव एवं विकास को स्पष्ट करना।
2. हिन्दी रंगमंच की परम्परा और प्रयोग का व्यावहारिक ज्ञान कराना।
3. प्रतिनिधि नाटक अंधेर नगरी, स्कन्दगुप्त, आषाढ़ का एक दिन, बकरी आदि के अध्ययन द्वारा विभिन्न नाट्य–प्रयोगों का बोध कराना।
4. नाटक और रंगमंच के परस्पर संबंधों का दिग्दर्शन कराना।

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पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी नाटक के वैशिष्ट्य की पहचान कर सकेंगे।
2. विद्यार्थी हिन्दी रंगमंच और नाटक के परस्पर संबंध की व्याख्या कर सकेंगे।
3. विद्यार्थी 'अंधेर नगरी' और 'स्कन्दगुप्त' नाटक के अध्ययन द्वारा भारतीय सामाजिक – सांस्कृतिक इतिहास की अन्तर्धाराओं से सुपरिचित हो सकेंगे।
4. विद्यार्थी 'आधे–अधूरे' और 'बकरी' नाटक के अध्ययन से आधुनिक नाटक की नवीन शैलियों की पहचान कर सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
A03 : हिन्दी निबंध

पूर्णांक : 100

इकाई 1

हिन्दी निबंध का उद्भव और विकास
रामचंद्र शुक्ल – चिंतामणि – भाग 1 (करूणा, उत्साह, श्रद्धा और भक्ति, कविता क्या है)

इकाई 2

हजारी प्रसाद द्विवेदी – अशोक के फूल (अशोक के फूल, मनुष्य ही साहित्य का लक्ष्य है, वसंत आ गया है, भारतवर्ष की सांस्कृतिक समस्या, मानव ही साहित्य का लक्ष्य है)

इकाई 3

बालमुकुंद गुप्त – शिवशंभू के चिट्ठे (बनाम लार्ड कर्जन, वायसराय का कर्तव्य, आशा का अंत, बंग विच्छेद)
हरिशंकर परसाई – विकलांग श्रद्धा का दौर, घायल बसंत, गर्दिश के दिन

इकाई 4

विद्यानिवास मिश्र – तुम चंदन हम पानी (भोर का आवाहन, तुम चंदन हम पानी, मुरली की टेर)
निर्मल वर्मा – कला का जोखिम (कला, मिथक और यथार्थ, परम्परा और इतिहासबोध)

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

प्रत्येक इकाई से व्याख्या एवं प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. समकालीन हिन्दी निबंध – कमला प्रसाद, हरियाणा साहित्य अकादमी, पंचकूला
2. हिन्दी निबंधकार – विभुराम मिश्र, लोकभारती प्रकाशन, इलाहाबाद
3. हिन्दी निबंध और निबंधकार – रामचन्द्र तिवारी, विश्वविद्यालय प्रकाशन, वाराणसी
4. हिन्दी निबंध साहित्य का सांस्कृतिक अध्ययन – डॉ. बाबूराम, वाणी प्रकाशन, नई दिल्ली
5. बालमुकुन्द गुप्त – सं कल्याणमल लोढ़ा
6. निबंधकार हजारी प्रसाद द्विवेदी – उषा सिंहल, किताबघर प्रकाशन, नई दिल्ली
7. निबंधकार अज्ञेय – प्रभाकर मिश्र, वाणी प्रकाशन, नई दिल्ली
8. आंखिन देखी – सं. कमला प्रसाद, वाणी प्रकाशन, नई दिल्ली
9. अमृतपुत्र विधानिवास मिश्र – सं. कुमुद शर्मा प्रभात प्रकाशन, नई दिल्ली
10. ललित निबंध : स्वरूप और परम्परा – श्रीराम परिहार, किताबघर प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी निबंध के उद्भव और विकास का बोध कराना।
2. आचार्य रामचन्द्र शुक्ल की निबंध कला और निबंध की विशेषताओं का उद्घाटन करना।
3. ललित निबंध–शैली और आचार्य हजारी प्रसाद द्विवेदी तथा विद्यानिवास मिश्र के योगदान पर प्रकाश डालना।
4. बालमुकुंद गुप्त और हरिशंकर परसाई के निबंधों के माध्यम से व्यंग्य निबंध शैली का उद्घाटन करना।
5. आचार्य शुक्ल, आचार्य द्विवेदी और निर्मल वर्मा के निबंधों के द्वारा वैचारिक निबंधों के स्वरूप का दिग्दर्शन कराना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी नाटक के महत्व से सुपरिचित हो सकेंगे।
2. विद्यार्थी हिन्दी निबंध के विविध रूपों और शैलियों को समझ कर उनकी तुलना कर सकेंगे
3. विद्यार्थी व्यंग्य निबंधों, मनोवैज्ञानिक निबंधों, ललित निबंधों और वैचारिक निबंधों की व्याख्या कर सकेंगे तथा उनके साहित्यिक सौष्ठव का मूल्यांकन कर सकेंगे।
4. हिन्दी की जातीय चेतना के विकास में हिन्दी निबंध की भूमिका को रेखांकित कर सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
A04 : स्त्री साहित्य

पूर्णांक : 100

इकाई 1. स्त्री विमर्श और स्त्री साहित्य : अवधारणा और सरोकार
स्त्रीवाद और स्त्री मुक्ति आंदोलन : ऐतिहासिक रूपरेखा
भारतीय सामाजिक संरचना और स्त्री प्रश्न
हिन्दी साहित्य परम्परा में स्त्री अस्मिता एवं मुक्ति के प्रश्न

इकाई 2. निबंध
शृंखला की कडियां – महादेवी वर्मा

इकाई 3. उपन्यास
कठगुलाब – मृदुला गर्ग

इकाई 4. कहानी
यही सच है – मन्नू भंडारी
आपकी छोटी लड़की – ममता कालिया
बसुमती की चिट्ठी – मैत्रेयी पुष्पा
आवाज – चंन्द्रकान्ता
यूटोपिया – वंदना राग

नाटक
नेपथ्य राग – मीरा कांत

इकाई 5 कविता
सात भाइयों के बीच चम्पा, हॉकी खेलती लडकियां, रात के संतरी की कविता,
अपराजिता, मां के लिए एक कविता – कात्यायनी
स्त्रियां, आम्रपाली, नमक, एक औरत का पहला राजकीय प्रवास
प्रेम के लिए फांसी : 1, 2 – अनामिका
सच्ची कविता के लिए, मैं किसकी औरत हूँ, स्वप्न समय,
मनोकामनाओं जैसी स्त्रियां – सविता सिंह
स्त्री विमर्श, उलटबांसी, पेड़ों का शहर, चिड़िया की आंख से – नीलेश रघुवंशी
धूप तो कब की जा चुकी है, यहीं कहीं था घर, सन्नाटे का संगीत,
जिन्हें वे संजोकर रखना चाहती थी, अकेली औरत का हंसना – सुधा अरोड़ा

अंक विभाजन–

चार व्याख्याएं – इकाई 2,3,4,5 से (आन्तरिक विकल्प देय) $(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय) $(15 \times 4 = 60)$

अनुशंसित ग्रंथ–

1. स्त्री संघर्ष का इतिहास – राधा कुमार, वाणी प्रकाशन, नई दिल्ली
2. हिन्दी साहित्य का आधा इतिहास – सुमन राजे, भारतीय ज्ञानपीठ, नई दिल्ली
3. हिन्दी कविता में स्त्री स्वर – सुनीता गुप्ता, नयी किताब, नई दिल्ली
4. नवजागरण और महादेवी वर्मा का रचनाकर्म : स्त्री विमर्श के स्वर – कृष्णदत्त पालीवाल, किताबघर प्रकाशन, नई दिल्ली
5. स्त्री स्वप्न और संकल्प – रोहिणी अग्रवाल, राजकमल प्रकाशन, नई दिल्ली
6. स्त्री विमर्श : भारतीय परिप्रेक्ष्य – के.एम. मालती, वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. स्त्री विमर्श की अवधारणा और सरोकार का ज्ञान कराना।
2. स्त्रीवाद और स्त्री मुक्ति आंदोलन की ऐतिहासिक रूपरेखा को स्पष्ट करना।
3. हिन्दी साहित्य परम्परा में स्त्री अस्मिता एवं स्त्री–मुक्ति परम्परा में स्त्री अस्मिता एवं स्त्री–मुक्ति के सवालों की परम्परा का उद्घाटन करना।
4. हिन्दी निबंन्ध, उपन्यास, कहानी, नाटक और कविता आदि विधाओं की प्रतिनिधि रचनाओं के द्वारा स्त्री विमर्श के व्यावहारिक स्वरूप का बोध कराना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी लैंगिक भेदभाव की व्यर्थता को समझ कर संवेदनशील बन सकेंगे
2. विद्यार्थी स्त्री की पीड़ा और उसकी भावनाओं को समझकर लैंगिक समानता की स्थापना के लिए अग्रसर होंगे।
3. विद्यार्थी स्त्री विमर्श के बुनियादी सवालों को समझकर उनकी व्याख्या कर सकेंगे।
4. विद्यार्थी स्वयं स्त्री की पीड़ा और इच्छाओं को साहित्यिक अभिव्यक्ति दे सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

A05 : मास मीडिया

पूर्णांक : 100

इकाई 1. भारत में प्रेस तथा सामचार एजेंसियों का उद्‌भव
भारतीय प्रेस और स्वतंत्रता आन्दोलन
स्वातंत्र्योत्तर भारतीय प्रेस
भारतीय प्रेस – समस्याएं और समाधान

इकाई 2. जनसंचार माध्यम के रूप में रेडियो का विकास
रेडियो प्रसारण की नयी दिशाएँ
एफ.एम. रेडियो तथा निजी प्रयास

इकाई 3. जनसंचार माध्यम के रूप में टेलीविजन का विकास
भारत में टेलीविजन की लोकप्रियता
सैटेलाइट और केबल टेलीविजन का विस्तार

इकाई 4. जनसंचार माध्यम के रूप में सिनेमा
हिन्दी सिनेमा का उद्‌भव और विकास
स्वातंत्र्योत्तर हिन्दी सिनेमा – दिशाएँ और समस्याएँ

इकाई 5. जनसंचार माध्यमों की पहुंच और विकास
इन्टरनेट, ऑन लाईन संचार, आधुनिक तकनीक और संचार

अंक विभाजन–

चार निबंधात्मक प्रश्न – प्रत्येक इकाई से एक (आन्तरिक विकल्प देय)	$(20 \times 4 = 80)$
एक टिप्पणी परक प्रश्न (दो टिप्पणियां, विकल्प देय)	$(10 \times 2 = 20)$

अनुशंसित ग्रंथ–

1. मीडिया एवं सूचना प्रौद्योगिकी कोश – रमेश जैन तथा कैलाश शर्मा, पंचशील प्रकाशन, जयपुर
2. प्रेस विधि : डॉ. नंदकिशोर त्रिखा, विश्वविद्यालय प्रकाशन, वाराणसी
3. हिन्दी पत्रकारिता : स्वरूप और आयाम – राधेश्याम शर्मा, हरियाणा साहित्य अकादमी, पंचकूला
4. मीडिया प्रबंधन के सांस्कृतिक आयाम – टी.डी.एस. आलोक, वाणी प्रकाशन, नई दिल्ली
5. मीडिया और मुद्दे – नवीन जोशी, सामयिक प्रकाशन, नई दिल्ली
6. Indias Communication : Revolution from Bullock Carts to Cyber Merits – Arvind Singhal and Eversett M. Rogers, Sage Publications, New Delhi
7. Broadcasting in India – P.C. Benerjee, Sage Publications, New Delhi
8. Radio and T.V. Journalism – K.M. Shrivastava, Sterling Publications, New Delhi

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अधिगम उद्देश्य

1. भारत में प्रेस तथा समाचार एजेंसियों के उद्भव, विकास और कार्यप्रणाली का अभिज्ञान कराना।
2. स्वतंत्रता आंदोलन में प्रेस की भूमिका से सुपरिचित कराना।
3. लोकतांत्रिक समाज में जनसंचार माध्यमों और स्वतंत्र प्रेस के महत्व को उजागर करना।
4. जनसंचार के आधुनिक माध्यमों–रेडियो, टेलीविजन, सिनेमा, इंटरनेट की शक्तियों, सीमाओं और कार्य प्रणाली का व्यावहारिक ज्ञान कराना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी आजादी के आंदोलन में प्रेस की भूमिका का मूल्यांकन कर सकेंगे।
2. लोकतांत्रिक राज्य और समाज के निर्माण में स्वतंत्र प्रेस और जनसंचार माध्यमों की अहमियत समझ सकेंगे।
3. जनसंचार के नवीन माध्यमों की उपयोगिता और कमियों की पहचान कर सकेंगे।
4. स्वतंत्रतापूर्व और स्वातंत्र्योत्तर प्रेस के स्वरूप, भूमिका और कार्यप्रणाली में आए बदलावों को समझ कर स्वतंत्र प्रेस की स्थापना पर सुझाव दे सकेंगे

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एम.ए (हिन्दी) – तृतीय सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
A06 : प्रेमचन्द

पूर्णांक : 100

इकाई 1.
उपन्यास – रंगभूमि

इकाई 2.
नाटक – कर्बला

इकाई 3.
कहानी – प्रतिनिधि कहानियाँ : प्रेमचंद (संपादक – भीष्म साहनी)

इकाई 4.
निबंध – साहित्य का उद्देश्य

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

सभी इकाई से व्याख्या एवं प्रश्न अपेक्षित है।

अनुशंसित ग्रंथ–

1. प्रेमचंद और उनका युग – रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली
2. प्रेमचंद और सौन्दर्यशास्त्र – नंदकिशोर नवल, वाणी प्रकाशन, नई दिल्ली
3. प्रेमचंद और भारतीय समाज – नामवर सिंह, राजकमल प्रकाशन, नई दिल्ली
4. प्रेमचंद : विगत महत्ता और वर्तमान अर्थवत्ता – सं. मुरली मनोहर प्रसाद सिंह, राजकमल प्रकाशन, नई दिल्ली
5. कमल का मजदूर – मदन गोपाल, राजकमल प्रकाशन, नई दिल्ली
6. प्रेमचंद की कहानी यात्रा और भारतीयता – कमल किशोर गोयनका, सामयिक प्रकाशन, नई दिल्ली
7. भारतीय समाज, राष्ट्रवाद और प्रेमचंद – जितेन्द्र श्रीवास्तव, सामयिक प्रकाशन, नई दिल्ली
8. प्रेमचंद की विरासत – राजेन्द्र यादव, सामयिक प्रकाशन, नई दिल्ली
9. प्रेमचंद एक साहित्यिक विवेचन – नंददुलारे वाजपेयी, राजकमल प्रकाशन, नई दिल्ली
10. प्रेमचंद : विरासत का सवाल – शिवकुमार मिश्र वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य में प्रेमचन्द के महत्व का ज्ञान कराना।
2. प्रेमचन्द के साहित्य में वर्णित तत्कालीन भारतीय समाज की वास्तविक स्थिति का बोध कराना।
3. प्रेमचन्द के उपन्यासों और कहानियों में वर्णित स्वाधीनता आन्दोलन के मूल्यों की पहचान कराना।
4. प्रेमचन्द की रचनाओं के साहित्यिक–सौष्ठव का मूल्यांकन करने में सक्षम बनाना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी प्रेमचन्द की रचनाओं में निहित गहन संदेशों को हृदयंगम कर सकेंगे।
2. प्रेमचन्द के उपन्यास, नाटक, निबंध और कहानियों में व्यक्त विचारों को शोध कार्य में उपयोग कर सकेंगे
3. प्रेमचंद की रचनाओं के अध्ययन–विश्लेषण के द्वारा तत्कालीन भारतीय समाज में व्याप्त विसंगतियों को समझ सकेंगे।
4. प्रेमचंद के साहित्यिक कौशल का अवबोध कर अन्य समकालीन साहित्यकारों से तुलना कर सकेंगे

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कम्पलसरी कोर कोर्स

HIN 401. हिन्दी साहित्य का इतिहास – आधुनिक काल

पूर्णांक : 100

इकाई 1.

आधुनिक काल की पृष्ठभूमि
आधुनिकता का उन्मेष एवं तत्कालीन परिस्थितियाँ
आधुनिक काल में साहित्य की नयी प्रवृत्तियां का उदय
भारतेन्दु युग, द्विवेदी युग, राष्ट्रीय काव्यधारा : प्रमुख साहित्यिक प्रवृत्तियाँ

इकाई 2.

छायावाद, प्रगतिवाद, प्रयोगवाद, नयी कविता एवं स्वातंत्र्योत्तर कविता : साहित्यिक प्रवृत्तियों का अध्ययन

इकाई 3.

आधुनिक कथा साहित्य : उद्‌भव और विकास
कहानी और उपन्यास

इकाई 4.

कथेतर गद्य की प्रमुख विधाएँ : उद्‌भव और विकास
नाटक, निबंध, आलोचना, संस्मरण, रेखाचित्र, आत्मकथा

इकाई 5.

आधुनिक विमर्श और हिन्दी साहित्य
उत्तर आधुनिकता, भूमण्डलीकरण, हाशिए की वैचारिकी और साहित्य

अंक विभाजन–

कुल पाँच प्रश्न
चार आलोचनात्मक प्रश्न – इकाई 1–4 से (आन्तरिक विकल्प देय) $(20 \times 4 = 80)$
एक टिप्पणीपरक प्रश्न (दो टिप्पणीयां) – इकाई 5 से $(10 \times 2 = 20)$

अनुशंसित ग्रंथ–

1. हिन्दी साहित्य का इतिहास – रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, काशी
2. हिन्दी साहित्य का दूसरा इतिहास – बच्च्वन सिंह, राधाकृष्णन प्रकाशन, नई दिल्ली
3. हिन्दी साहित्य का इतिहास – सं. नगेन्द्र, मयुर पेपरबैक्स, नई दिल्ली
4. हिन्दी का गद्य साहित्य – रामचन्द्र तिवारी, विश्वविद्यालय प्रकाशन, वाराणसी
5. आधुनिकता और हिन्दी साहित्य – इन्द्रनाथ मदान, राजकमल प्रकाशन, नई दिल्ली
6. बीसवी शताब्दी का हिन्दी साहित्य – विजयमोहन सिंह, राजकमल प्रकाशन, नई दिल्ली
7. हिन्दी साहित्य और संवेदना का विकास – रामस्वरूप चतुर्वेदी, लोकभारती प्रकाशन, इलाहाबाद
8. आधुनिक साहित्य की प्रवृतियाँ – नामवर सिंह, लोकभारती प्रकाशन, इलाहाबाद
9. आधुनिक हिन्दी साहित्य का इतिहास – बच्चन सिंह, लोकभारती प्रकाशन, इलाहाबाद
10. हिन्दी आलोचना की पारिभाषिक शब्दावली – अमरनाथ, राजकमल प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य के इतिहास के आधुनिककाल (1850 ई. के बाद) को स्पष्ट करना।
2. कविता, कथा साहित्य, कथेतर गद्य एवं साहित्य के विविध विमर्शों से सम्बन्धित साहित्यकारों एवं विशेषताओं को स्पष्ट करना।
3. आधुनिक साहित्यिक परिभाषिक शब्दावली एवं उनके द्वारा साहित्य विवेचन की पद्धति को स्पष्ट करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी आधुनिक काल की पृष्ठभूमि, परिस्थिति एवं प्रवृत्तियों से अवगत हो सकेंगे।
2. विद्यार्थी कविता के विभिन्न वादों की सामान्य प्रवृत्तियों से अवगत हो सकेंगे।
3. विद्यार्थी कथेतर गद्य की विविध विधाओं एवं साहित्यकारों के साहित्य एवं विशेषताओं का ज्ञान प्राप्त कर सकेंगे।
4. विद्यार्थी साहित्य एवं समाज में प्रचलित आधुनिक विमर्शों की प्रवृत्तियों का ज्ञान प्राप्त कर सकेंगे।
5. उत्तर आधुनिकता, भूमंडलीकरण आदि साहित्य की वैचारिकी का ज्ञान प्राप्त कर सकेंगे।

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कम्पलसरी कोर कोर्स

HIN 402. आधुनिक काव्य–I

पूर्णांक : 100

इकाई 1.

साकेत (नवम सर्ग)	– मैथिलीशरण गुप्त

इकाई 2.

कामायनी (श्रद्धा सर्ग)	– जयशंकर प्रसाद
सरोज स्मृति	– सूर्यकांत त्रिपाठी निराला

इकाई 3.

असाध्य वीणा	– सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'
ब्रह्मराक्षस, भूल गलती	– गजानन माधव मुक्तिबोध

इकाई 4.

कुरुक्षेत्र (छठा सर्ग)	– रामधारी सिंह दिनकर
कैदी और कोकिला	– माखनलाल चतुर्वेदी

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

प्रत्येक इकाई से व्याख्या और प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. साकेत : एक अध्ययन – नगेन्द्र, नेशनल पब्लिशिंग हाउस, नई दिल्ली
2. मैथिलीशरण – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
3. कामायनी : अध्ययन की समस्याएं – नगेन्द्र, नेशनल पब्लिशिंग हाउस, नई दिल्ली
4. कामायनी का रचना संसार – प्रेमशंकर, वाणी प्रकाशन, नई दिल्ली
5. प्रसाद का काव्य – प्रेमशंकर, राधाकृष्णन प्रकाशन, नई दिल्ली
6. निराला का काव्य – बच्चन सिंह, आधार प्रकाशन, पंचकूला
7. निराला : कृति से साक्षात्कार – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
8. असाध्य वीणा : पाठ और आलोचनात्मक संदर्भ – सं. छबिल कुमार मेहेर, आधार प्रकाशन, पंचकूला
9. अज्ञेय : सृजन की समग्रता – रामकमल राय, लोकभारती प्रकाशन, इलाहाबाद
10. दिनकर : अर्द्धनारीश्वर कवि – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
11. मुक्तिबोध : ज्ञान और संवेदना – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य के आधुनिक इतिहास के विविध कवियों का आलोचनात्मक अध्ययन।
2. हिन्दी साहित्य के आधुनिककाल के विभिन्न कवियों की रचनाओं का विश्लेषणात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी आधुनिक हिन्दी साहित्य के साहित्यकारों का विशिष्ट ज्ञान प्राप्त कर सकेंगें।
2. विद्यार्थी आधुनिक साहित्य की प्रमुख रचनाओं का विश्लेषणात्मक ज्ञान प्राप्त कर सकेंगे।

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एम.ए (हिन्दी) – चतुर्थ सेमेस्टर
कम्पलसरी कोर कोर्स
HIN 403. आधुनिक काव्य–II

पूर्णांक : 100

इकाई 1.

हरिजन गाथा	– नागार्जुन
पटकथा	– धूमिल

इकाई 2.

सतपुड़ा के जंगल	– भवानीप्रसाद मिश्र
कुआनो नदी	– सर्वेश्वर दयाल सक्सेना

इकाई 3.

समय देवता	– नरेश मेहता
तालस्तॉय और साइकिल	– केदारनाथ सिंह

इकाई 4.

हॉकी खेलती लड़कियां, सात भाइयों के बीच चम्पा	– कात्यायनी
मां के लिए एक कविता	
आम्रपाली, नायिका भेद, अमीर खुसरो, स्त्रियां, नमक	– अनामिका

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

प्रत्येक इकाई से व्याख्या और प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. हिन्दी कविता का इतिहास – रामस्वरूप चतुर्वेदी, लोकभारती प्रकाशन, इलाहाबाद
2. कविता के नये प्रतिमान – नामवर सिंह, राजकमल प्रकाशन, नई दिल्ली
3. नागार्जुन की कविता – अजय तिवारी, वाणी प्रकाशन, नई दिल्ली
4. धूमिल और उसका काव्य संघर्ष – ब्रह्मदेव मिश्र, लोकभारती प्रकाशन, इलाहाबाद
5. धूमकेतु धूमिल और साठोत्तरी कविता – मीनाक्षी जोशी राधाकृष्ण प्रकाशन, नई दिल्ली
6. नरेश मेहता : कविता की ऊर्ध्व यात्रा – रामकमल राय, लोकभारती प्रकाशन, इलाहाबाद
7. भवानी प्रसाद मिश्र का काव्य संसार – कृष्णदत्त पालीवाल, वाणी प्रकाशन, नई दिल्ली
8. सर्वेश्वर दयाल सक्सेना का रचना कर्म – कृष्णदत्त पालीवाल, वाणी प्रकाशन, नई दिल्ली
9. हिन्दी की लम्बी कविताओं का आलोचनात्मक पक्ष – राजेन्द्र प्रसाद सिंह, राजकमल प्रकाशन, नई दिल्ली
10. समकालीन काव्ययात्रा – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
11. समकालीन हिन्दी कविता – विश्वनाथ प्रसाद तिवारी, लोकभारती प्रकाशन, इलाहाबाद
12. कविता का स्त्री पक्ष – प्रमिला के.पी., जवाहर पुस्तक सदन, मथुरा
13. अनामिका : एक मूल्यांकन सं. अभिषेक कश्यप, सामयिक प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य के आधुनिक इतिहास विशेष रूप से समकालीन कविता के विभिन्न कवि/कवयित्रियों का आलोचनात्मक अध्ययन करना।
2. हिन्दी साहित्य के आधुनिक इतिहास विशेष रूप से समकालीन कविता की विभिन्न रचनाओं का विश्लेषण करना।
3. हिन्दी साहित्य की समकालीन कवयित्रियों की रचनाओं का विवेचनात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी साहित्य के आधुनिक इतिहास विशेष रूप से समकालीन कविता के विभिन्न कवि एवं कवयित्रियों का आलोचनात्मक ज्ञान प्राप्त कर सकेंगे।
2. हिन्दी साहित्य की समकालीन कवयित्रियों की रचनाओं के विविध पक्षों का ज्ञान प्राप्त कर सकेंगे।
3. विद्यार्थी हिन्दी साहित्य के आधुनिक इतिहास विशेष रूप से समकालीन कविता की विभिन्न रचनाओं के विविध पक्षों का विश्लेषनात्मक ज्ञान प्राप्त करना।

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एम.ए (हिन्दी) – चतुर्थ सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
A01 : हिन्दी उपन्यास

पूर्णांक : 100

* हिन्दी उपन्यास का उद्‌भव और विकास
* निर्धारित पाठ –
  1. गोदान – प्रेमचन्द
  2. मैला आँचल – फणीश्वरनाथ रेणु
  3. शेखर – एक जीवनी (भाग 1, 2) – सच्चिदानंद हीरानन्द वात्स्यायन 'अज्ञेय'
  4. दिव्या – यशपाल

अंक विभाजन–

चार व्याख्याएं $(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न $(15 \times 4 = 60)$
प्रत्येक उपन्यास से व्याख्या और प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. हिन्दी उपन्यास का इतिहास – गोपाल राय, राजकमल प्रकाशन, नई दिल्ली
2. उपन्यास की संरचना – गोपाल राय, राजकमल प्रकाशन, नई दिल्ली
3. हिन्दी उपन्यास का विकास – मधुरेश, लोकभारती प्रकाशन, नई दिल्ली
4. गोदान : नया परिप्रेक्ष्य – गोपाल राय, अनुपम प्रकाशन, पटना
5. गोदान का महत्व – सं. सत्यप्रकाश मिश्र, नई कहानी प्रकाशन, इलाहाबाद
6. मैला आँचल : वाद–विवाद – सं. भारत यायावर, आधार प्रकाशन, पंचकूला
7. मैला आँचल का महत्व – सं. मधुरेश, सुमित प्रकाशन, इलाहाबाद
8. अज्ञेय और उनका कथा साहित्य – गोपाल राय, वाणी प्रकाशन, नई दिल्ली
9. शेखर एक जीवनी : विविध आयाम – सं. रामकमल राय, अभिव्यक्ति प्रकाशन, इलाहाबाद
10. यशपाल : रचनात्मक पुनर्वास – मधुरेश, आधार प्रकाशन, पंचकूला

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अधिगम उद्देश्य

1. हिन्दी साहित्य की गद्य विद्या–उपन्यास के उद्भव एवं विकास को स्पष्ट करना।
2. हिन्दी साहित्य के प्रमुख उपन्यासों का विवेचनात्मक अध्ययन करना।
3. हिन्दी साहित्य के प्रमुख उपन्यासकारों का आलोचनात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी साहित्य की गद्य विद्या–उपन्यास के उद्भव एवं विकास का ज्ञान प्राप्त कर सकेगें।
2. हिन्दी साहित्य के प्रमुख उपन्यासकारों का आलोचनात्मक ज्ञान प्राप्त कर सकेंगे
3. हिन्दी साहित्य के प्रमुख उपन्यासों का विवेचनात्मक ज्ञान प्राप्त कर सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

A02 : हिन्दी आलोचना

इकाई 1.

* हिन्दी आलोचना का उद्‌भव एवं विकास
* प्रमुख आलोचक और उनके आलोचना सिद्धान्त
  1. रामचन्द्र शुक्ल
  2. हजारीप्रसाद द्विवेदी
  3. डॉ. नगेन्द्र
  4. नंददुलारे वाजपेयी
  5. रामविलास शर्मा
  6. गजानन माधव मुक्तिबोध
  7. रामस्वरूप चतुर्वेदी

इकाई 2.

रचनाकार समीक्षक

प्रेमचंद, रामधारी सिंह दिनकर, विजयदेव नारायण साही, सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'

अंक विभाजन–

कुल पाँच प्रश्न

चार निबंधात्मक प्रश्न – इकाई 1 से (आन्तरिक विकल्प देय)	$(20 \times 4 = 80)$
एक टिप्पणीपरक प्रश्न (दो टिप्पणीयां) – इकाई 2 से (विकल्प देय)	$(10 \times 2 = 20)$

अनुशंसित ग्रंथ–

1. हिन्दी आलोचना – विश्वनाथ त्रिपाठी, राजकमल प्रकाशन, नई दिल्ली
2. हिन्दी आलोचना का विकास – नंदकिशोर नवल, राजकमल प्रकाशन, नई दिल्ली
3. हिन्दी आलोचना : शिखरों का साक्षात्कार – रामचन्द्र तिवारी, लोकभारती प्रकाशन, इलाहाबाद
4. आलोचक और आलोचना – कमला प्रसाद, आधार प्रकाशन, पंचकूला
5. हिन्दी आलोचना का दूसरा पाठ – निर्मला जैन, राजकमल प्रकाशन, नई दिल्ली
6. हिन्दी आलोचना का विकास – मधुरेश, लोकभारती प्रकाशन, इलाहाबाद
7. आचार्य रामचन्द्र शुक्ल और हिन्दी आलोचना – रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली
8. हिन्दी के रचनात्मक आलोचक – योगेश प्रताप शेखर, प्रकाशन संस्थान, नई दिल्ली
9. दूसरी परम्परा की खोज – नामवर सिंह, राजकमल प्रकाशन, नई दिल्ली
10. आलोचक और आलोचना सिद्धान्त – रतन कुमार पाण्डेय, वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य के आलोचना साहित्य का अध्ययन करना।
2. हिन्दी के प्रमुख आलोचक एंव उनके आलोचना सिद्धान्त का ज्ञान कराना।
3. हिन्दी साहित्य के प्रमुख रचनाकार समीक्षकों का आलोचनात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी के आलोचना साहित्य से परिचित होगें।
2. विद्यार्थी हिन्दी के प्रमुख आलोचक एवं आलोचना सिद्धान्त का विवेचनात्मक ज्ञान प्राप्त कर सकेगें।
3. विद्यार्थी हिन्दी साहित्य के प्रमुख रचनाकार समीक्षा को का विवेचनात्मक ज्ञान प्राप्त कर सकेंगे।

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एम.ए (हिन्दी) – चतुर्थ सेमेस्टर
इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)
HIN A01 – A06 में से किन्हीं 3 का चयन करें
A03 : कथेतर गद्य विधाएं

* हिन्दी गद्य का विकास
* हिन्दी गद्य की विभिन्न विधाएं – संस्मरण, रेखाचित्र, यात्रावृत्त, रिपोर्ताज, जीवनी, आत्मकथा, डायरी, साक्षात्कार

इकाई 1.

संस्मरण – दंतकथाओं में त्रिलोचन : काशीनाथ सिंह

रेखाचित्र – चीनी फेरीवाला : महादेवी वर्मा

इकाई 2.

यात्रावृत्त – चीड़ों पर चाँदनी : निर्मल वर्मा

रिपोर्ताज – ऋणजल – धनजल : फणीश्वरनाथ रेणु

इकाई 3.

जीवनी – आवारा मसीहा (प्रथम एवं द्वितीय पर्व) : विष्णु प्रभाकर

आत्मकथा – अपनी खबर : पाण्डेय बेचन शर्मा 'उग्र'

इकाई 4.

डायरी – हँसते हुए मेरा अकेलापन : मजयज

साक्षात्कार – हजारी प्रसाद द्विवेदी से मनोहर श्याम जोशी का साक्षात्कार

अंक विभाजन–

चार व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

प्रत्येक इकाई से व्याख्या और प्रश्न पूछा जाना अपेक्षित है।

अनुशंसित ग्रंथ–

1. हिन्दी का गद्य साहित्य – रामचन्द्र तिवारी, विश्वविद्यालय प्रकाशन, वाराणसी
2. आधुनिक हिन्दी गद्य साहित्य का विकास और विश्लेषण – विजयमोहन सिंह, भारतीय ज्ञानपीठ, नई दिल्ली
3. हिन्दी गद्य विन्यास और विकास – रामस्वरूप चतुर्वेदी, लोकभारती प्रकाशन, इलाहाबाद
4. साहित्य विधाओं की प्रकृति – सं. देवीशंकर अवस्थी, राधाकृष्णन प्रकाशन, नई दिल्ली
5. बीसवीं शताब्दी का हिन्दी साहित्य – सं. विश्वनाथ प्रसाद तिवारी, भारतीय ज्ञानपीठ, नई दिल्ली
6. साहित्यिक विधाएं : पुनर्विचार – हरिमोहन वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. हिन्दी साहित्य के गद्य साहित्य के विकास का विवेचनात्मक अध्ययन करना।
2. कथेतर गद्य की विविध विधाओं का विकासात्मक एवं आलोचनात्मक अध्ययन करना।
3. हिन्दी साहित्य के प्रमुख कथेतर गद्य साहित्य के साहित्यकारों का आलोचनात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी हिन्दी गद्य साहित्य के उद्भव एवं विकास से परिचित हो सकेंगें
2. विद्यार्थी कथेतर गद्य की विविध विधाओं का आलोचनात्मक ज्ञान कर सकेंगें।
3. विद्यार्थी हिन्दी साहित्य के प्रमुख कथेतर गद्य साहित्यकारों के विवेचनात्मक ज्ञान से परिचित हो सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

A04 : दलित साहित्य

पूर्णांक : 100

इकाई 1. दलित का आशय, दलित साहित्य की अवधारणा एवं सरोकार
दलित साहित्य आंदोलन के उदय की पृष्ठभूमि
मराठी दलित आंदोलन, हिन्दी दलित आंदोलन
दलित साहित्य की सैद्धांतिकी : बौद्ध धम्म एवं दर्शन, फुले–अम्बेडकरवाद, अस्मितावाद और दलित सौन्दर्यशास्त्र
दलित साहित्य की प्रमुख विधाएं एवं रचनाकार

इकाई 2. आत्मकथा
मुर्दहिया – तुलसीराम

इकाई 3. उपन्यास
छप्पर – जयप्रकाश कर्दम

इकाई 4. कहानी
पच्चीसा चौका डेढ़ सौ – ओमप्रकाश वाल्मीकि
बदबू – सूरजपाल चौहान
घालय शहर की एक बस्ती – मोहनदास नैमिशराय
सिलिया – सुशीला टाकभौरे
पटकथा – अजय नावरिया

नाटक
वीमा – रत्नकुमार सांभरिया

इकाई 5. कविता
अछूत की शिकायत – हीरा होम
ठाकुर का कुंआ, शायद आप जानते हो – ओमप्रकाश वाल्मीकि
शम्बूक, तब तुम्हारी निष्ठा क्या होती – कंवल भारती
सुनो ब्राह्मण, हमारे गांव में – मलखान सिंह
पंख मेरे फड़फड़ाते हैं, सपने सज जायेंगे – सुशीला टाकभौरे

अंक विभाजन–

चार व्याख्याएं – इकाई 1, 3, 4, 5 से (आन्तरिक विकल्प देय)	$(10 \times 4 = 40)$
चार आलोचनात्मक प्रश्न (आन्तरिक विकल्प देय)	$(15 \times 4 = 60)$

अनुशंसित ग्रंथ–

1. दलित साहित्य का सौंदर्यशास्त्र – शरणकुमार लिंबाले, वाणी प्रकाशन, नई दिल्ली
2. दलित साहित्य के प्रतिमान – डॉ. एन. सिंह, वााणी प्रकाशन, नई दिल्ली
3. दलित साहित्य का सौंदर्यशास्त्र – ओमप्रकाश वाल्मीकि, राधाकृष्ण प्रकाशन, नई दिल्ली
4. दलित साहित्य का समाजशास्त्र – हरिनारायण ठाकुर, भारतीय ज्ञानपीठ, नई दिल्ली
5. हिन्दी दलित साहित्य : एक मूल्यांकन – सं. प्रमोद कोवप्रत, वाणी प्रकाशन, नई दिल्ली
6. दलित साहित्य : बुनियादी सरोकार – कृष्णदत्त पालीवाल, वाणी प्रकाशन, नई दिल्ली
7. दलित साहित्य : एक अंतर्यात्रा – बजरंग बिहारी तिवारी, नवारूण प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. दलित साहित्य की सैद्धान्तिकी का अध्ययन करना।
2. दलित साहित्य आंदोलन एवं उदय के कारणों को स्पष्ट करना।
3. मराठी एवं हिन्दी दलित आंदोलन का विकासात्मक अध्ययन करना।
4. हिन्दी साहित्य के प्रमुख दलित साहित्यकारों एवं साहित्य का आलोचनात्मक अध्ययन करना।

पाठ्यक्रम प्रतिफल

1. विद्यार्थी दलित साहित्य की सैद्धान्तिकी का ज्ञान प्राप्त कर सकेंगे
2. दलित साहित्य आंदोलन एवं उदय के कारणों का ज्ञान प्राप्त कर सकेगें।
3. मराठी एवं दलित आंदोलन का विकासात्मक ज्ञान प्राप्त कर सकेगें।
4. हिन्दी साहित्य के प्रमुख दलित साहित्यकारों एवं साहित्य का आलोचनात्मक ज्ञान प्राप्त कर सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

A05 : भाषा प्रौद्योगिकी

पूर्णांक : 100

इकाई 1.

- हार्डवेयर एवं सॉफ्टवेयर की सामान्य परिचय
- संगणंक (Computer) की बनावट तथा कार्यप्रणाली का अध्ययन

इकाई 2.

- भाषा प्रौद्योगिकी – अर्थ, स्वरूप और कार्य
- संगणक साधित हिन्दी भाषा प्रौद्योगिकी

इकाई 3.

- मानक हिन्दी यूनिकोड –नोट पैड, वर्ड पैड, फॉण्ड तथा मुद्रण संबंधी सुविधाएं
- यूनीकोड में परिवर्तन संबंधी सॉफ्टवेयर

इकाई 4.

- विविध हिन्दी सॉफ्टवेयर तथा फॉण्ट में टंकण
- भारतीय भाषाओं के सॉफ्टवेयरों का अध्ययन

इकाई 5.

- इण्टरनेट और हिन्दी
- ई–मेल, नेटवर्क अभियांत्रिकी
- वेब डिजाइनिंग, ब्लॉग लेखन, ऑडियो–वीडियो सम्पादन, वेबसाइट निर्माण

अंक विभाजन–

चार निबंधात्मक प्रश्न – इकाई 1,2,3,4 से (आन्तरिक विकल्प देय)	$(20 \times 4 = 80)$
एक टिप्पणीपरक प्रश्न (दो टिप्पणियां) – इकाई 5 से	$(15 \times 4 = 20)$

अनुशंसित ग्रंथ–

1. भाषा और प्रौद्योगिकी – डॉ. विनोद प्रसाद, वाणी प्रकाशन, नई दिल्ली
2. भाषा प्रौद्योगिकी – डॉ. सूर्य प्रसाद दीक्षित, किताबधर प्रकाशन, नई दिल्ली
3. कम्प्यूटर के भाषिक अनुप्रयोग – डॉ. विजयकुमार मल्होत्रा, वाणी प्रकाशन, नई दिल्ली
4. कम्प्यूटर सूचना प्रणाली विकास – रामबंस विज्ञानाचार्य, वाणी प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. भाषा प्रौद्योगिकी के विभिन्न अंशों की समझ विकसित करना
2. संगणक के सामान्य सिद्धान्तों का ज्ञान प्राप्त करना।
3. इण्टरनेट और वेबसाइट की जानकारी प्राप्त करना।
4. तकनीक और भाषा में समन्वय की संभव दक्षता प्राप्त करना।

पाठ्यक्रम प्रतिफल

1. भाषा प्रौद्योगिकी की विभिन्न तकनीकों की जानकारी प्राप्त कर सकेंगें
2. भाषा के प्रयुक्त होने वाले सॉफ्टवेयरों को सीख सकेंगे
3. ई–मेल, बेब डिजाइनिंग इत्यादि की जानकारी प्राप्त कर सकेंगे
4. तकनीक के सहारे भाषा के अद्यतन होने को सीख सकेंगे।

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इलेक्टिव कोर कोर्स (वैकल्पिक प्रश्नपत्र)

HIN A01 – A06 में से किन्हीं 3 का चयन करें

A06 : आधुनिक भारतीय साहित्य

इकाई 1.

क. भारतीयता और भारतीय साहित्य की अवधारणा
भारतीय साहित्य की आधारभूत विशेषताएं
भारतीय साहित्य के अध्ययन की समस्याएं

ख. आधुनिकता और भारतीय साहित्य
आधुनिक भारतीय उपन्यास : सामान्य परिचय
आधुनिक भारतीय कविता : सामान्य परिचय
आधुनिक भारतीय नाटक : सामान्य परिचय

इकाई 2.

ययाति (उपन्यास) – विष्णु सखाराम खाण्डेकर

इकाई 3.

गीतांजलि (काव्य) – रवीन्द्रनाथ टैगोर

इकाई 4.

हयवदन (नाटक) – गिरीश कर्नाड

अंक विभाजन–

तीन व्याख्याएं (आन्तरिक विकल्प देय)	$(10 \times 3 = 30)$
चार आलोचनात्मक प्रश्न (प्रत्येक इकाई से)	$(15 \times 4 = 60)$
एक टिप्पणीपरक प्रश्न (इकाई 1. ख से)	$(10 \times 1 = 10)$

अनुशंसित ग्रंथ–

1. भारतीय साहित्य : स्थापनाएं और प्रस्तावनाएं – के. सच्चिदानंदन, राजकमल प्रकाशन, नई दिल्ली
2. भारतीय साहित्य की भूमिका – रामविलास शर्मा राजकमल प्रकाशन, नई दिल्ली
3. भारतीय साहित्य – लक्ष्मीकांत पाण्डेय, प्रमिला अवस्थी, लोकभारती प्रकाशन, इलाहाबाद
4. भारतीय साहित्य – डॉ. नगेन्द्र, नेशनल पब्लिशिंग हाउस, नई दिल्ली
5. भारतीय साहित्य के नये क्षितिज – रोहिताश्व, शिल्पायन, नई दिल्ली
6. भारतीय चिंतन की परम्परा – के. दामोदरन, पीपुल्स पब्लिशिंग हाउस, नई दिल्ली
7. भारतीय साहित्य – मूलचंद गौतम, राधाकृष्ण प्रकाशन, नई दिल्ली

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अधिगम उद्देश्य

1. आधुनिकता और भारतीयता की अवधारणा समझना।
2. भारतीयता की विशिष्टताओं को रेखाकिंत करना।
3. भारतीय साहित्य में अन्तःसूत्रों की पहचान करना।
4. भारतीय जनमानस की सांस्कृतिक विशेषताओं की पड़ताल करना।

पाठ्यक्रम प्रतिफल

1. भारतीय उपमहाद्वीप की साहित्यिक विशिष्टताओं को जान सकेंगे
2. विभिन्न प्रदेशों के साहित्य की सामान्य प्रवृत्तियों को जान सकेंगे
3. महाराष्ट्र, बंगाल और कर्नाटक के साहित्य का गहन अध्ययन कर सकेंगे
4. साहित्य में मानवीय मूल्यों का महत्व समझ सकेंगे

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GLOBAL P.G. COLLEGE

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Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Master of Arts (Geography)

Duration – 2 Years

GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn the basic ideas and principles of geography, including physical landforms, human activities, and the environment.

PEO2: Students will learn to investigate geographical problems, prepare reports, and contribute to policy and planning at regional, national, and global levels.

PEO3: Students will gain knowledge about sustainable development, environmental management, and social equity issues.

PEO4: Students will get better at communication, writing reports, and giving presentations so they can work well in studies, research, or jobs.

PEO5: Students will develop critical thinking and research skills to carry out geographical studies independently. They will learn how to observe, analyze, and interpret data.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will learn about the geography of rural areas, including landforms, farming, water resources, forests, and local social and economic patterns.

PO2: Students will learn to study rural development issues like farming, irrigation, roads, and resource management.

PO3: Students will learn how to protect natural resources, take care of the environment, and use land and water in villages wisely.

PO4: Students will do field research and surveys in villages to collect and understand information about land, people, and social patterns.

PO5: Students will be encouraged to keep learning and doing research about rural areas and local issues.

PSO1: Students will learn about soil, water, landforms, and climate in rural areas to effectively plan and manage villages and natural resources.

PSO2: Students will learn about farming, forests, irrigation, and resource use in villages to support sustainable development and improve rural life.

PSO3: Students will learn to conduct surveys, engage with local communities, and carry out village research to understand rural problems and find ways to improve life.

PSO4: Students will develop skills to observe, analyze, and interpret rural geographical problems.

PSO5: Students will integrate geography with sociology, economics, agriculture, and environmental science to promote holistic rural development.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

University of Rajasthan
Jaipur

SYLLABUS

M.Sc. GEOGRAPHY

(Semester Scheme)

I & II Semester Examination 2024-25

III & IV Semester Examination 2025-26

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M.A. / M.SC. GEOGRAPHY

First Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 101	Evolution of Geographical Thoughts (upto 1800 AD)	CCC	4	3	1	0	3	
2.	Geo 102	Structural and Dynamic basis of Geomorphology	CCC	4	3	1	0	3	
3.	Geo 103	Principles and Theory of Economic Geography	CCC	4	3	1	0	3	
4.	Geo 111	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Man and Natural Environment							
	GEO A02	Cultural Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Population Geography							
	GEO B02	Quantitative Techniques in Geography							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Geography of Rural Development							
	GEO C02	Geography of Soils							
8.		**Elective – Practical**	ECC						
	GEO D01	Practical		6	0	0	9	4	
	GEO D02	Practical		6	0	0	9	4	
		Total Credit		**36**					

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I SEMESTER

Paper code: Geo 101: Evolution of Geographical Thoughts (upto 1800 AD)

Section-A

Beginnings and geosophical nature of geography: ancient Indian geographical thought (the puranic geography), Ancient classical period: contribution of Greeks scholars (Herodotus and Eratosthenes), Greeko-Roman scholar (Posidonius), Romans scholars (Strabo and Ptolemy), and Chinese scholars.

Section-B

Implications of dark age in Europe, development and nature of Geography during medieval period: Contributions of Al-Biruni, Al Muquaddassi, Al-Masudi and Al Idris, Ibn Battuta and Ibn Khaldun.

Section-C

Impact of renaissance on geography: main inventions, discoveries and explorations, cosmographic tradition and position of geography among sciences: Sebastian Munster, Philip Cluverious, Nathanael Carpenter, Varenius, Anton Friedrich Busching, Immanuel Kant and Conrad Malte Brun.

Readings Recommended:

Adhikari, S. 2009: Fundamentals of Geographical Thought. Chaitanya Publishing House, Allahabad.

बंसल, सुरेश चन्द 2008: भौगोलिक चिन्तन के मूल तत्व। मीनाक्षी प्रकाशन, मेरठ।

Dickinson, R.E. 1967. The Markers of Modern geography. Routledge & Kegan Paul Limited. London.

Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity: Readings in Human Geography, Blackwell Publishers Ltd, Oxford.

Dikshit, R.D. 2004. Geographical Thought. A Critical History of Ideas. Prentice-Hall of India, New Delhi (in English and Hindi).

जैन, एस.एम. 2005: भौगोलिक चिन्तन एवं विधि तंत्र। साहित्य भवन पब्लिकेशन्स, आगरा।

Hartshorne, R. 1987: Perspective on the Nature of Geography Scientific Publishers, Jodhpur (Copyright 1959 by the Association of American).

Holt-Jensen, A. 1988. Geography: History and Concepts- A Student's Guide. Sage, Los Angees (Fourth Edition)

James, P.E.: All Possible Worlds 1972: A History of Geographical Ideas: Odessey Press, 622 pages.

Johnston, R, Gregory D, Pratt G, Watts M. and Whatmore S. (2003): The Dictionary of Human Geography. Blackwell Publishers, Oxford. 5th Edition.

कौशिक, एस.डी. 2005-06, भौगोलिक विचारधाराऐं एवं विधि तंत्र। रस्तोगी पब्लिकेशन्स, मेरठ, आठवां संस्करण (पुनमुद्रित)।

मौर्य, एस.डी. 2007, भौगोलिक चिन्तन का इतिहास, प्रयाग पुस्तक भवन, इलाहाबाद।

Majid. H. 2004. Evolution of Geographical Thought. Rawat Publications, Jaipur (Reprinted 2007- Revised & Enlarged).

सक्सेना, एल.के. व तिवारी, ए.के. 2003, भौगोलिक चिनतन। राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।

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Paper code: Geo 102: Structural and Dynamic Basis of Geomorphology

Section-A

Interior structure of the earth, thermal state of the earth's interior, Isostasy: views of Airy, Pratt, Hayford and Bowie, Joly and Holmes, Origin of the continents and oceans, earth movements: eperiogenic and orogenic- Mountain building theories of Jeffreys, Kober, Joly, Daly, Holmes and Plate Tectonics.

Section-B

Definition, nature and scope of geomorphology, major concepts in geomorphology, Denudation: weathering, mass movements, erosion and sediment regimes, various models of landscape evolution: Davis, Penck, King, Hacks, Morisawa, Schumn.

Section-C

Topographies: fluvial, glacial-periglacial, Aeolian, karst and coastal, element of slope and various models of slope development: Wood, Davis, Penck, King, Strahler.

Readings Recommended:

Chorley, R.J. 1972: Spatial Analysis in Geomorphology. Methuen, London.
Cooke, R.U. and Doornkamp, J.C. (1974): Geomorphology in Environmental Management-A introduction. Clarendon Press, Oxford.
Dury, G.H.; 1959: The Face of the Earth. Penguin Harmondsworth.
Fairbridge, R.W. 1986: Encyclopedia of Geomorphology. Reinhodts, New York.
Garner, H.F. 1974: The Origin of Landscape-A Synthesis of Geomorphology. Oxford University Press, London.
Goudie, A. 1993: The Nature of the Environment. Oxford & Blackwell, London.
Mitchell, C.W. 1973: Terrain Evaluation. Longman, London.
Ollier, C.D. 1979: Weathering. Longman, London.
Pitty, A.F. 1971: Introduction to Geomorphology. Methuen, London.
प्रदास, गायत्री 2004: भू-आकृति विज्ञान। शारदा पुस्तक भवन, इलाहाबाद।
Sparks, B.W. 1960: Geomorphology. Longman, London.
Sharma, H.S. (ed) 1980: Perspectives in Geomorphology. Concept Publishing Company, New Delhi (VOL I to IV).
Skinner, B.J. & Porter, S.C. 1995: The Dynamic Earth. John Wiley, New York.
Stoddart, D.R. (ed) 1996: Process and Form in Geomorphology. Routledge. New York.
Singh, S. 1998: Geomorphology. Prayag Publication, Allahabad.
Spark, B.W. 2004: Geomorphology, Longmans, London.
Thornbury, W.D. 1960: Principles of Geomorphology. John Wiley, New York.
Young, A. 1972: Slopes. Longmans, London.

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Paper code: Geo 103: Principles and Theory of Economic Geography

Section-A

Changing nature of economic geography, approaches to economic geography, agricultural typology-with special reference to: subsistence plantation agriculture, mediterranean agriculture, mixed farming, commercial grain farming, livestock rearing.

Section-B

Energy resources: detailed study of conventional and non-conventional energy resources, spatial patterns and supply problems, industries: iron & steel, alluminium industry, paper and pulp, cotton textile, chemical fertilizer and auto mobile.

Section-C

Decision making process: location decision-behavioural view, international trade: major regional trade and economic integration block, major trends and patters, economic region: concept and methods of delineation, need of economic regionalization for area development and planning-economic regions of India.

Readings Recommended:

Alexander, J.W. 2001: Economic Geography. Prentice Hall of India, New Delhi.

Bengston, N.A. and Royen, M.V.: Fundamentals of Economic Geography (Prentice Hall New York).

Boesh, H.: A Geography of World Economy.

Chapman, K and Walker, D. 1991: Industrial Location: Principles and Policies... Blackwell Oxford.

Grigg, D. 1995: An Introduction to Agricultural Geography. Second edition, Routeledge, London.

James, O. W. and Peter, O. M. 1986: Economic Geography. John Wiley and Sons, New York.

Jarret, H. R. 1977: A Geography of Manufacturing. Trans-Atlantic Publishers, London.

Leong, G.C. and Morgan, G.C. 1982: Human and Economic Geography, Oxford University Press, London.

Lloyod, P.E. and Dicken, P. 1977: Location in Space: A Theoretical Approach to Economic Geography. Harper & Row, Publishers, London.

Mandal, R. B. 1982: Land Utilization - Theory and Practice. Concept Publishing Company, New Delhi.

Scott, A. J. 1988: New Industrial Spaces. Pion, London.

Shafi, M. 2000: Agricultural Geography of South Asia. Macmillan, New Delhi.

Singh J. and Dhillon, S.S. 2004: Agricultural Geography. Tata Mc-Graw-Hill, New Delhi.

Singh, Kashi Nath and Siddiqui, A.R. 2012: Economic Geography, Prayag Pustak Bhawan, Allahabad.

Smith, D. M. 1981: Industrial Location - An Economic Geographical Analysis. John Wiley, New York.

Wheeler, J.O. and Muller, O.P. 1995: Economic Geography. John Wiley, New York.

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Paper code: Geo 111: Practical

Minimum Marks: 36	Bifurcation of Marks	Max. Marks: 100
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

Elementary trigonometry, classification of map projections and their specific uses. Mathematical constriction of projections: cylindrical equal area, Mercator's and Gall's stereographic

Section-B

conical (with one standard parallel, two standard parallels, Bonne's, polyconic and modified polyconic (international).

Section-C

Mathematical construction of projections: zenithal (equidistant-polar and equatorial case, equal area-polar and equatorial case, Gnomonic-polar and equatorial case, stereographic-polar and equatorial case and orthographic- polar and equatorial case).

Readings Recommended:

चौहान, पी.आर. 2005: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Technlques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010-11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi.

तिवारी, आर.सी. एवं सुधाकर, त्रिपाठी 2009: प्रयोगात्मक भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Raj Jain

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Paper code: Geo A01: Man and Natural Environment

Section-A

Definition and scope of environmental geography, its relation with other subjects, elements of the environment, man and environmental relationships: environmental determinism, possiblisim and neo determinism, biosphere and its components, concept of ecology and ecological succession, types of ecosystems, energy flow in the ecosystem, soil system, geobiochemical cycles, major biomes of the world.

Section-B

Environmental degradation and natural disasters, environmental crises: ozone depletion, green house gas effects, El-Nino, global warming and climate change, water scarcity, acid rain, sea level change; desertification, environmental pollutions: water, air soil, noise and radioactive.

Section-C

Environmental quality, sustainable development, environmental management, soil and forest resources management, water management, wildlife conservation, biodiversity and its conservation, environmental awareness and education, international efforts of environmental conservation.

Readings Recommended:

Agarwal, A. and Narain, S. 1977: Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting System. Centre for Science and Environment, New Delhi.

Economic and social commission for Asia and the Pacific United Nations 1989: Guidelines for the preparation of National Master Water Plans.

Govt. of India, 1980: Ministry of Energy and Irrigation. Rashtriya Barh Ayog (Report-National Commission of Floods. Vol. I & II, New Delhi).

Govt. of India, 1972: Ministry of Agriculture Report of the Irrigation Commission. Vol I & IV, New Delhi).

Gulhati, N.D. 1972: Development of Inter-State Rivers: Law and Practice in India. Allied Pub., Bombay.

International Water Resource Association and Central Board of Irrigation & Power, Water of Human Needs, 1975: Vols. I to V Proceedings of the Second World Congress on Wather Resources, 12-16 December, New Delhi.

Jones, J.A. 1997: Global Hydrology: Processes, Resources and Environmental Management. Longman.

Kates, R.W. and Burton, I. (ed.) 1980: Geography, Resource and Environment Management, Ottowa.

Krutilla, John V. and Eckstein, O. 1958: Multiple Purpose River Development: Studies in Applied Economic Analysis. John Hopkin's Press, Boston.

Law, B.C. (ed.) 1968: Mountains and Rivers of India IGU. National Committee for Geography, Calcutta.

Matter, J.R., 1984: Water Resources Distribution, Use and Management. John Wiley, Marylane.

Michael, A.M. 1978: Irrigation: Theory and Practices. Vikas Publishing House pvt., New Delhi.

Newson, M. 1992: Land, Water and Development River Basin systems and their Sustainable Management. Routledge, London.

Pareira, H.D. 1973: Landuse and Water Resources. Cambridge University Press, Cambridge.

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Rao, K.L. 1979: India's Water Wealth. Orient Longman, New Delhi.
सिंह, जगदीश 2003: पर्यावरण एवं संविकास। ज्ञानोदय प्रकाशन, गोरखपुर।
शर्मा, पी.डी. 2009: पारिस्थितिकी एवं पर्यावरण। रस्तोगी पब्लिकेशन, मेरठ।
Singh, R.A. and Singh, S.R. 1979: Water Management: Principles and Practices. Tara Publication, Varanasi.
Singh, Savindra 2006: Environmental Geography. Prayag Pustak Bhawan, Allahabad.
Smith, K. 1972: Water in Britain. A Study in Applied Hydrology and Resource Geography. McMillan, London.
श्रीवास्तव, वी.के. एवं राव, बी.पी. 2002: पर्यावरण और पारिस्थितिकी। वसुन्धरा प्रकाशन, गोरखपुर।
Tideman, E.M. 1996: Watershed Management. Guidelines for Indian Conditions, Omega, New Delhi.
Tebbutt, T.H.Y. (ed.) 1985: Advances in Water Engineering. Elsevier Applied Science Pub., London.
Todd, D.K. 1959: Ground Water Hydrology. John Wiley, New York.
U.S.D.A. 1955: The Year Book of Agriculture: Water. Oxford and I.B.H. Publishing Co., New Delhi.
Verghese, B.G. 1990: Water of Hope: Integrated Water Resource Development and Regional Co-operation within the Himalayan-Ganga. Brahmaputra-Barak Basin, Oxford IBH, New Delhi.
White, G.F.L. 1977: Environmental Effects of Complex River Development. Westriver Press, Boulder, Colorado.

Paper code: Geo A02: Cultural Geography

Section-A

Definition, nature and scope of cultural geography, the evolutionary approaches and conceptual framework, evolution of man and human society from Palaeolithic to Pleistocene period, rise and dominance of *homo-sapiens* and their spatial distribution over the continents, distribution and characteristics of primary races of the world, zone and stata theory.

Section-B

Beginning of plant domestication, animal domestication and their regions, evolution of civilization: Mesopotamian, Nile, Indus and Hwang Ho Valley with respect to racial, Ethnic, religious, linguistic, demographic and organizational characteristics. School of cultural determinism, cultural adaptation, assimilation, integration diffusion and Environmental perception. Major cultural hearths, realms and regions of the world, basic similarities and differences.

Section-C

Major linguistic families and their distribution in the world, bases of cultural diversity: race, religion, language and nationalism, culture and environment, human settlements-origin, types, pattern and distribution, westernization, sanskritization and cultural urbanization.

Readings Recommended:

Anderson, J. 2009: Understanding Cultural Geography-Places and traces. Routledge, USA.
Anderson, K., Domosh, M., Pile, S. and Thrift, N. (eds.) 2003: Handbook of Cultural Geography. Sage Publications, London.
Ahmad, Aijazuddin 1999: Social Geography. Rawat Publication, New Delhi.
Crang, Mike 1999: Cultural Geography. Routledge, London.

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Chapman, K. 1979: People, Pattern and Process-An Introduction to Human Geography. Edward Arnold Ltd., London.
Dreze Jean, Sen, Amartya 1996: Economic Development and Social Opportunity. Oxford University press, New Delhi.
Dubey, S.C. 199: Indian Society. National Book Trust, New Delhi.
Haq, Mahbubul: Reflection on Human Development. Oxford University Press. New Delhi.
Mitchell, D. 2000: Cultural Geography: A Critical Introduction. Blackwell Publishers, Inc. USA.
Norton, W. 2006: Cultural Geography. Environments. Landscapes. Identities. Inequalities. Oxford University Press, Toronto. 2nd Edition.
प्रसाद, गायत्री 1991: सांस्कृतिक भूगोल। शारदा पुस्तक भण्डार, इलाहाबाद।
Robertson, Iain, and Penny Richards 2003: Introduction in Studying cultural landscapes, ed. Iain Robertson and Richards, 1-18.
Rubenstain, J.M. and Becon, J.M. 1990: Cultural Geography, John Wiley and Sons Inc., New York.
रजवी, मुनीरुद्दीन 2001: सांस्कृतिक भूगोल। रावतसन्स [illegible] अलावली, जयपुर।
Scott, A. J. 1997: The Cultural Economy of Cities, International Journal of Urban and Regional Research, 21(2), 323-339.
Saberwal, Vasant K. 1996: Pastoral Politics: Gaddi grazing, degradation, and biodiversity conservation in Himachal Pradesh, India. Conservation Biology 10, no. 3: 741-749.
Sen, Amartya and Dreze Jean 1996: Indian Development Selected Regional Perspectives. Oxford University Press.
Sopher, D. 1980: An Exploration of India: Geographical Perspectives on Society and Culture. Cornell University Press, Ithaca, New York.
Smith, D.M. 1977: Human Geography; A Welfare Approach. Edward Arnold Publication, London.
Spencer, J.E. and Thomas, W.L. 1969: Cultural Geography. John Wiley and Sons inc., New York.
Subb Rao. Personality of India 1958: Pre and Proto Historic Foundation of India and Pakistan. M.S. University, Baroda, Vadodara.
Wagner, P.L. & Mikesell, H.W. (eds.) Readings in Cultural Geography.
Miljerkee. A.B. and Aijazuddin, A. 1985: India-Culture, Society and Economy. Inter India publications, New Delhi.
Broke, J.C. and Webb, J.W. 1978: A Geography of Mankind, McGraw Hill, New York.

Paper code: Geo 801: Population Geography

Section-A

Population Geography: definition, nature and scope and interdisciplinary study, theories of population growth – pre-Malthusian views, Malthus' theory, Marxist theory, Optimum population theory, demographic transition model, world population distribution, growth trends and determinants.

Section-B

Migration: history, theories, trends and patterns of international and internal migration, population dynamics: fertility and mortality- measurement, determinants and distribution, world population composition and characteristics, world population urbanization, trend pattern and challenges.

Section-C

India- population characteristics and relationship with development; population control movement and policies; urbanization and populatin explosion; post independence

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development-reproductive and child health programme, contemporary issues- ageing of population; declining sex ration; hiv/aids.

Readings Recommended:

Bhende, Asha, A. and Kanitkar, 2002: Principles of Population Studies. 14th Edition, Himalaya Publishing House, Mumbai.

Chandna, R.C. 2013: Population Geography. Kalyani Publishers, Delhi.

Chandna, R.C. 2006: Jansankhya Bhugol. Kalyani Publishers, Delhi.

Garnier, J.B. 1978: Geography of Population, Longman, U.K.

Hassan, M.I. 2005: Population Geography. Rawat Publication, Jaipur.

Kundu, A. Lopamudra, R.S. 2012: Migration and Exclusionary Urbanisation in India. Enonomic & Political Weekly, XLVII (26/27): 219-227.

Kundu, A. 2006: Trends & patterns of urbanization and their economic implications. India Publications, London.

Newbold, K.B. 2010: Population Geography: Tools and Issues. Rowman & Littlefield Coporation, New Delhi.

Premi, M.K. 1991: India's Population Heading Towards a Billion. B.R. Publishing Coporation, New Delhi.

Rural Urban Dynamics and the Millennium Development Goals 2013: Global Monitoring Report.

Woods, R. 1997: Theoretical Population Geography. Longman, U.K.

Weeks, J.R. 1988: Population: An Introduction to Concepts and Issues. Springer, Wadsworth.

www.un.org/esa/population/publications/worldageing19502050/

www.who.int/ageing/en/

India.unfpa.org/drive/NationalPopulation-Policy2000.pdf

UNAIDS Report on Global AIDS Epidemic, 2010

Paper code: Geo B02: Quantitative Techniques in Geography

Section-A

Probability: theory of. probabilites- law of addition and multiplication probabilites of destribution: normal, bionomial, poisson-sampling: basic concepts, sample units and design, sampling frame and procedures, standard error and sample size, testing the adequancy of samples, hypothesis testing: needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures; contingency tables, chi-square test, bionmial test, t-test, mann-whitney U test.

Section-B

Bivariate analysis; forms of relation and measuring the strength of association and relation-construction and meanings of scatter diagram simple linear and regression analyses-spearman's tank and product moment correlation cefficients-the ordinary least square method of fitting a regression line-construction of regression line: interpolation, prediction, explanation and residual-statistical tests of significance of the estimates; residuals and their mapping.

Section-C

Multivariate analysis; basics of multiple regression-partial correlation coefficient regression analysis, analysis of variance and anova-testing the overall significance of a regression auto correlation-multicolliniarity-basis principles and elements of factor Analysis and principal

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component analysis, surface and models: gravity potential; model-spatial interpolation and trend surface analysis-simulation models: random walk and diffusion models-markov chain model similarity indices and region building-construction of thiessen polygons.

Readings Recommended:

Gupta, S.P. 1979: Statistical Methods. Sultan Chand & Sons, New Delhi
Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi.
Nagar, K.N. 1992: Sankhiki Ke Mool Tatva. Meenakshi Prakashan, Meerut.
Unwin, D. 1981: Introductory spatial Analysis. Methuen, London.
Gregory, S. 1978: Statistical Methods and Geographer. Longman, Landon.
Hammond R. and McCullagh, P.S. 1974: Quantitative Techniques in Geography: An Introduction. Clearendan Press, Oxford.
John, P. Cole and Cuchlanie, A.M King 1968: Quantitative Geography, John Wiley, London.
Johnston, R.J. 1973: Multivariate Statistical Analysis in Geography. Longman, London.
Kautsoniannis 1973: Theory of Economitrics. Macmillan, London.
Maurice Yeats 1974: An Introduction to Quantitave Analysis in Human Geography. McGraw Hill, New York.
Peter Haggett, Andrew D. Cliff & Allan Frey 1977: Location Methods. Vol. I and II, Edward Arnold, London.

Paper code: Geo C01: Geography of Rural Development

Section-A

Geography and rural development; agriculture and rural development, rural land use; agriculture pastoral, forestory and land use competition. Landuse and landscape. Approaches to rural development, growth centre approach infrastructure reformist. Rural settlement, housing, population and employment rural transport, service provision, derivation, recreation; health and nutrition.

Section-B

Rural planning and land management; resource development and integrated rural development: crop and soil management live stock range and management; water management, ecological management.

Section-C

Rural development in Rajasthan; rural development schemes irrigation and land development schemes, drought prone areas schemes, desert development programme; integrated rural development in Rajasthan, MNREGA and tribal areas development; wasteland development.

Readings Recommended:

Glig, A.W. 1985: An introduction to Rural Geography. Anrold London.
Association of Country Councils 1979: Rural Deprivation, London ACC.
Allan, J.A. 1980: Remote Sensing in Land in Landuse Studies, Geography 65.
Tweari, A.K. (ed.) 1988: Desertification: Monitoring and Control, Scientific Pubs, Jodhpur.
Anderson, J.R.L.J. 1977: Hardardar-Agricultural Decision Analysis, Ames, Lows State University Press.
Andrease, B. 1981: Farming Development and Space-World Agricultural Geography, New York, Water Cryter.
Morgan, W.B. and RJA 1971: Munon-Agricultural Geography. London Methuen.

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Pacione, M. 1981: Rural Geography London, Parpur Clark, (ed) and Row 1984-Register of Research in Rural Geography Licester: Rural Geography Study Group.
Bowler, I.R. 1948: Agricultural Geography-Progress in Human Geography-8.
Newbury, Pa. 1980: Geography of Agriculture-Plymouth Macodonald and Evans.
Grigg, D.B. 1974: The Agricultural Systems of the World, Cambridge University Press.
Grigg, D.B. 1984: An Introduction to Agricultural Geography, London Hutchinson.
Jones, A. 1975: Rural Housing. The Agricultural Tied College, London Bell.
Lassey, W.R. 1977: Planning in Rural Environment, New York, Mcgraw Hill.
Lavery, P. (ed.) 1974: Recreational Geography, Newton Abbot; David and Charles.
Leasdale, R. 1981: Settlement systems in sparsely populated regions & Homes (ed.) and Oxford, Pergamon.
Menab, A. 1984: Integrated Rural Development, Glaucester Glancesser College of Arts.

Paper code: Geo C02: Geography of Soils

Section-A

Soils: Definition, origin. Pedology, distinction between soil and sediment, Weathering and soils: soil formation: soil forming factors, soil profile. Soil taxonomy

Section-B

Physical properties of soils - texture, structure, colour, porosity and permeability, Chemical properties of soils - soil clays. Cation exchange, Humus, organic matter, pH, Soil biochemistry.

Section-C

Classification of tropical soils. Major soils in India – Black, soils and red soils – their characteristics and distribution. Soils and environmental problems — soil erosion, salinazation, pollution

Recommended Readings:

Miller, R. W. and Donahue, R. L. (1990): Soils, Prentice-Hall of India
Pitty, A. F. (1978): Geography and soil properties. University Press.
Bridges, E. M. (1986): Principles and Applications of Soil Geography, Halsted Press.
Daji, J. A. (1970): A textbook of soil science, Asia Pub. House
Bunting, B. T. (1976). The Geography of soils, Hutchinson, London
Brikeland, P. W. (1984). Soils and geomorphology, Oxford University Press

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Paper code: Geo D01: Practical

Minimum Marks: 36	Bifurcation of Marks	Max. Marks: 100
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

History of cartography, types of maps, enlargement and reduction and finding of area on map using planimeter.

Section-B

Study of geological maps and preparation of their cross sections and interpretation, interpretation of weather maps and weather forecast.

Section-C

Conventional: Projection Sinusoidal and Mollweide, map policy of India and projections used for map output in India.

Readings Recommended:

चौहान, पी.आर. 2005: प्रयोगात्मक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010-11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी, पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography. Kalyani Publishers, New Delhi.

तिवारी, आर.सी. एवं सुधाकर, त्रिपाठी 2009: प्रयोगात्मक भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

Paper code: Geo D02: Practical

Minimum Marks: 36	Bifurcation of Marks	Max. Marks: 100
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

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Section-A

Elementary knowledge of computer, software & hardware, file format, graphic in computer.

Section-B

Elements of digital cartography, data input, data capture, scanning, digitization and map compilation.

Section-C

Map though autoCade, ArcGIS, GIS, QGIS, Erdas and Arcmap.

Readings Recommended:

चुनियाल, डी.डी. 2004: दूरसम्वेदन तथा भौगोलिक सूचना प्रणाली। शारदा पुस्तक प्रकाशन, इलाहाबाद।

Cromley, R.G. 1992: Digital Cartography, Prentice Hall, Englewood Cliffs, N.J.

Demers, M.N. 1997: Fundamental of Geographical Information Systems. John Wiley & Sons, Inc., New York.

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Joseph, G. 2005: Fundamentals of Remote Sensing. Universities Press (India) Private Limited, Hyderabad.

Khullar, D.R 2000: Essentials of Practical Geography. New Academic publishing Co., Jalandhar.

Nag, P. 1992: Thematic Cartography and Remote Sensing, Concept publishing company, New Delhi.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

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M.A. / M.SC. GEOGRAPHY
Second Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 201	Modern and Contemporary Geographical Thought (19th century onwards)	CCC	4	3	1	0	3	
2.	Geo 202	Principals of Climatology	CCC	4	3	1	0	3	
3.	Geo 203	Principles and Theory of Economic Geography	CCC	4	3	1	0	3	
4.	Geo 211	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Geography of Rural Settlements							
	GEO A02	Plant Geography with Special Reference to Tropics							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Geography of Tourism and Recreation							
	GEO B02	Geographical Perspectives on Sustainable Development							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Geography of Tribes with Special Reference to Rajasthan							
	GEO C02	Geography of Crime							
8.		**Elective – Practical**	ECC						
	GEO D01	Practical		6	0	0	9	4	
	GEO D02	Practical		6	0	0	9	4	
		Total Credit		36					

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II SEMESTER

Paper code: Geo 201: Modern and Contemporary Geographical Thought (19th century onwards)

Section A

Definition, scope, purpose and philosophy of geography, themes and basic concepts in geography; impact of Darwinism on Geographical thoughts, Foundations of modern geography: German school (Humboldt, Ritter, Ratzel, Richthofen, Hettner, Schluter), French school (Blache, Brunhes) British school (Mackinder) and Russian scholars during the 19th century, focus on geography as a science of chorology and landscape morphology.

Section B

Rise of Anglo American School of geography: (Semple and Hartshorne) implications of geography as spatial science, relationship between geography, economics and planning (regional science) paradigms and revolutions: quantitative revolution, behaviouralism, radical geography, approaches of integrated geography and modern synthesis.

Section C

Philosophical pluralism: empiricism, positivism, humanistic geography (idealism, phenomenologism and existentialism) and structuralism, post-modernism and various paradigms/ schools of geographical thought during post-modern period, dualism in geography: physical and human geography, systematic and regional geography environmentalism and possibilism, qualitative and quantitative, idiographic and nomothetic, Indian geography: development, emerging trends and professional challenges.

Recommended Readings:

Dear, M.J. and Flusty, S. (ed.) 2002: The spaces of Post modernity: Readings in Human Geography. Blackwell Publishers Ltd. Oxford.

Dikshit, R. D. 2004: Geographical Thought. A Critical History of Ideas. Prentice-Hall of India Private Limited, New Delhi.

Doi, R. D. 2002: Geographic Thought: A Spectrum of Compilation to Coherence. University Book House (Pvt.) Ltd., Jaipur.

Dikshit, R. D. 1994 (ed.): The Art and Science of Geography – Integrated Readings. Prentice-Hall of India Private Limited, New Delhi.

Haggett, P. 2001: Geography: A Global Synthesis. Prentic-Hall Pearson Educational, New York.

Hartshorne, R. 1987: Perspective on the Nature of Geography. Scientific Publishers, Jodhpur (Copyright 1959 by the Association of American Geographers.

Holt-Jensen, A. 2009: Geography: History and Concepts – A Student's Guide, SAGE, Los Angeles, London.

Haggett, P. 1983: Geography: A Modern Synthesis. Harper and Row, New York.

Harvey, D. 1969: Explanation in Geography. Arnold, London.

जैन, एस.एम. 2005: भौगोलिक चिन्तन एवं विधि तंत्र। पालिवाल भवन पब्लिशर्स्, आगरा।

Johnston, R. J. 1983: Philosophy and Human Geography. Edward Arnold (Publishers) Ltd. London.

Johnston, R. J. and Sidway, J. D. 2004: Geography and Geographers. Arnold, London.

Johnston, R. Gregory D. Pratt G, Watts M. and Whatmore S. (2003): The Dictionary of Human Geography. Blackwell Publishers, Oxford.

Johnston, R.J. 1985: The Future of Geography. Methuen and Company Ltd., New York.

Kapoor, A 2001: Voice of Concern. The Concept Publishing Company, New Delhi.

Minca, C. 2001 (ed): Postmodern Geography. Blackwell Publishers Ltd, Oxford.

सोर्म, एस.डी. 2007: भौगोलिक चिन्तन का इतिहास। प्रयाग पुस्तक भवन, इलाहाबाद।

Peet, R. 2003: Radical Geography, Rawat Publishers, Jaipur.

Peet, R. 1998: Modern Geographical Thought. Blakkwell Publishers Ltd, Oxford.

Soja, E. (1989): Post-modern Geographies. Verso Press, London. Reprinted 1997: Rawat Publications, Jaipur and New Delhi.

Taylor, G 1960: Geography in the Twentith Century. Methuen & Co. Ltd. Londo

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Paper Code: Geo 202: Principles of Climatology

Section A

Earth-atmospheric system: components, characteristics and interactions, Current trends in climatology, Recent concerns – climate change and its impact, Microclimatology – influencing factors – forest and urban climates, Agro climatology – soil-plant-climate relationship.

Section B

Air masses: origin, classification, types, Fronts: Frontogenesis and Frontolysis – classification of fronts, Extra-tropical cyclones: formation, impact, Weather forecasting: traditional and modern techniques

Section C

Basis of climatic classification, Koppen's system of climatic classification – salient features, distribution of types, Thornthwaite's scheme of climatic classification – application, Comparative analysis of Koppen and Thornthwaite classifications, The Monsoon: characteristics, economic importance, A Origin of monsoon: classical and recent views, Prediction of monsoon: problems and prospects.

Recommended Readings:

Barry, R.S. & Chorley, R.J. (1971): Atmosphere, Weather and Climate, ELBS, Methuen & Co. Ltd., U.S.A.

Griffiths, J.F.(1966): Applied Climatology-An Introduction, Oxford University Press, London.

Harp, H.J. and Trinidade, O.D. (eds) (1990): Climate and Development, Springer Verlag, U.S.A.

Lal, D.S.(1997):Climatology, Sharda Pustak Bhawan, Allahabad.

Mather, J. R.(1974): Climatology: Fundamentals and Applications, McGraw Hill Book Co. New York.

McBoyle, G.(1973): Climate in Review, Houghton Mifflin Co., Boston.

Oliver, J.E. and Hidose, J.J. (1984): Climatology - An Introduction, Charles and Merrill, U.S.A.

Robinson, P.J. and Hendersen-Sellers, A.(1999): Contemporary Climatology, Pearson Education, London

Subrahmanyam, V.P.(ed)(1983):Contribution to Indian Geography, Heritage Publishers, New Delhi , a) Vol. III - General Climatology b) Vol. IV- Applied Climatology

Further Reading:

Bhutani, Smita, Our Atmosphere, Kalyani Publishers, Ludhiana, 2000.

Critchfield, H.J., General Climatology, Prentice Hall, N.J., 1975.

Frederick K. and Edward J. Tarbuck, The Atmosphere: An Introduction to Meteorology, Prentice Hall of India Pvt. Ltd., New Delhi, 1995.

Lydolph, P.E., The Climate of the Earth, Rowman Nad Allanheld, Totowa, New Jersey, 1985.

Rumney, G.R., Climatology and the World Climates, Macmillan, London, 1968.

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Strahler, A.N., Modern Physical Geography, John Wiley and Sons, New York, Singapore, 1987.
Thompson Russell D.. Applied Climatology - Principles & Practice, John Willey, New York, 1997.
Trewartha, G.T., An Introduction to Climate, McGraw Hill, New York, 1980, Fifth Edition (International Student Edition).

Paper code: Geo 203: Principles and Theory of Economic Geography

Section A

Simple model of economy, environmental relations of the economy, spatial structure of economy, geographical basis of economic activities, evolution of world economic system.

Section B

Manufacturing: factors of production, theories of plant location: Weber's Least cost theory, Losch's economies of location, Isard's space economy, Smith's spatial margins, webber's uncertainty effect, industries-iron & steel, alluminium, paper and pulp, cotton textile, chemical industries-fertilizer, spatial variation in transport costs: location of transport routes and structure of transport costs.

Section C

Spatial organisation of land use: laws of return, concept of rent, Vonthunen's general theory of landuse, dynamic agricultural location theory, Thunian location theory in the late 20th century world, classical central place theory: range of good, threshold, central place system and hierarchy, Christaller's hexagonal trade areas, loss and uniform plain, modification of Christaller's model.

Recommended Readings :

Alexander, J.W. 1988: Economic Geography. Prentice Hall, India, New Delhi.
Berry, B.J.L. et al 1976: Geography of Economic System. Prentice hall, Englewood, Cliff.
[illegible] आर्थिक भूगोल। रस्तोगी प्रकाशन, मेरठ।
Ghosh and Chatterjee 1989: A New Approach to Economic Geography.
Huntington, Ellsworth1940: Principles of Economic Geography. New York: John Wiley and Sons, Inc.
Hartshorn, T.A. and Alexander, J.W. 2000: Economic Geography. Prentice Hall, New Delhi.
Hoover E.W. and Lee, R.1974: Economic Geography. Methuen, London.
[illegible] आर्थिक भूगोल। वसुन्धरा प्रकाशन, गोरखपुर।
[illegible] Concept Publishing Co., New Delhi
भारतीपाल सिंह, जगदीश सिंह: आर्थिक भूगोल के मूल तत्व। वसुन्धरा, गोरखपुर।
Leong, G.C. and Morgan, G.C. 1982: Human and Economic Geography. Oxford University Press, London.
Lloyod, P.E. and Dicken, P. 1977: Location in Space: A Theoretical Approach to Economic Geography. Harper & Row, Publishers, London.
Ramesh, A. 1984: Contributions to Indian Geography. Volume V, Resource Geography, Heritage Publishers, New Delhi.
श्रीवास्तव, वी.के. एवं राय, बी.पी. 2002: आर्थिक भूगोल। वसुन्धरा प्रकाशन।
Siddhartha, K. 1999: Economic Geography. Kisalaya Publication Pvt. Ltd., Patna.
Sihag, M.S. and Sihag, Savita, 2011: Resource Geography. Gautam Book Company, Jaipur.
Wheeler, J.O. et al 1995: Economic Geography. John Wiley, New York.
Zimmerman, E.W. 1951: World Resources and Industries. Harper & Co. New York.

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Paper Code: Geo 211: Practical

Minimum Marks: 36	Bifurcation of marks	Max. Marks: 100
Written Test on Lab. Work (4 Questions)	32	4 hours
Record Work & Viva-Voce	16+08	
Project Report & Viva-Voce	16+08	
Internal Assessment	20	
Total	100	

N.B. In written test there shall be 2 questions from each section. Candidates have to answ 4 questions selecting at least one question from each section. All questions carry equ marks. Examination be conducted in batches of not more than 20 candidates in ar case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

Preparation of frequency table, graphical representation of data: histogram, frequenc polygon, frequency curve and cumulative frequency curve or ogive, finding skewnes computation of mean, median and mode, dispersions: mean and standard deviation an computation of correlations: Karl Pearson's and Spearman's rank, coefficient of variability theoretical basis of nearest neighbour analysis and exercises.

Section B

Locational analysis of urban centres, measurement of disparities, using latest data base: state district, tehsil and development block level, preparation of choropleth, isopleths an isochrone map, population potential surface map, population pyramids map and cartograms.

Section C

Three dimensional diagrams: spherical and block pile, drawing of polygraphs, semi-log ant log graphs, network analysis, trilinear chart, circular graph, climatograph, annual wate budget graphs (surplus and deficiency).

Project Report: A candidate is to prepare project report of a village area for one week away from the Headquarter of the institution. The marking on the project report will be awarded by the external examiner in consultation with the Internal examiner concerned. The project should be based on primary data obtained by the candidate. The data should be represented by suitable cartographic methods.

Books recommended

Dickinson, G.C. 1973: Statistical Mapping and Mapping Statistics. London.

Lawrence, G.R.P. 1971: Cartographic Methods. Methuen, London.

Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publications, New Delhi.

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.

Rampal, K.K. 1993: Mapping and Compilation: Methods and Techniques. Concept Publishing Company, New Delhi.

शर्मा, जे.पी. 2010–11: प्रयोगात्मक भूगोल की रूपरेखा। रस्तोगी पब्लिकेशन्स, मेरठ।

Singh, R.L. and Singh RPB 1991: Elements of Practical Geography. Kalyani Publishers, New

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Paper code: Geo A01: Geography of Rural Settlements

Section A

Significance and scope of settlement geography; Development of settlement geography. Methodological advances in the study of settlement geography; Approaches to the study of settlements: Evolutionary, spatial, and ecological; Types of settlement: Clustered and dispersed.

Section B

Rural Settlements: Definition and characteristics; Site and situation. The evolution of field boundaries and field patterns. Types and materials of farm fencing; Folk housing and folk architecture; Traditional building materials.

Section C

Indian Village: Nature and characteristics; A model of Indian village by Spate; Study of rural settlements in India with special reference to their morphological characteristics; Approaches to the morphogenesis of Indian villages. Orientation and segregation of castes in villages; Dichotomy in built environment: Mohammad Habib and Budha Prakash Debate; Study of landscape as a text.

Recommended Readings:

Ahmad, E. 1979. Social and Geographical Aspects of Geography of Human Settlements. New Delhi: Classical Publications.

Ambrose, P. 1970. Concepts in Geography; Settlement Patterns. London: Longmans. Census of India, 1961. House Types and Settlement Patterns of Villages in India. New Delhi.

Chisholm, M. 1969. Rural Settlements and Land Use. London: Hutchinson.

Christaller, C. W. 1966. Central Places in Southern Germany. Englewood Cliffs N. J: Prentice Hall. Clout, H. D. 1972. Rural Geography: Introductory Survey. Oxford: Pergamon.

Cox, K. R. 1972. Man, Location and Behavior: An Introduction to Human Geography. New York: John Wiley and Sons.

Duncan, J. S. 1990. The City as Text: The Politics of Landscape Interpretation in the Kandya Kingdom. Cambridge: Cambridge University Press.

Eidt, R. C., K. N. Singh, and R. P. B. Singh, 1977. Man, Culture and Settlement. Varanasi: Kalyani Publishers.

Hudson, R. S. 1970. A Geography of Settlements. Estover, Plymouth: Macdonald and Evans.

James, P. E. and C. F. Jones, 1954. American Geography: Inventory and Prospects. Syracuse: Syracuse University Press.

John E. Bush. 1962. The Morphology of Indian Cities. In Roy Turner (Ed.) India's Urban Future. Bombay: Oxford University Press.

King, A. D. (ed.) 1980. Building and Society: Essays on the Social Development of the Built Environment. London: Routledge and Kegan Paul.

Mayer, H. M. and C. F. Kohn. 1959. Readings in Urban Geography. Chicago: University of Chicago Press.

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Mukerji, A. B. 1976. Rural Settlements of the Chandigarh Siwalik Hills (India): A Morphogenetic Analysis. Geografiska Annaler, 58(2): 95-115.
Mukerji, A. B. 1984. Progress in Rural Settlement Geography. In A Survey of Research in Geography 1972 – 75. New Delhi: Concept Publishing Company.
Mukherji, R. K. 1968. Man and His Habitation: A Study in Social Ecology. Bombay: Popular Prakashan. Noble, W. A. 1969. Approaches toward an Understanding of Traditional South Asian Peasant Dwellings. Professional Geographer, 21(4): 264-272.
Noble, A.G. 2007. Traditional buildings: A Global Survey of Structural Forms and Cultural Functions. London: I.B. Tauris
Rapoport, A. 1965. House, Form and Culture, Englewood Cliff JN: Prentice Hall.
Ray, A. 1964. Villages, Towns and Secular Buildings in Ancient India. Calcutta: Firma K. L. Mukhopadhyaya.
Singh, J. P. and Khan, M. 2002. Mystical Space, Cosmology and Landscape: Towards a Cultural Geography of India. New Delhi: Manak Publication.
Singh, K. N. 1968. The Territorial Basis of Medieval Town and Village Settlement in Eastern Uttar Pradesh. Annals of the Association of American Geographers, 58(2):218-226.
Singh, R. L. and K. N. Singh (eds.) 1975. Readings in Rural Settlement Geography. Varanasi: The National Geographical Society of India, B. H. U.
Smailes, A. E. 1969. The Indian City: A Descriptive Model. Geographische Zeitschrift. September, pp181 – 182.
Spate, O. H. K. 1952. The Indian Village. Geography, 37: 142-152.
United Nations Centre for Human Settlements (HABITAT), 1966. An Urbanising World, Global Report on Human Settlements. Oxford: Oxford University Press.
Verma, L. N. 2008. Adhiwas Bhugol (4th Edition). Jaipur: Rajasthan Hindi Granth Academy.
Wagner, P. L. and Mikesell, M. W. (Eds.). 1962. Readings in Cultural Geography. Chicago: University of Chicago Press.

Paper code: Geo A02: Plant Geography with Special Reference to Tropics

Section A

Evolution as a discipline, scope and content, Links with other disciplines, Relevance to Geography, Recent trends and need for phytogeographical research, Distinguishing characteristics. Indigenous and exotic flora, Bio-diversity of the tropics.

Section B

Terrestrial - forests, grasslands, deserts, Marine and aquatic – mangroves, coastal, Vegetation types of India.

Section C

Degradation and depletion of tropical vegetation, Need for conservation and management, Methods - protected area network – effectiveness, Green belts and zones in urban areas.

Recommended Readings:

Akin, W.E. (1991): Global patterns – Climate, vegetation soils, University of Oklahama Press, U.S.A.
Ewusie, J.Y. (1980): Elements of Tropical Ecology, Heinemann Educational Books Inc. London.
Furley, P.A. and Newey, W.N. (1983): Geography of the biosphere, Butterworth & Co. Ltd., London.
Kellman, M.C. (1975): Plant Geography, Methuen & Co. Ltd., London.
Mani, M.S. (1974): Ecology and Biogeography in India. The Hague: Dr. W. Junk Publishers

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Lars, N. (1985): Basic Biogeography, Longman, London.
Slaymaker,O. and Spencer, T. (1998): Geography and Global Environment Change, Addison Wesley Longman Ltd., UK.
Smithson, P. et al (2002): The Fundamentals of The Physical Environment, Routledge, London.

Books for further reading:

Ali, S. (1990): Notes on National Forest Policy 1988, Encology, 5(3), August, 1990, 20—22.
Bharucha, F.R. (1983): A text-book of the plant geography of India, Oxford University Press, Bombay.
Dikshit, K.R. (1991): Environment, Forest Ecology and Man in the Western Ghats – The Case of Mahabaleshwar Plateau, Rawat Publ., New Delhi.
Forest Survey of India (1987-1999): The State of Forest Reports, Dehradun.
Ganeshaiah, K. N. et al (ed) (2001): Tropical Ecosystems – Structure, Diversity and Human welfare. Oxford & IBH Publ. Co., New Delhi.
Geethakrishnan, K.P. (1994): National Forest Policy, 1988, Encology, 5(3), 15-20.
Meher-Homji, V.M. (1987): Vegetation types of Peninsular India in relation to environment conditions, in Explorations in the Tropics, Prof. K.R. Dikshit Fel.Vol.Comm., Pune, 3-19.
Meyers, A.A. and Giller, P.S. (1988): Analytical Biogeography – An Integrated Approach to the Study of Animal and Plant Distribution, Chapman and Hall, London, New York.
O'riordan, T. et al (2002): Biodiversity, Sustainability and Human Communities Protecting beyond the Protected, Cambridge Univ. Press, U.K.
Puri, G.S. (1980): Indian Forest Ecology, Vols.2, New Delhi: Oxford.
Sharma, N.P. (ed.) (1992): Managing World's Forests, Kendall Hunt Publ. Co., Iowa.
Walter, H. (1973): Vegetation of the Earth in relation to climate and eco-physiological conditions, English Univ. Press Ltd., London.

Paper code: Geo B01: Geography of Tourism and Recreation

Section A

Leisure, recreation and tourism - definitions and relationships- Tourist Mobility and Gazes- Space and Place Context, Evolution of Tourism- historical origins- modernisation- mass tourism- Globalisation and Tourism- opportunities, risks and constraints, Contemporary world patterns- core regions in Global North and South, Tourism and Tourism Spaces- Approaches- areas of research- Role of tourism in development.

Section B

The nature of tourism production- Tourism capitalist relationships and regulation theory Dynamics of globalization, Organisation – Models of production- micro firms and MNCs- Spatial fixity and factors of, Supply- Infrastructure, services and marketing, Tourism labour process-flexibilisation- spatio-social context, Tourism consumption-motivational factors- commodification of tourists' experiences, typologies of tourists' consumptions– Spatial context.

Section C

Impact of tourism- Changing perspective- Commodification of places- Environmental dimension, Economic impact-Employment, labour, Sectoral linkages and hierarchy, Social construction of tourism places- Commodification of culture- Stages; Structuring of tourists' gazes and place image- Tourists- community relationships, Tourism impact assessment, Tourism development in Rajasthan: Policy and perspective.

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Recommended Readings:

Banerjee-Guha, S. (2003): Contemporary Tourism Policy and Costal Districts of Maharashtra: A Critique, unpublished report, Equations. Banglore, on project conducted at the Department of Geography, University of Mumbai.

Bhardwaj, D. S. and Chaudhary, M. (1997): Contemporary issues in Tourism, Himalaya, Mumbai

Bhatia, A.K. (1989): Tourism Development, Principles and Practices, Sterling, Banglore.

Bhatia, A.K. (1991): Internationational Tourism: Fundamentals and Practices, Sterling, New Delhi.

Chris Ryan. (1991): Recreational Tourism, a Social Science Perspective, Routledge, London.

Cosgrove, I. And Jackson, R. (1972): The Geography of Recreation and Leisure, Hutchinson, London.

Garg, N.K. (1996): Tourism and Economic Development. Avishkar, Jaipur.

Hall, C.M. and Page, S. J. (1999): The Geography of Tourism and Recreation, Environment, Place and Space, Routledge, London.

Hall, C.M. and Page, S.J. (2001): Tourism in South and South-east Asia: Issues and Cases, Butterworth, Heinemann, Oxford.

Hunter, C. and Green, H. (1995): Tourism and the Environment, A Sustainable Relationship.

Kaul, R.K. (1985): Dynamics of Tourism and Recreation, Inter India, New Delhi.

Pearce, D. (1987): Tourism Today-- A Geographical Analysis, Longman Scientific and Technical, New York.

Pearce, D. (1989): Tourist Development, Longman Scientific and Technical, New York.

Robinson, H. (1976): Geography of Tourism, Macdonald and Evans, London.

Shaw, G. and Williams, A.M. (1994): Criticai Issues in Tourism, a Geographical Perspective, Blackwell, Oxford, U.K.

Shaw, G. and Williams, A.M. (2004): Tourism and Tourism Spaces, Sage.

Sinha, P.C. (1997): International Encyclopedia of Tourism Management, Vol. 1-12, Anmol, New Delhi.

Books for further reading:

Baggio R. and Klobas J. (2011): Quantitative Methods in Tourism, A Handbook. Aspects of Tourism. Channel View Publications, UK, USA, Canada.

Batra, G.S. and Donghal, R.C. (2002): Tourism promotion and Development, Deep and Deep, New Delhi

Becken S. and Hay J., (2012): Climate Change and Tourism, From Policy to Practice, Earthscan: Routledge, Tourism Environment and Development Series, London and New York.

Chattopadhyay, K. (1995): Economic Impact of Tourism Development, Avishkar, Jaipur.

Foster, D. (1986): Travel and Tourism Management, Macmillan, Hampshire.

Fullagar S., Markwell K., Wilson E., (2010): Slow Tourism, Experiences and Mobilities, Aspects of Tourism. Channel View Publications. Bristol, Buffalo, Toronto.

Holder A and Fennell D. (ed.) (2013): The Routledge Handbook of Tourism and the Environment, Routledge, Taylor and Francis Group, London and New York.

Kaiser, C, Jr., Helber, L.E. (1977): Tourism Planning and Development, CBI Publishing Co. Inc. Boston.

Kaur, J.(1985):Himalayan Pilgrimmages and New Tourism, Himalayan Books, New

Kumar, R.B. (1995): Coastal Tourism and Environment, Avishkar, Jaipur.

Lavery, P. (1971): Recreational Geography, Donglas David and Charles Ltd., Vancouver

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Hall R.C, and Morrison, A.M. (1985): The Tourism System: An introductory Text, Prentice Hall International Englewood Cliff, New Jersey.
Modi, S (2002): Tourism and Society, Rawat, Jaipur.
Neumeyer, M.H. and Neumeyer, E.S. (1949): Leisure and Recreation, A. S. Barner and Company, New York.
Newsome D and Dowling R. (ed.) (2010): Geotourism: The Tourism of Geology and Landscape, Goodfellow Publishers Ltd, Oxford.
Singh, S.(1995): Profile of Indian Tourism, Avishkar, Jaipur
Singh, S.N.(1986):Geography of Tourism and Recreation, Inter India, New Delhi
Yadav, Hrishikesh, (ed.) (1995): Sangati Sahyadrichai, Sahyadri Prakashan, Mumbai.
Yeoman I., et. al. (2012): 2050 – Tomorrow's Tourism, Aspects of Tourism, Channel View Publications, Bristol, Buffalo, Toronto.

Paper code: Geo B02: Geographical Perspectives on Sustainable Development

Section A

Sustainable Development: Definition, concept and historical developments; difference between economic growth, economic development and sustainable development; economic theories of sustainable development, reconciliation between political and theoretical discourses.

Section B

Geography and Sustainable Development: Sustainable development in disciplinary perspective, sustainable development and geographical agenda, geography and the pursuit of sustainable development. Sustainable Development and the Spatial Scale and Spatial Interaction : Structuring global scale, achieving sustainable development at local, regional, national and global scales, sustainable development and open economies, interaction between different spatial scales.

Section C

Climate change, Energy, and Sustainable Development: Climate change as a threat to sustainable development, current and future climate regimes, mitigating climate change. Sustainable Development and International Relations: International relations theories, climate change and global discourse, discourses in conflict at international forums. Future Perspectives : Existing strategies for sustainable development, consensus and contest, challenge of sustainable development, sustainable development and societal change.

Recommended Readings:

Adams, W.M. (2001), Green Development : Environment and Sustainability in Developing Countries, 2nd edition, Routledge, London.
Barbier, E.B. (1987), The Concept of Sustainable Development, Environmental Conservation, 14(2), 101-110.
Daly, H.E. (1999), "Towards Some Operational Principles of Sustainable Development", Ecological Economics, 2(1), 1-6.
World Commission on Environment and Development (1987), Our Common Future, Oxford University Press. Oxford.
Purvis, M. and Alan Grainger (2004), Exploring Sustainable Development : Geographical Perspectives, Earthscan, London.

Further Readings:

Bhoovigyan Vikas Foundation (2001), International Conference on Sustainable Life Styles

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and Sustainable Development, Contributory Papers, New Delhi.
World Development Report (2003), Sustainable Development in a Dynamic World, Oxford University Press, Delhi.

Paper code: Geo C01: Geography of Tribes with Special Reference to Rajasthan

Section A

Tribes and tribal communities- Perspectives in time and space.: (A Historical Perspective)

Race, Ethnicity and Tribes – Contemporary Global Distribution of Tribes, Differentials in tribal living Location, environment, economy, society and culture of tribes, Social organisation and control.

Section B

Tribes in Rajasthan

Tribes of Rajasthan- Locational and environmental, – Demography of tribes : Major and minor areas of concentration – Characteristics and classification. Differentials in characteristics - Economic activities and associated status Occupational characteristics of tribals in Rajasthan – Social mobility – Case studies. Issues of integration and marginalization – Analysis of development projects and the placement or Displacement and resettlement of tribals.

Section C

Tribals and mainstream development

Study of scheduled and non scheduled tribes, Tribals in various sectors of economy and society, Tribal movements – Historical perspectives – Social, economic, political and ecological issues. Tribal Development Policies in India- Colonial and post- colonial policies: Nature, parameters and objectives - Impact of such policies on tribals- A Review.

Recommended Readings:

Bhange, N.P.(1993): Tribal Commission and Committees in India, Himalaya Publishing House, Bombay.
Boss, N.K.(1971): Tribal life in India, National Book Trust,New Delhi.
Chkravarty,M. Mukherjee,D,(2009), Indian Tribes, SAraswat library, Calcutta.
Chaudhury, B.(1982): Tribal Development in India: poblemsand Prospects,
Chaudhary SN (ed) (2012), Tribal Health and Nutrition, Rawat Publication, Jaipur
Pati, R N. and Jena B (1989) Tribal Development in India, Ashish Publishing House, New Delhi.
T. Prasad (1979): Tribal Geography. An Introductory Bibliography, Classical Publications, New Delhi.
Ramaswami, VS (1988): Tribal Economy; Problems and Prospects, Chugh Publications, Allahabad.
Singh, K.S.(1982): Tribal Movement in India, Manohar Publications, New Delhi.
Singh, S.(1969): Tribal Situation in India, Indian Institute of Advanced Study, Simla
Vivelo, F.R. (1978): Cultural Anthropology, McGraw Hill, New York.
Waterlow, C. (1967): Tribe, State and Community, London
Vyas,N.N. and Mann,R.S.(2008), Indian Tribes in Transition, Rawat Publications, Jaipur
Vyas, N.N. and Mann, R.S.(2008), Indian Tribes of Northern Mato Grosso Brazil, Rawat Publications, Jaipur

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Paper code: Geo C02: Geography of Crime

Section A

Spatio-Social Perspectives on Crime:

Crime as a socially constructed and spatially embeded act – Concept, Definitions Typologies of Crime- Interrelation with social inequality and underdevelopment. Teleological bases- Dynamics of value system and morality -institutional regulation of criminality and deviance, Evolution of political, legal and judiciary systems - Democracy and secularisation – Social justice, human rights and Crime. Capitalist modes of production – Flexibilisation of economy – Time and space convergence and post-modernity- Neoliberalism – spatial dimension of crime – Contemporary trends. Theories of Crime and space–Anomie; Cultural transmission, Crowding; labeling and conflict theory; Power differential, A Critical review.

Section B

Place and Space in Crime

Emplacement in Crime- The built environment, Local subculture and locales of crime - Mobility conditions and places of crime and criminals – regional patterns of crime in India. Systemic violence- implications of sex, age, religion, race, caste and class: illustrations of sexual violence, child abuse, racist violence; homophobic violence, elder abuse – World trends. Geographies of crime and fear- Use of space; Place, space and social identity – socio-spatial exclusion. Gender and crime- patriarchy and sexual violence– Femininity, masculinity and spatial expression of fear of violence – Rapes, domestic violence, - homosexuality and crime.

Section C

Scale, Power, Social Space and Crime; Inter-relations

International Order and Crime- Patterns of flesh trade, drug trafficking – Geopolitics, war and crime- Partition and violence. World patterns of terrorism – terrorism and violence in India. Ethnic strife in South Asia – Communal riots in India - State Oppression, peoples'. Protest and violence – Indian examples. Crime, Justice and the state – Police, prosecution, Judiciary, legislation and administration efficacy in space and society- Indian context.

Recommended Readings:

Pain Rachel, Barke Michael, Fuller Duncan, et. al., (2001), 'Introducing Social Geographies', London, Arnold.

Clinard Marshall B. and Abbott, D. J. (1973), 'Crime in Developing Countries: A Comparative Perspective, Wiley International, 1973.

Herbert, D. (1982): The Geography of Urban Crime, Longman London.

Humpheries, D. and Wallace, Don (1980): Capital Accumulation and Urban Crime, Social Problems, Vol. 28, No. 2, pp. 179-193.

Newman, O. (1973): Defensible Space, Crime Prevention Through Urban Design, Architectural Press, London.

Ahmad, A. (1999): Social Geography, Rawat Publishers.

Daniels, S. and Lee, R. (eds.)(1996): Exploring Human Geography, Arnold.

Castells, M., (1996): The Rise of the Network Society, Basil Blackwell, 1996.

Dear, M.J. and Flusty, S. (2000): The Spaces of Postmodernity, Blackwell.

Vincent J. Del Casino, (2009): Social Geography- Critical Introduction to Geography, Wiley-Blackwell

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Chris Hamnett (ed.), (1996): Social Geography A Reader, Arnold.
Shaban Abdul, 2010, 'Mumbai Political Economy of Crime and Space', Hyderabad, Orient Blackswan Further Reading
Crawford. A. (1998). 'Crime Prevention and Community Safety', London, Longman
Evans. D. Fyfe. N R. and Herbert, D. T., (eds.)(1992) Crime. Policing and Place', London Routledge
McLaughlin, E, (eds.) (1996), 'The Problem of Crime', London Sage
Pain, R, (2000), 'Place, social relations and the fear of crime, a review', Progress in Human Geography 24(3)
Yarwood. R, and Gardner. G, (2000) Fear of crime, cultural threat and the countryside Area 32(4). 403- 12
Clinard. Marshall B. (1961): Sociology of Deviant Behaviour, Holt, Rinehart and Winston, New York
United Nations Interregional Crime and Justice Research Institute (1990): Essays on Crime and Development, Publication No. 36, Rome.
Radzinowicz, L. (1966): Ideology and Crime, Heinemann
Wilson, J. and Kelling, G. (1997): Broken Windows, in Dunham, R. and Alper, G. (eds.), Critical Issues in Policing, Waveland Press, Illinois, pp. 424-437.
Shaban, Abdul (2007): Mumbai: Space, Crime and its Political Economy, Project Report submitted to BRS, TISS, Mumbai. - Theories of Crime, Entire report.
Malcu, L. (1995): Social Movements and Social Classes, Sage
J. O'Loughlin and Friedricks, J. (1996): 'Social Polarization in Post– Industrial Metropolises', Water de Gruyter.
Peet, R. (1977): 'Radical Geography', Maaroufa Press.
Harvey, D. (1996): 'Justice, Nature and the Geography of Difference', Basil Blackwell.
Thoms, D.C. (1992): 'Fragmenting Societies', Routledge,
Babcock. B (1984): 'Unfairly Structured Cities ', Basil Blackwell.
Castells. M. (1988): 'Information Technology: Economic Restructuring and Urban Development', Basil Blackwell.
Harvey, D. (1989): 'The Condition of Post Modernity', Basil Blackwell.
Harvey D. 2001, 'Spaces of Capital Towards a critical Geography', Edinburgh University Press
Sibley, D. (1995): 'Geographies of Exclusion', Routledge.
David Atkinson, Peter Jackson, David Sibley and Neil Washbourne, (2005): Cultural Geography: A Critical Dictionary of Key Concepts, I.B. Taurus
Steve, P. and Michael, K. (1993): Places and the Politics of Identity, Routledge, U.K.
Herod Andrew and Wright Melisa, (eds.), 2002, 'Geographies of Power-Placing Scale', Blackwell
Bagchi Amiya Kumar (1982), 'The Political Economy of under-development', Cambridge University Press, Cambridge.
G. S. Bajpai (ed.), 2002. 'Development without disorders: Criminological view points, Vishwavidyalaya prakashan.
Websites:
www.jstor - article by W. Lawrence Neuman and Ronald J. Berger 1988.
Competing perspectives on cross-National Crime: An Evaluation of Theory and Evidence - source Sociological Quarterly. 1988. 29(2). Pgs. 281-313.
www.google (Crime and Development in Africa by Lamin Sesay

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Paper code: Geo D01: Practical

Minimum Marks: 36	**Bifurcation of Marks**	**Max. Marks: 100**
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section A

Design of questionnaire (Field based): Types: closed and open-ended, Planning, designing and constructing questionnaire for field work- quantifiable data based and perceptional qualitative data based, ethnographic survey method,

Section B

Data recording – codification for computer based analysis, Data compilation and analysis.
Settlement Hierarchy: Population and functional – rank-size and primacy: distinction- Construction- Interpretation, Use of NATMO maps for understanding settlement hierarchy – applications.

Section C

Network Analysis: Topological graphs -Connectivity- Calculations of Alpha, beta and gamma indices, Mapping of relative accessibility and connectivity – Matrices- point of minimum aggregate travel distance.

Recommended Readings:

Gregory, S. (1971): Statistical Methods and Geographer, Longman, London.
King, C. A. M. (1978): Techniques in Geomorphology, Edward Arnold, London. Taylor, Peter J. (1977): Quantitative Methods in Geography, Houghton and Mifflin co., Boston
Monkhouse. F.J. and Wilkinson, H.R. (1971): Maps and Diagrams, Methuen, London
Cole, J.R and King , C.A.M. (1968): Quantitative Geography, John Wiley And Sons, London.
Goudie, A. (1981): Geomorphological Techniques, George Alien And Unwin, London.
Hammond, R. And McCullagh, P.S., (1974): Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
Yeates, M, (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw Hill Book Co., New York.
Mahmood Aslam, (1977): Statistical Methods in Geographical Studies, Rejesh Publication, New Delhi.
Rogerson P.A. (2010). 3rd Ed. Statistical Methods for Geography, a Students Guide, Sage.
Ebdon, David, (1985): Statistics in Geography: A Practical Approach , Wiley-Blackwell, New York.

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Fotheringham,A.S., Brunsdon, C., Charlton,M : (2000) Quantitative Geography: Perspectives on Spatial Data Analysis, Sage Publication Ltd, London,
Baily, T.C., and Gatrell, A. C, (1995): Interactive Spatial Data Analysis, Prentice Hall, London
Griffith , D. A. , Layne, L.J.,(2002): A Casebook for Spatial Statistical Data Analysis: A Compilation of Analyses of Different Thematic Data Sets , Amazon.com
Chen, Y.Q. and Lee Y.C., (ed.) (2003): Geographical Data Acquisition , New York
Vallentine G. Clifford,N. (2010), Key Methods in Geography, Sage.
Delyser D., Herbert S., Aitken S. (eds.) (2010), The Sage Handbook of Qualitative Research, Sage. 19.
Cloke, P., Cook, I, Crang, P., et.al. (2004), Practising Human Geography, Sage.

Paper code: Geo D02: Practical

Minimum Marks: 36	**Bifurcation of Marks**	**Max. Marks: 100**
Written Test on Lab.Work (4 Questions)	60	4 Hours
Record Work & Viva-Voce	25+15	
Total	100	

N.B.: In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 09 hours for teaching practicals be provided for a batch of 20 students per week.

Section-A

Network Analysis: Topological graphs -Connectivity- Calculations of Alpha, beta and gamma indices, Mapping of relative accessibility and connectivity – Matrices- point of minimum aggregate travel distance.

Section-B

Mental Maps and diagrams: Typology of distance and direction of space- Construction of Maps, Imagining Place and space: Perception – mapping and interpretation, Interpreting political context of maps, cartographic techniques, diagrams, pictures and cartoons.

Section-C

Techniques Regionalization and Patterns: Identification of regional boundaries, Boundary girdle technique and synthetic mapping, Index of concentration: location quotient and concentration, Index of similarity and dissimilarity and inequality- Construction and applicability of Lorenz curve- Interpretations – Calculation of Ginni's co-efficient of concentration

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Recommended Readings:

Gregory, S. (1971): Statistical Methods and Geographer, Longman, London.
King, C. A. M. (1978): Techniques in Geomorphology, Edward Arnold, London. Taylor.
Peter J. (1977): Quantitative Methods in Geography, Houghton and Mifflin co., Boston
Monkhouse. F.J. and Wilkinson, H.R. (1971): Maps and Diagrams, Methuen, London
Cole, J.R and King , C.A.M. (1968): Quantitative Geography, John Wiley And Sons, London.
Goudie, A. (1981): Geomorphological Techniques, George Alien And Unwin, London.
Hammond, R. And McCullagh, P.S., (1974): Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
Yeates, M, (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw Hill Book Co., New York.
Mahmood Aslam, (1977): Statistical Methods in Geographical Studies, Rejesh Publication, New Delhi.
Rogerson P.A. (2010), 3rd Ed. Statistical Methods for Geography, a Students Guide, Sage.
Ebdon, David, (1985): Statistics in Geography: A Practical Approach , Wiley-Blackwell, New York.

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M.A. / M.SC. GEOGRAPHY
III Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 301	Advanced Geography of India	CCC	4	3	1	0	3	
2.	Geo 302	Fundamentals of Natural Hazards and Disaster Management	CCC	4	3	1	0	3	
3.	Geo 303	Urban Geography	CCC	4	3	1	0	3	
4.	Geo 311	Practical	CCC	6	0	0	9	4	
5.		Elective – I	ECC	4	3	1	0	3	
	GEO A01	Research Methodology							
	GEO A02	Political Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Advanced Geomorphology							
	GEO B02	Contemporary Issues in Human Geography							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Marketing Geography							
	GEO C02	Social Geography							
8.		**Elective – Practical**	ECC						
	GEO D01	Project Work		6	0	0	9	4	
		Total Credit		**36**					

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III SEMESTER

***Paper code: Geo 301: Advanced Geography of India**

Section A

Geological structure and its relation with distribution of minerals, physiographic divisions; climate - various seasons and weather associated with these seasons, mechanism ofIndian monsoon, major climatic regions; soil: characteristics, distribution and major soil regions; drainage system and watersheds.

Section B

Resource potential and evaluation, water resources & Multi-purpose irrigational projects, vegetational resources, agriculture: typology, major crops, changing pattern of crops and green revolution, animal resources, mineral resources, human resources & population policies.

Section C

Resources development and utilization: power, industries and transport, river basins of India, riverine problems of sharing water and their planning, industrial regions and economic regions of India, regional problems.

Recommended Readings:

Bansil, B.C. 1975: Agricultural Problems in India, Delhi.

Deshpande, C.D. 1992: India-A Regional Interpretation. Northen Book Centre, New Delhi.

Gopal Krishnan, R. 2001: Geography of India. Jawaher Publishers & Distributions, New Delhi.

Govt. of India: National Atlas of India, NATMO Publication, Calcutta.

Govt. of India 1965: The Gazetteer of India, Vol. I & II Publication Division, New Delhi.

India 2004, Ministry of Information and Broad Casting. Govt. of India, New Delhi.

Khullar, D.R. 2006: India a comprehensive Geography. Kalyani Publishers, New Delhi.

Krishna, D. 1971: The New Agricultural Strategy. Delhi.

Kurdue, A. & Raza, Moonis: Indian Economy the Regional Dimension.

मलैरिया, सी. 1999: आधुनिक भारत का वृहत् भूगोल। साहित्य भवन पब्लिकेशन्स, आगरा।

Mahesh Chand and V.V. Puri, Regional Planning in India.

Md. Noor., Perspectives in Agricultural Geography. New Delhi.

Misra, R.P., Regional Planning: Concepts, Techniques and Policies

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Paper Code: Geo 302: Fundamentals of Natural Hazards and Disaster Management

Section-A

Concept of Hazards, Risk, Vulnerability and Disaster. Types of Hazards : Natural, man-made. Natural Disasters : Floods, drought and desertification, earthquakes, landslides, avalanches, cyclones, forest fires.

Section-B

Regional Dimension of Hazard : Occurrence and trends with special reference to northwest India. Case Studies : Floods in Delhi, Major Fires in Kolkata, Earthquakes in Bhuj, Rail Accidents in India.

Section-C

Disaster Management : Concepts relating to the Pre-disaster phase, emergency phase, post-disaster phase. Disaster Management Mechanism in India : Agencies, Plans and Policies.

Recommended Readings :

Allan, S., Adam, B. and Carter, C. (eds.) (2000), Environmental Risks and the Media, Routledge, London.

Ambala-Bertrand, J.M. (1993), Political Economy of Large Natural Disasters : With Special Reference to Developing Countries, Clarendon Press, Oxford.

Blaikie, P and Others (1994), At Risk : Natural Hazards, People's Vulnerability and Disasters, Routledge, London.

Burton, I., Kates, R.W. and White, G.F. (1993), Environment as Hazard, 2nd edition, Guilford Press, New York.

Hewitt K. (1997), Regions of Risk : A Geographical Introduction to Disasters, Longman, London.

Kasperson, J.X., Kasperson, R.E. and Turner, B. L. (1995), Regions at Risk : Comparisons of Threatened Environments, United Nation University Press, Tokyo.

Mitchell, J.K. (ed.), (1999), Crucibles of Hazard : Mega-Cities and Disasters in Transition, United Nations University Press, New York.

Quarantelli, E.L. (ed.), (1998), What is a Disaster? Perspective on the Question, Routledge, London.

Schneid, T. and Collins, L. (1998), Disaster Management and Preparedness, Lewis Publishers, Washington, D.C.

Godschalk, D.R. et.al. (1999), Natural Hazard Mitigation: Recasting Disaster Policy and Planning, Island Press, Washington, D.C.

Paraswamam, S. and Umikrishnan, P.V. (2000), India : Disaster Report, Oxford University Press, New Delhi.

Kapur, Anu and Others (2005), Disasters in India : Studies of Grim Reality, Rawat, Jaipur.

Gupta, M.C., Gupta, L.C., Tamini, B.K., Sharma, Vinod, K. (2000), Manual on Natural Disaster Management in India, National Disaster Management Centre, New Delhi.

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University of Rajasthan
JAIPUR

Paper Code: Geo 303: Urban Geography

Section A

Meaning, aims, importance and scope of urban geography, factors affecting recent trends the growth of town cities different historical periods during neolithic period, greek and roman period. dark ages, medieval period renaissance period, industrial revolution. and modern times, chief characteristics of the towns, trends of urbanisation in the world, urbanisation in india since 1901 and its problems, definitions of urban centres, chief characteristics of modern town, city conurbation metropolian and megalopolis, spatial pattern and distribution of urban centres origin and evolution of urban settlement, types of cities-central placed, urban transportation.

Section B

Functions and functional classification of towns, urban rank-size relationship, concept of urban economic functions and its urban hierarchy based on functions law of promate city, urban morphology, unplanned growth of towns, urban master plans, morphology of indian cities, functional structure of towns, characteristics of C.B.C. residential area, and other functional areas central place theory (christaller and losch) and models of urban structure theori of urban structure (burgess, hoyt, harris & ullman, mann, white).

Section C

Centrifugal and centripetal forces in urban geography. development of suburbs, rural, urban fringe, satellite towns, ring towns, sphere of urbac influence (umland) and its delimitation control of urban problems: environmental, urban poverty, slums, transportation, housing, crime, principles of town planning, preparation of a master plan, study of master plan of Jaipur city, principles of regional planning.

Recommended Readings:

A.E. Smailes: The Geography of Towns. Hutchinson, University Library, London.
Abercrombie: Town and Country-Planning. Oxford University Press, London.
बंसल, एस.सी. 2010: नगरीय भूगोल, मीनाक्षी प्रकाशन, मेरठ।
Carter, Harold 1995: The Study of Urban Geography, Arnold (Publisher) Pvt. Ltd., London.
Dickinson, R.E.: City Region and Regionalism. Routleged and Kegon Paul London.
Herrold M. Mayer: Readings in Urban Geography, Central Book Depot, Allahabad.
N.V. Sovani: Urbanization and Urban India. Asia publishing House, Bombay.
P.C. Malhotra: Survey of Bhopal City and Bairagarh (Asia publishing Bombay)
R.L. Singh: Banglore as Urban Survey. National Geographical Society of India, B.H.U., Varansi.
Shah Manzoor Alam: Hyderabad and Secuderabad, Twin City Studies in Urban Geography. Allied Published, Delhi.
Singh, R.L.: Banars A study in Urban Geography. Student Friends, Allahabad.
Toylor G.: Urban Geography. Muthuen and Co., London.
V.K.R.V. Rao: Socio-Economic survey of Greater Delhi. Asia Publishing Bombay.
V.L.S. Prakash Rao: T Gowns of Mysore state. Statistical Publishing House, Calcutta.

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Paper code: Geo 311: Geography Practicals

Minimum Marks: 36	Bifurcation of marks	Max. Marks: 100
Written Test on Lab. Work (4 Questions)	48	4 hours
Record Work & Viva-Voce.	20+12	
Internal Assessment	20	
Total	100	

N.B. In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

Methods and techniques of representation of relief: methods and techniques of depicting relief Profile, gradients and calculation of slope, Block diagrams, field sketching, hypsographic curves, altimetric frequency graphs.

Section B

Interpretation of topographical maps: a brief history of topographical maps of the world with special reference to India and their interpretation, detailed study of such topographical sheets which depict typical geomorphological and cultural landscapes, scanning and digitization of maps (Raster- Vector Image).

Section C

Calculation of scale, number of runs/strips and aerial photographs in a strip, knowledge of stereoscopic vision and use of stereoscope, Air photo interpretation and exercise on the determination of height on Air photo using Parallax Bar.

Recommended Readings:

Robinson, A.H. et al. 2004: Elements of Cartography. John Wiley & Sons, Inc., New York.
Singh, R.L. and Singh RPB 1991: Elements of Practical Geography. Kalyani Publishers, New. Delhi.
Rampal, K.K. 1993: Mapping and Conflation: Methods and Techniques. Concept Publishing Company, New Delhi.
Monkhouse, F.J. and Wilkinson, H.R. 1971: Maps and Diagrams. Methuem, London.
Sharma, J.P. 2011: Practical Geography. Rastogi Publications, Meerut.
Tiwari, R.C. 2009: Practical Geography. Prayag Pustak Bhawan, Allahabad.

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Paper Code: Geo A01: Research Methodology

Section A

Research: meaning, objectives, significance, types of research, research approaches, problems of geographical research, relevant and applied research, hypothesis and its basic concepts, testing of hypothesis, models and paradigm, formulation of research proposal and research design, types of research projects and report writing.

Section B

Sources of data, methods of data collection, processing, analysis and results, observation and interview questionnaire and field schedule, sampling theory, sample size, sampling techniques, selected techniques of spatial analysis, concentration and dispersal of economic activities, interaction theories, scaling techniques, measurements of disparities and inequalities, methods of delimitation of economic, industrial, agricultural and planning regions.

Section C

Regional population analysis, population projections, network analysis, delimiting sphere of city influence, core and marginal area, morphometric analysis, drainage basin analysis and slope analysis, biogeochemical cycles, integrated, area development planning, use of software for quantitative geographical analysis, introduction to remote sensing and geographical information system in land use analysis.

Recommended Readings:

आहूजा,राम 2010: सामाजिक अनुसंधान। रावत पब्लिकेशन्स, नई दिल्ली।

जी.डी. चौनियाल 2006: सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली। शारदा पुस्तक भवन, इलाहाबाद।

Guthrie, G. 2010: Basic Research Methods-An Entry to Social Science Research. SAGE Publications, India Pvt Ltd., New Delhi.

Gupta, S.P. 1979: Statistical Methods. Sultan Chand & Sons, New Delhi.

Harvey, D. 1969: Explanation in Geography. Arnold Heinemann, London.

Har Prasad 1992: Research Methods and Techniques in Geography. Rawat Publication, Jaipur.

K.R. Sharma 2004: Research Methodology. National Publishing House, Jaipur.

Kothari, C.R. 1990: Research Methodology--Methods and Techniques. Wishwa Prakashan, New Delhi

Misra, H.N. and Singh, V.P. 1998: Research Methodology in Geography. Rawat Publication, Jaipur.

Mahmood, A. 1998: Statistical Methods in Geographical Studies. Rajesh Publication, New Delhi.

Mishra, R.P. 1989: Research Methodology. Concept Publishing Company, New Delhi.

Pal, S.K. 1998: Statistics for Geoscientists – Techniques and Applications. Concept Publishing Company, New Delhi.

Sharma, P.R. and Yadav, R.S. 2011: Research Methodology: Concepts and Studies. R.K. Books, New Delhi.

श्रीवास्तव एवं प्रसाद 2008: भूगोल की सांख्यिकी विधियाँ। पब्लिशिंग प्रकाशन, गोरखपुर।

नरेन्द्र प्रसाद शर्मा 2001: रिसर्च मैथोडोलोजी। पंचशील प्रकाशन, फिल्म कॉलोनी, चौड़ा रास्ता, जयपुर।

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Paper Code: Geo A02: Political Geography

Section A

Definition, scope nature and importance of political geography: its relation with other social sciences, history and development of political geography: pre-modern phase (before 19th Century), geopolitics and German school of thought. Global strategic views: views of Mackinder, Spykman, Mehring, Hooson, De Seversky, World's geostrategic regions, types of approaches, trends of politics in the world modern phase (19th to 2000 AD).

Section B

State and nation, idea of state: elements of the state: territory, population, organization and power, concept of nation, nationalism, heart of the state: core areas, the focus: capital city, frontiers and boundaries: definitions, classification and concepts, boundaries as economic barriers, Indias, borders and their problems, buffer zones, the concept of territorial sea and maritime boundaries ,landlocked states: problem of access, growth of nations and disintegration of empires: unitary and federal states, the dying colonialism and resurgent nationalism, supernationalism: form state of blocks.

Section C

Extending dimensions of political geography, politics and transportation, geography of foreign aid & economic development, emergence of third world block, politico-geographical study of india, political geography of administration, politico-geographical implications of space research, function, methods and trends of electrol geography: voter's participation before voting prediction, conceptual model of the voting decision, operationalisation of conceptual decision, garrymendering in relation to India.

Recommended Readings:

Adhikari, S. 2004: Political Geography. Rawat Publications, Jaipur.

Alexander I.M. 1966: World Political Patterns. John Murray and Co., London.

De Blij, H.J. and Glassner, Martin 1968: Systematic Political Geography. John Willey, New York.

Deshpande, C.D. 1992: India- A Regional Interpretation. Northern Book Centre, New Delhi.

Dikshit R.D. 1982: Political Geography: A Contemporary Perspective. Tata McGraw-Hill Publishing Co., New Delhi.

East, W.G. and Spate, O.H.K. 1966: The Changing Map of Asia. Methuen, London.

Fellmann, J. Getis, A. and Getis, J. 1995: Human Geography: Landscapes of Human Settlements. WCB Brown Publishers, Dubuque.

Guha, J.L. and Chattorij, P.R.: A New Approach to Economic Geography. World Press, Kolkata.

Pounds, N.J.G. 1972: Political Geography. McGraw Hill, New York.

Short, J.R. 1982: Political Geography of the 20th Centaury A Global Analysis. New York.

सक्सेना, एच.एम.: राजनैतिक भूगोल के सिद्धान्त। रस्तोगी पब्लिकेशन्स।

Taylor, P. 1985: Political Geography. Longman, London.

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Paper Code: Geo B01: Advanced Geomorphology

Section A

Fundamental concepts of geomorphology; schools in geomorphology, recent trends in geomorphology, earth movements: epeirogenic, orogenetic types and classification of weathering, mass movement erosion. plate tectonics, seismicity, vulcanicity, orogenic structures with reference to the evolution of Himalaya, various models of landscape evolution (Davis, Penck, King, Hacks, Morisawa, Schumn, polycylic evolution of landscapes.

Section B

Geomorphic processes, dynamics of fluvial, glacial, Aeolian, marine, and karst processes and resultant landforms. polycylic landforms, various models of slope development (Wood. Davis.- Penck. King. R. Savigear, Strahler, Fisher-Lehmann, Young), concept of morphogenetic region. Systems in geomorphology; Models in geomorphology, erosion surfaces-techniques of identification and correlation.

Section C

Terrain evaluation, geomorphic mapping. geomorphic hazards and mitigation measures; Digital Elevation Model (DEM) and Triangulated Irregular Network (TIN) unit, land capability and land suitability classification, hydro-geomorphology, urban geomorphology, environmental geomorphology, geomorphic hazards.

Recommended Readings:

Ahmed, E. 1985. Geomorphology. Kalyani Publishers, New Delhi.
Bloom, A. L. 1998/2001: Geomorphology. Prentice Hall of India, New Delhi.
Chorley, R.J., Schumm S A and Sugden D E. 1984: Geomorphology. Methuen and Company Ltd., London
Cooke, R.U. and Doornkamp, J.C. 1974: Geomorphology in Environmental Management-A introduction. Clarendon Press, Oxford.
Chorley, R.J. 1972 Spatial Analysis in Geomorphology. Methuen, London.
Dayal, P. 1994: A Text Book of Geomorphology. Kalyani Publishers, New Delhi.
Dury, G.H. 1959: The Face of the Earth. Penguin Harmondsworth.
Fairbridge, R.W. 1986: Encyclopedia of Geomorphology. Reinhodts, New York.
Goudie, A. 1995: The Nature of the Environment. Oxford & Blackwell, London.
Garner, H.F. 1974: The origin of landscape-A Synthesis of Geomorphology. Oxford University Press, London.
Jog, S. R. (ed.) 1995: Indian Geomorphology (2 vols.). Rawat Publications, Jaipur.
Kale, V. and Gupta, A. 2001: Introduction to Geomorphology. Orient Longman, Hyderabad.
Mitchell, C.W. 1973: Terrain Evaluation. Longman, London.
Ollier, C.D. 1979: Weathering Longman. London.
Pitty, A.F. 1971: Introduction to Geomorphology. Methuen, London.
Singh, S. 2004: Geomorphology. Prayag Pustak Bhawan, Allahabad.
Stoddart, D.R. (ed) 1996: Process and Form in Geomorphology. Routledge, New York.
Sparks, B.W. 1986: Geomorphology. Longmans, London.
Thornbury, W.D. 2005: Principles of Geomorphology. John Wiley and Sons, New York.
Thornbury, W.D. 1960: Principles of Geomorphology, John Wiley, New York.

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Paper Code: Geo B02: Contemporary Issues in Human Geography

Section-A

Human Geography : Changing nature or perspectives, issues and debates, critical understanding of social theory and human geography. Conceptualizing Space and Place : Structure and dynamics of space; relational framework of space and place; social construction of space and time; ethics of space and place.

Section-B

Geography of Difference and Exclusion : Geographies of identity and difference related to class, religion, caste, gender and location: social justice and political geography of difference. Geographical Organisation of Power : Spatial meaning and definitions of power; dynamics of spatio-social interactions and power; geopolitics of power-territoriality and globalization.

Section-C

Geography of Development : Meaning, definitions and approaches; construction of development indicators; linking globalisation and new forms of development; local initiatives towards development. Geography of social action and movements : Reasons and approaches to social movements; aspects of social security; social-environmental movements in India.

Recommended Readings :

Agnew, J.A. and Corbridge, S. (1995), Mastering Space : Hegemony, Territory and International Political Economy, Routledge, London.
Benko, G. and Strohmayer, U. (1997), Space and Social Theory : Interpreting Modernity and Postmodernity, Blackwell Publishers, Oxford, London.
Bhabha, H. (1994), The Location of Culture, Routledge, London and New York.
Corbridge, S., Martin, R. and Thrift, N. (1997), Money, Power and Space, Blackwell, Oxford.
Derek, G., Martin, R., and Smith, G. (1994), Human Geography : Society, Space and Social Science, Macmillan Publishers, Cambridge.
Johnston, R.J. (1991), A Question of Place : Exploring the Practice of Human Geography, Blackwell Publishers, Cambridge.
Harvey, D. (1996), Justice, Nature and Geography of Difference, Blackwell Publishers, Cambridge.
Massey, D. (1998), Space, Place and Gender, Polity Press, Cambridge.
Massey, D., Allen, J., and Sarre, P. (1999), Human Geography Today, Blackwell Publishers, Cambridge.
Morley, D. and Robins, K. (1995), Spaces of Identity : Global Media, Electronic Landscapes and Cultural Boundaries, Routledge, London.
Redcliff, M., and Benton, T. (1994), Social Theory and Global Environment, Routledge, London and New York.
Rogers, A. and Vertovec, S. (1995), The Urban Context, Berg, Oxford.
Sack, R.D. (1997), Homo Geographicus : A Framework for Action, Awareness, and Moral Concern, The John Hopkins University Press, London.
Sibley, D. (1995), Geographies of Exclusion : Society, and Difference in the West, Routledge, London.
Werlen, B. (1993), Society, Action and Space : An Alternative Human Geography, Routledge, London

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Paper Code: Geo C01: Marketing Geography

Section-A

Marketing Geography: Definition, scope and significance. Growth and development. Approaches of study: Commodity, Spatial, Social, Economic, Behavioural. Application of Planning: Market, Urban, Agriculture.

Section-B

Markets: Classification, structure and hierarchy, Markets participants, Market Channel and Trade Area, Theoretical Framework for Study of Market Centres: Christaller and Losch Model of Market Locations; B.J. Berry's Model and Reilly's Models of interaction and trade area delimitation.

Trade, Classification and structure: Local, Regional, National, and International. Historical Development of Trade, Factors of Development of Trades.

Section-C

Indian Agricultural Marketing: Definition, Types and Structure, Formal Marketing: Regulated, Government Purchase Centres. Informal Marketing: Local, Regional, Private Traders, Processing Units. Marketing Channels, Foodgrains and Vegetables, WTO and Agricultural Marketing: Its impact on agriculture, environment, Food Security and Society.

Recommended Readings:

Acharya, S.S & Agarwal, N.L (1987) Agricultural Marketing in India, Oxford & IHB Publishing Co, New Delhi.

Berry, B.J.L. (1967) Geography of Market centers and Retail Distribution. Prentice Hall, Englewood cliffs, N.J

Davis, R.L. (1976) Marketing Geography, .Methuen, London,

Dixit, R.S. (1984) Marketing Centers and their spatial development in the Umland of Kanpur, Allahabad

Garnier, B, J and Delobez. A (1977) Geography of Marketing, Longman, London.

Khan.N (1991) Agriculture development and Marketing, H.K. Publisher, New Delhi

Losch, A (1 954) Economics of Location. Yale University press, New Heaven,

N.C.A.E.R (1983) Market towns and Spatial Development in India, NCAER, N.D.

Saxena, H.M (1984) Geography of Marketing. Concepts and Methods, New Delhi.

Saxena, P. Marketing and Sustainable Development. Rawat Publication, New Delh

Singh, G.N. (1987) Agricultural Marketing in India. Hugh Publication, Allahbad.

Rajgopal (2001) Rural Marketing. Rawat Publication, New Delhi

Dy. Registrar (Acad.)
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Jaipur

Paper Code: Geo C02: Social Geography

Section-A

Definition, nature and scope of social geography. Social geography in the realm of social sciences. Concepts and themes in social geography : Social space. Social segregation. Social justice. Social well-being. Ethnicity.

Section-B

Evolution of socio-cultural regions in India : Evidence from classical literature. Core and peripheral regions. Attributes of spatial distribution of : Tribes. Religion. Language. Caste.

Section-C

Social transformation and change in India : Modernization and sanskritization. Role of rural-urban interaction. Problems of social transformation. Social and ethnic diversity of India and national integration. Cultural pluralism and development.

Recommended Readings :

Ahmad, Aijazuddin : Social Geography, Rawat Publications, New Delhi, 1999.
Jones, Emrys and John Eyles : An Introduction to Social Geography, Oxford University Press, London, 1977.
Jones, Emrys (ed.) : Readings in Social Geography, Oxford University Press, London, 1975.
Khare, R.S. : Cultural Diversity and Social Discontent, Sage India, New Delhi, Sage India, 1998.
Mandelbaum, David G. : Society in India, University of California Press, Berkley, 1970.
Rao, M.S.A. : Urbanisation and Social Change, Orient Longmans, New Delhi, 1970.
Sareer, T.R. and S.R. (ed.) : Castes and Tribes of India, Anmol, New Delhi, 1993.
Singer, Milton and B.S. Cohn (ed.) : Structure and Change in Indian Society, Aldine, Chicago, 1968.
Singh, K.S. : Tribal Situation in India, Indian Institute of Advanced Studies, Shimla, 1972.
Sopher, David E. : An Exploration of India, Longman, London, 1980.
Srinivas, M.N. : Social Change in Modern India, Orient Longman, 1966.
Srinivas, M.N. (ed.) : Caste : Its Twentieth Century Avatar, Penguin India, New Delhi, 1997.
Atreya, B.L. et al. (ed.) : Indian Culture, Universal Publications, New Delhi, 1956.
Dubey, S.C. : Indian Society, National Book Trust, New Delhi, 1991.
Sen, Amartya, and Dreze Jean : Indian Development : Selected Regional Perspectives, Oxford Univers ty Press. Delhi, 1996.

Paper Code: Geo D01: Project Work

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M.A. / M.SC. GEOGRAPHY
IV Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EOSE Duration (Hrs.)	
					L	T	P	THY	P
1.	Geo 401	Geography of Rajasthan	CCC	4	3	1	0	3	
2.	Geo 402	Agricultural Geography	CCC	4	3	1	0	3	
3.	Geo 403	Applied Geography	CCC	4	3	1	0	3	
4.	Geo 411	Practical	CCC	6	0	0	9	4	
5.		**Elective – I**	ECC	4	3	1	0	3	
	GEO A01	Bio.Geography							
	GEO A02	Industrial Geography							
6.		**Elective – II**	ECC	4	3	1	0	3	
	GEO B01	Regional Planning and Development							
	GEO B02	Geography of Water Resources							
7.		**Elective – III**	ECC	4	3	1	0	3	
	GEO C01	Oceanography							
	GEO C02	Principles and Applications of Remote Sensing and Geographical Information System							
8.		**Elective – Practical**	ECC						
	GEO D01	Dissertation		6	0	0	9	4	
		Total Credit		36					

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IV SEMESTER

Paper Code: Geo 401: Geography of Rajasthan

Section-A

Physical aspects of rajasthan: geological structure, relief, climate, drainage, natural vegetation, environmental pollution-causes and types, drought, desertification, soils, soil erosion and conservation ,availability, problems and conservation of water resources.

Section B

Economics aspects: irrigation, sources, types, irrigation intensity, crop wise irrigation, quality of irrigation water, problems, irrigation projects: detailed study of Indira Gandhi canal project, Chambal valley project, Mahi bajaj sagar project on physical and socio-economic aspects.

Agriculture: development under five year plans, problems of agriculture development, general land use: live-stock and dairy development, minerals, industries: textile, sugar, cement, marble and granite, fertilizer, zinc and copper smelting, power & energy: hydro-electricity, coal, petroleum, solar energy, bio-energy, transport &trade, development of tourism, desert development programme, tribal areas development programme, Aravali hill development programme.

Section C

Cultural and development aspects: population-number, growth, distribution and density, rural and urban, male and female population, literacy status, occupational structure, schedule castes and schedule tribes, population problems, study of Bhil, Meena and Garasia, settlement types, building materials and house types and factors affecting settlements in Rajasthan.

Recommended Readings :

Bhalla L.R. 1996-97: Geography of Rajasthan. Kuldeep Publications, Ajmer.

Dhillariya, S.S. 1988: Desert Spread and Desertification. Environmentals, Jaipur.

Govt. of Rajasthan Techno-Economics Survey Of Rajasthan. Govt. of Rajasthan Publication.

Gujar, R.K 1992: Geography of Indira Gandhi Canal. Rajasthan Hindi Granth Academy.

Lodha, R. & Maheshwari, D. 2001: Geography of Rajasthan. Shahitya Bhawan Publication, Hospital Road, Agra.

Maheswari, D. 2008: Geography of Rajasthan. Shahitya Bhawan Publication, Hospital Road, Agra.

Mishra,V.C. 1967: Geography of Rajasthan. National book trust of India, New Delhi.

Sharma H.S. and M.L. Sharma 2014: Geography of Rajasthan. Panchsil Puplisher,Jaipur.

Singh, Attar 1992: Flood Prone Areas of India. Aviskar Publishers Jaipur.

Sharma B.L. 1984: Agricultural Typology of Rajasthan.

Sing, R.L. 1977: Regional Geography of India.

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JAIPUR

Paper Code: Geo 402: Agricultural Geography (Elements & Applied)

Section A

Agriculture geography: nature and development, origin dispersal and development of agriculture, field survey and mapping in agriculture geography, geographical determinants of agricultural land use: relief and climate, soils, human determinants of agriculture.

Section B

Models in agricultural geography, diffusion of agriculture innovations, land use and land capability classification, agricultural efficiency productivity, agricultural evaluation, techniques, crop ranking intensity, crop diversification and crop combination regions.

Section C

Agricultural regionalization, agricultural typology, green revolution, agricultural scenario in India, agro-climatic zones: India and Rajasthan, agricultural policy in India.

Recommended Readings:

Ali Mohammad 1981: Situation of Agricultural Geography. Rajesh Publication, New Delhi.
Ali Mohammad : Situation of Agricultural, Food and Nutrition in Rural India. Concept Publishing Co., Delhi.
Ali Mohammad : Synamics of agriculture Development in India. Concept Publication Co., Delhi.
ICAR (1956-71): Soil and Water Conservation Research.
ICAR : Soil Conservation of India.
Kostowickie, Z. : Agricultural Typology. Polish Academy, Warsaw.
Symon Lesin 1967: Agricultural Geography. G. Gell and Sons Ltd., London.
Singh, R.L. (Ed.) : Applied Geography. BHU Press, Varanasi.
Singh P.P. Govind Raju, K.C. and others : new Seeds Adoption and Yield, Sterling Publication Pvt. Ltd., New Delhi.
Singh, Jasbir : Agricultural Atlas of India. vishal Publishers.
Singh, Jasbir : Agricultural Geography of Haryana.
Noor Mohammad : Agricultural Land use in India. Inter-India Public, Delhi.

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Paper Code: Geo 403: Applied Geography

Section A

Meaning, nature and scope, principles and approaches, application of geographical methods of survey and geospatial tools in analysis of resource base, its appraisal, micro regional planning and demographic attributes.

Section B

Delineation of resource regions, regional divisions according to variations in levels of socio-economic development, special purpose regions-river valley regions, national capital region, problem regions- hilly regions, tribal regions, regions of drought and floods.

Section C

Planning for a region's development, state capital region (Jaipur), indicators of development and their data sources, measuring levels of regional development and disparities-case study of Rajasthan, land use policy implications in India with special reference to India, review of policies related to decentralized planning formulation at national, state, district, block and grass root level.

Recommended Readings:

Bhat, L.S. et al 1976: Micro-Level planning: A Case Study of Karnal Area, Haryana, K.B. Publications, New Delhi.

Blair, J. P. and Carroll, M. C. 2009: Local Economic Development – Analysis, Practices, and Globalization. SECOND EDITION, SAGE PUBLICATIONS, INC.

Chandna, R. C. 2008: Regional Planning and Development. Kalyani Publishers, Ludhiana.

Dutta, A.K., Mishra, H.N. and Chatterjee, M. 2008 (eds.): Explorations in Applied Geography. Printice-Hall of India Private Limited, New Delhi.

Friedmann, J. 1992: Empowerment: The Politics of Alternative Development. Blackwell, Oxford.

Gosal, G.S. and Krishan, G. 1984: Regional Disparities in Levels of Socio-Economic Development in Punjab. Vishal Publications, Kurukshetra.

Gupta, P., and Sdasyuk, G. 1968: Economic Regionalization of India: Problems and Prospects. Census of India, New Delhi.

Johnson, E.A.J. 1970: The Organisation of Space in Developing Countries. Harvard University Press, Cambridge.

Kundu, A. and Raza, M. 1982: Indian Economy, The Regional Dimension. Spectrum Publishers, New Delhi.

Misra, R. P. (ed.) 1992: Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publishing Company., New Delhi.

Nangia, S. 1976: Delhi Metropolitan Region. Rajesh Publication, Delhi.

Pacione, M. 2009 (ed.): Applied Geography: Principles and Practice. Routledge, London.

Pathak, C. R. 2003: Spatial Structure and Processes of Development in India. Regional Science Association., Kolkata.

Raza, M. 1988: Contributions to Indian Geography. Volume X, Regional Development. Heritage Publishers, New Delhi.

श्रीवास्तव, वी.के. 1997: प्रादेशिक नियोजन और सामुदायिक विकास। बसुन्धरा प्रकाशन, गोरखपुर।

Sundaram, K. V. 2004: The Trodden Path: Essays on Regional and Micro Level Planning. Anamaya Publications., New Delhi.

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Paper Code: Geo 411: Practical

Minimum Marks 36	Bifurcation of Marks	Max. Marks 100
Written Test (Four Hours)	32 Marks	
Record Work and Viva-Voce.	12+04	
Field Survey and Viva-Voce. 2 hours	12+04	
Camp Work and Viva-Voce.	12+04	
Internal Assessment	20	
Total	100 Marks	

N.B. In written test there shall be 2 questions from each section. Candidates have to answer 4 questions selecting at least one question from each section. All questions carry equal marks. Examination be conducted in batches of not more than 20 candidates in any case. 12 hours of teaching practicals be provided for a batch of 20 students per week.

SYLLABUS

Section A

The art of surveying, history of surveying, scope and utility, problems and classification of surveying, use of plane table survey, types of traversing, resectioning in plane table survey: two and three point problems, use of Indian pattern clinometer.

Section B

Use of dumpy level, practical contouring cross sectioning, use and application of abeny level, theodolite: its parts and their functions, use, traverse and traverse computation, independent coordinates.

Section C

Use of total station and GPS, interpretation and identification of cultural and physical features on aerial photographs, photo interpretation of land use and settlements in the field.

Camp Work: A topographical survey of about 100 hectares in a settlement for one week away from the headquarter of the institution. Survey reports of the same will be prepared with the help of computer technology (word programme & AutoCAD). The marking on the survey report will be awarded by the external examiner in consultation with the internal examiner concerned.

Recommended Reading:

B.C. Punmia 1988: Surveying and Field Work. Vol. I, Laxmi Publications, New Delhi.
Breed. C.B. and Hosmer, G.L.: The Principle of Surveying. Vol.I and II, New York.
Devis, R.E. and Foot, F.S.: Surveying theory and practice. Mc-Graw Hill Book Co., New York.
Gautam, N.C.: Urban Land use studies through Airphoto Interpretation .
Roorke Engineering College: Mannual of Surveying.
T.R.Tracy: Surveying theory and practice. John Willey and Sons, Inc., New York.
Thrilfall, H.S., A.: Text Book of surveying and Levelling. Charles Graffiin, London.
Techniques: Pink Publishing House, Mathura.

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Paper Code: Geo A01: Bio Geography

Section A

Definition, scope and significance nature, approaches, history, recent trends and developments, plant and animal ecology forms and functions of eco system, ecosystem with special reference to mountain and desert factors influencing distribution of flora, taxounomical and ecological classification of plant, ecological succession, ecotone and community, patterns of distribution of world vegetation.

Section B

Nature and classification of animals, dispersal and migration of animals: type and causes – case studies, geographical isolation, the zoo-geographical region, biogeography of the seas: island biogeography.

Section C

Conservation and management of forest and wild life with reference to India, process of desertification, its consequences and management principals, projecting into the future: climate change: biogeographical consequesces of global change: changing communities and biomes, effect of climate change on biological diversity, environmental hazards and problems of pollutions.

Recommended Readings:

Anjuneyulu, Y. 2002: Environmental Impact Assessment Methodologies. B.S. Publications, Hyderabad.

Anjuneyulu, Y 2004: Introduction to Environmental Science. B.S. Publications, Hyderabad

Benjkie, P. Carmon, T. and Davis, I (eds.) 2004: At Risk: Natural Hazards Peoples Vulnerability and Disasters Routtedge, London.

Clarke, J.I. Curson, P. Kayastha, S.L and Nag, P. (eds.) 1991: Population and Disaster. Basil Blackwell, U.S.A.

Cox, C.B. Moore, P.D. 2010: Biogeography- An Ecological and Evolutionary Approach. Johnwiley and Sous, U.S.A.

Huggett, R.J. 1998: Fundamental of Biogeography. Routledge, London.

Ladle, R.J. and Whittaker, R.J. 2011: Conservation Biology. Blackwell Publications Co., U.S.A.

Mathur, H.S. 1988: Essentials of Biogeography. Pointer Publishers, Jaipur.

Macdonald, Geen, 2002: Biogeography: Introduction to Space-Time and Life. John Wiley, New York.

Odum, E.P. 1975: Ecology, Rowman and Littlefield. Lanhan U.S.A.

Robinson,H. 1982:Biogeography. Eles,Mc.Donald and Evans London.

Singh, A.K., Kamra, V.K. and Singh, J. 1986: Forest Resource: Economy and Environment. Concept Publishing Company, New Delhi.

सिंह, एस. 2013: जैव भूगोल। प्रयाग पुस्तक भवन, इलाहाबाद।

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Paper Code: Geo A02: Industrial Geography

Section A

Evolution of industrialization (India and World), location factors of industries, theories: least cost school, transport cost school, market areas school, marginal location school and behavioural school, new trends in industrial geography, concept of entrepreneur, significance of enterprise and firm, significance of cost and price.

Section B

Formation and delineation of industrial regions, industrial complexes, industrial regionalization, industrial regions in India: Hooghly side industrial regions, Damodar valley industrial regions, Delhi-Mumbai industrial corridor, industrial policies of India, liberalization, privatization and globalization (special reference of India); special economic zones, industrial regions of World: Ruhr basin industrial region, Great lakes industrial region.

Section C

Industries: cotton, jute, textile, iron and steel, aluminium, fertilizer, paper and pulp, copper, chemical and pharmaceutical, ship building, automobile, cottage and agro-based industries, tourism industry, concept of optimum location, geographical inertia, multi-location industries, market oriented industries, foot loose industries, raw material oriented industries, manufacturing industries, processing industries.

Recommended Readings:

Lloyd and Dicken: Location in Space: A theoretical Approach to Economic Geography.

M.C Carr and Lindberg Hodder and Lee Economic Geography: A preface to Economic Geography

Smith, D.E. Cox K.P. Man: Industrial Location. A Economic, Geographical Analysis Location and Behavior-An Introduction to Human Geography.

Riley, R.C. 1973: Industrial Geography. Chalto and windus, London.

Bengston, N.A.: Fundamentals of Economic Geography. Prentice Hall, New York.

Besoh, H.: A Geography of world Economy, D. Van Noetrand.

Britton, John. N.H.: Regional Analysis and Economic Geography. G. Bell and Sons, London.

Estall, R.C. and Buchanan, R.O.: Industrial Activity and Economic Geography. Hutchinson and Co., London.

Ghose, B.C.: Industrial London.

Hoover, E.M.: The Location of Economic Activity. McGraw Hill Books Co. New York.

Saxena, Economic Geography.

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Paper Code: Geo B01: Regional Planning and Development

Section A

Conceptual and theoretical framework of regional planning, principles and determination of regional planning, multi-level planning and inter-regional stresses, regional hierarchy, role of geography in preparation of a regional plan, significance of the term integration (political, economic and spatial) for regional planning.

Section B

The process of regional development: indicators of development; levels of regional development and disparities, strategies for development. regional planning in India: concept and indicators of development; regional imbalances; type of regions and methods of regionalization, growth pole and growth centers, environmental issues in regional planning for sustainable development, demarcation and planning regions of India.

Section C

Role of remote sensing, global positioning systems (GPS) and geographic information system (GIS) in modern regional planning, case studies from selected countries: regional planning in USA (TVA), regional planning in India (DVC and NCR) regional planning in Netherlands, Principles of town and country planning.

Recommended Readings:

Dube K. N. (ed) 1990: Planning and Development in India. Asia Publishing House, New Delhi.

Govt. of India 1986: Regional Plan 2001 - National Capital Region. NCRPB, Ministry of Urban Development, New Delhi.

Bhat, L. S. 1973: Regional Planning in India. Statistical Publishing Society, Kolkata.

Blair, J. P. and Carroll, M. C. 2009: Local Economic Development - Analysis, Practices, and Globalization. SECOND EDITION, SAGE PUBLICATIONS, INC.

Chandna, R. C. 2008: Regional Planning and Development. Kalyani Publishers, Ludhiria.

Journal of Geography and Regional Planning (JGRP) is an open access.

Hufschmidt, M.M. 1969: Regional Planning: Challenges and Prospectus. Praiger and Company, New York.

Mishra, R.P. 1978: Regional Planning and National Development. Vikas Publications, New Delhi.

Mishra R.P. (ed) 1992: Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publications, New Delhi.

श्रीवास्तव, शर्मा एवं चौहान 2008: प्रादेशिक नियोजन और संतुलित विकास। वसुन्धरा प्रकाशन, गोरखपुर।

www.academia.edu/Papers/in/Economic_Geography

www.jstor.org/stable/143805

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Paper Code: Geo B02: Geography of Water Resources

Section A

Definition and scope of water resource geography, inventory and distribution of world's water resources, water resources of India, groundwater, hydrological cycle, demand and use of water, irrigation methods.

Section B

Salinity, alkalinity, overexploitation of groundwater and arsenic problem, water pollution, river water pollution, demand and water supply in industries, flood management, drought and dry land farming.

Section C

Water conservation/participatory approach, traditional methods of water conservation in India and Rajasthan, integrated basin planning, watershed management, river water disputes, water management by remote sensing technology, environmental disasters and water crisis.

Recommended Readings:

Agarwal, Anil 2001: Drouht: Try Capturing the Rain, Briefing paper, Down to Earth, Centre for Science and Environment, New Delhi.

Agarwal, Anil and Narain Sunita, 1998, (eds.): Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting System, Centre for Science and Environment, New Delhi

Black, Magie, 2005: The No-Nonsense Guide to Water, Rawat Publications, Jaipur.

Black, Magie, 2004: A Matter of Life and Health, OUP, New Delhi.

Barlow and clark Tony, 2002: Blue Gold: The Battle Against Corporate Theft of the World's Water, Earthscan, London

भारती, लक्ष्मीकांत, 1998: भारत की नदियाँ। नेशनल बुक ट्रस्ट ऑफ इण्डिया, नई दिल्ली।

Climate Change, 2001: International Pannel on climate Change, Cambridge University Press.

Clarke, Robin 1991: Water: The International Crisis, Earthscan, London.

Dams and Development 2000: Report of the World Commission on Dams, November.

Das, P.K. 1996: The Monson, National book Trust, India, New Delhi.

Dhruv Narain, V.V., Shastry, C. and Patnaik U.S. 1990: Watershed Management, ICAR, New Delhi

Dakshinamurti, C., Michael, A.M. and Mohan, S., 1972: Water Resources of India and their Utilization in Agriculture, IARI Monograph No. 3, New Delhi.

Gurjar, R.K. 1990: Geographical Perspectives on Irrigation, Rawat Publications, Jaipur.

Goudie, A., 1997: The Nature of the Environment, Blackwell, London.

Kinnersley, David, 1988: Troubled Water: River, Politics and Pollution, Hilten Shipman, London.

Mahnot, S.C. and Singh, P.C., 1993: Soil and Water Conservation, Intercooperation Coordination Office, Jaipur.

Narain, Sunita, 2004: Down to Earth, Febuary 29, 2004.

Park, C., 1997: The Environment: Principles and Application, Routledge, London.

Rao, K.L., 1975: India's Water Wealth, Orient Longman, New Delhi.

Singh, Gopal, 2004: A Geography of India, Atma Ram & Sons, New Delhi.

Shiva, Vandana, 2002: Water Wars: Privatization, Pollution and Profit, Pluto Press, London.

Sun Water Resources Plan, 1998: Volume, I, II, III : Tahal consulting Engineer, Ltd. Tel Aviv, Israel.

Sidhartha, K., 1996: Flood in India: A Model for Generating Pattern, Cepder Patna.

Sidhartha, K., 1989: Drought in India: Spatio Temporal Variations, H.T. Patna.

Singh, R.L., 1971: India: A Regional Geography, NAGI, New Delhi.

World, C., 1997: Refleared in Water A Crisis of Social Responsibility, Cassell London.

Dy. Registrar (Acad.)
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Paper Code: Geo C01: Oceanography

Section - A

Oceanography – nature, scope and development, distribution of land and water, Ocean bottom topography, bottom relief of Pacific, Atlantic and Indian Ocean.

Section - B

Characteristics of Ocean water: temperature – distribution, salinity – composition, source and distribution, density of sea level. Movement of ocean water: currents - causes and character, currents of Atlantic, Indian and Pacific Ocean, Waves, tides and theories of origin.

Section - C

Ocean deposits and coral reefs: sources, types and distribution of ocean deposits, coral reefs –formation, condition of growth, type and theories of origin.

Recommended Readings:

Davis, R.J.A. 1986. Oceanography – An Introduction of the Marine Environment, Win C. Brown, Iowa.

King, C.A., Oceanography for Geographers, Edward Arnold Pub.

Murray, S.J., 1913, Ocean, A General account of the Science of the sea, Thorton Butter Worth, London.

Siddhartha, K. 1999, Oceanography, A Brief Introduction, Kisalaya Pub. Pvt. Ltd., New Delhi..

Singh, S. 2002, Physical Geography, Prayag Pub., Allahabad.

Stahler, A. N. Stahler A.M., 1997, Geography and man's Environment, John Wiley and Sons, New York.

Thurnman, H.V., 1978, Introduction to oceanography, Charles E. Merrill Pub. Co., London.

Weyl, P.K. 1970, Oceanography an Introduction of the Marine Environment, John Wiley and Sons Ltd., London.

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Paper Code: Geo C02: Principles and Applications of Remote Sensing and Geographical Information System

Section A

Remote sensing: definition and scope of remote sensing, elements of remote sensing: electro-magnetic radiation and interaction with earth surface features, data products and users, atmospheric windows, remote sensing systems: platforms, sensors, resolution and radiometric characteristics, elements of image interpretation and keys, types of aerial photographs, aerial cameras types of mosaics, relief displacement and parallax, Satellites: landsat- Mss & Tm, Spot, Noaa-Avhrr, Irs, Modis, Radarsat, Ikonos, Quickbird & Cartosat.

Section B

Digital image processing and classification: pre-processing and image enhancement techniques- rectification and restoration, contrast manipulation, density slicing, spatial filtering and band ratio, classification- supervised and unsupervised, post-classification analysis and accuracy assessment, microwave remote sensing, advantages over optical, unique capabilities of microwave, SAR & SLAR.

Section C

RS applications: mapping and monitoring of land use and land cover, forestry and desertification, soil and water resources, remote sensing and hazard mapping and environmental monitoring, introduction to GIS, fundamentals of GIS- geospatial databases data structure and formats, projections and coordinate system, raster and vector data infrastructure and analysis, integration of remote sensing and GIS.

Recommended Readings:

American society of Photogrammetry1983: Manual of Remote sensing. ASP, Falls Church,V.a..

Barrett E.C. and L.F. Curtis, 1992: Fundamentals of Remote sensing and Air photo Interpretation. Mcmillan, New York.

Compbell J. 1989: Introduction to Remote Sensing. Guilford, New York.

Curran, paul J. 1985: Principles of Remote Sensing. Longman, London.

पुनियाल, जी.सी. 2004: सुदूरसंवेदन तथा भौगोलिक सूचना प्रणाली। सारदा पुस्तक प्रकाशन, इलाहाबाद।

Hord R.M. 1989: Digital Image Processing of Remotely Sensed Data. Academic, New York.

Lilsand, T., Kiefer, R.W. and Chipman. J. 2007: Remote Sensing and Image Interpretation. John wiley & Sons, New York.

Jalan, Seema 2010: Image Processing. Sahityagar, Jaipur.

Luder D. 1959: Aerial photography Interpretation: Principles and Application. McGraw Hill, New York.

Pratt W.K. 1978: Digital Image Processing. John Wiley & Sons, New York.

Rao D.P.(ed.) 1988: Remote Sensing for Earth Resources. Association of Exploration Geophysicist, Hyderabad.

Thomas M. Lillesand and Ralph W. Kefer 1994: Remote Sensing and Image interpretation. John wiley & Sons, New York.

Paper Code: Geo D01: Dissertation

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JAIPUR

GLOBAL P.G. COLLEGE
(Affiliated to University of Rajasthan)
Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Master of Science (Chemistry)

Duration – 2 Years

GLOBAL P.G. COLLEGE
(Affiliated to University of Rajasthan)
Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn both basic and advanced concepts of chemistry, covering physical, organic, inorganic, and analytical chemistry.

PEO2: Students will learn the importance of safety, ethics, and environmental care while conducting chemical research.

PEO3: Students will join knowledge from different subjects together to solve big and difficult problems, and to find good and complete solutions.

PEO4: Students will learn to plan, conduct, and evaluate chemical research projects independently, developing skills as researchers and problem-solvers in chemistry.

PEO5: Students will learn and follow chemical safety rules, lab ethics, and environmental protection practices to work responsibly and safely in laboratories.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will gain a comprehensive understanding of both basic and advanced concepts in physical, organic, inorganic, and analytical chemistry.

PO2: Students will learn to plan, conduct, and evaluate chemical research independently, analyzing experimental data to solve complex chemistry problems.

PO3: Students will follow lab safety rules, act ethically, and use environmentally responsible methods in chemical experiments to work safely and responsibly in the laboratory.

PO4: Students will apply their knowledge of chemistry and related sciences to solve theoretical and practical problems, enabling them to handle complex chemical challenges effectively.

PO5: Students will be prepared for lifelong learning, advanced studies, research, and careers in teaching, industry, and other chemistry-related fields.

PSO1: Students will learn and gain knowledge in lab techniques, chemical synthesis, instrument use, and modern analytical methods to work effectively in research and industry.

PSO2: Students will learn to work safely and ethically in laboratories, following safety rules and protecting the environment.

PSO3: Students will apply knowledge from various scientific disciplines to solve complex scientific problems.

PSO4: Students will be prepared for careers in teaching, research, the chemical industry, pharmaceuticals, and analytical laboratories

PSO5: Students will participate in team research projects, demonstrating leadership, teamwork, and professional conduct in science.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

University of Rajasthan
Jaipur

SYLLABUS

M.Sc. (CHEMISTRY)

(Semester Scheme)

I & II Semester Examination 2024-25

III & IV Semester Examination 2025-26

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M.Sc. CHEMISTRY

Syllabus :

Credit-based Semester System with continuous assessment.

To acquire a Master degree in Chemistry, a candidate is required to earn minimum of 120 credits with grade E or higher.

Credit registration at least once in all Compulsory Credit Course (CCC) and earning all credits for accumulation of the prescribed minimum credit with grade E or higher grade in all CCC will be binding.

SCHEME OF EXAMINATION:

- Each Semester shall have continuous assessment which shall include internal assessment in theory and practical by internal examination/seminar/oral examination/viva-voce etc, besides assessment of candidate's regularity and performance in the class.
- A candidate has to pass in the continuous assessment as well as EoSE (End of Semester Examination) paper separately.
- Each EoSE of theory paper shall carry 100 marks and will be of 3 hours duration. Candidate has to attempt five (05) questions in all. All questions carrying equal marks.
- Part 'A' of the theory paper shall contain 10 Short Answer Questions of total 20 marks, based on knowledge, understanding and applications of the topics/texts covered in the whole syllabus. Each question will carry two (02) marks for correct answer.
- Part 'B' of the theory paper will have total four questions of 20 marks each, framed by taking one question from each unit with internal choice. The limit of answer will be five pages.
- Each Laboratory EoSE will be of six hours durations and involve laboratory experiments/exercises, record and viva-voce examination with weightage in ratio of 75:25.
- The Practical examination will be conducted by board of examiners consisting of one internal (to be appointed by the Head of Department) and one external examiner (to be appointed by the University).
- The medium of instruction and examination shall be English only.

COURSE STRUCTURE

The Credit Courses of the programme have been classified as below:

- CCC: Compulsory Core Course
- ECC: Elective Core Course
- SSC: Self Study Course
- PRJ: Project Work

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M.Sc. Chemistry I & II Semester III & IV Semester

FIRST SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 701	Advanced Inorganic Chemistry-I	CCC	4	4	0	0	3	0
2.	CHE 702	Organic Reaction Mechanism	CCC	4	4	0	0	3	0
3.	CHE 703	Quantum, Surface and Electrochemistry	CCC	4	4	0	0	3	0
4.	CHE 711	Chemistry Core Laboratory-1	CCC	6	0	0	9	0	6
5.	CHE A01	Spectroscopy – I	ECC	4	4	0	0	3	0
6.	CHE A02	Analytical Techniques	ECC	4	4	0	0	3	0
7.	CHE A03	Green and Sustainable Chemistry	ECC	4	4	0	0	3	0
8.	CHE A11	Elective Laboratory-1	ECC	6	0	0	9	0	6

SECOND SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 801	Advanced Inorganic Chemistry – II	CCC	4	4	0	0	3	0
2.	CHE 802	Stereochemistry and Organic Reaction Mechanism - II	CCC	4	4	0	0	3	0
3.	CHE 803	Thermodynamics and Chemical Kinetics	CCC	4	4	0	0	3	0
4.	CHE 811	Chemistry Core Laboratory-2	CCC	6	0	0	9	0	6
5.	CHE A04	Spectroscopy – II	ECC	4	4	0	0	3	0
6.	CHE A05	Environmental Chemistry	ECC	4	4	0	0	3	0
7.	CHE D01	Biomolecules – I	ECC	4	4	0	0	3	0
8.	CHE A12	Elective Laboratory – 2	ECC	6	0	0	9	0	6

THIRD SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE 901	Organotransition Metal Chemistry	CCC	4	4	0	0	3	0
2.	CHE 902	Organic Synthesis – I	CCC	4	4	0	0	3	0
3.	CHE 903	Bio-Physical Chemistry	CCC	4	4	0	0	3	0
4.	CHE 911	Core Laboratory – 3	CCC	6	0	0	9	0	6
5.		Theory Elective – 1	ECC	4	4	0	0	3	0
6.		Theory Elective – 2	ECC	4	4	0	0	3	0
7.		Theory Elective – 3	ECC	4	4	0	0	3	0
8.		Elective Laboratory-3	ECC	6	0	0	9	0	6

FOURTH SEMESTER

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours/week				EoSE (hrs)
					L	T	P	Th	P
1.	CHE X01	Solid States and Nanomaterials	CCC	4	4	0	0	3	0
2.	CHE X02	Organic Synthesis – II	CCC	4	4	0	0	3	0
3.	CHE X03	Advanced Physical Chemistry	CCC	4	4	0	0	3	0
		Theory Elective – 1	ECC	4	4	0	0	3	0
		Theory Elective – 2	ECC	4	4	0	0	3	0
		Theory Elective – 3	ECC	4	4	0	0	3	0
		Project Work	PRJ	12					

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Elective Core Courses (ECC) groups

A: Integrated / Allied Chemistry

B: Inorganic Chemistry group

C: Physical Chemistry group

D: Organic Chemistry group

E: Pharmaceutical Chemistry group

S. No.	Course Code	Elective Paper Title	Prerequisite	Semester
1.	CHE A01	Spectroscopy – I		I
2.	CHE A02	Analytical Techniques		I
3.	CHE A03	Green and Sustainable Chemistry		I
4.	CHE A04	Spectroscopy – II		II
5.	CHE A05	Environmental Chemistry		II
6.	CHE B01	Bioinorganic Chemistry	-	III
7.	CHE B02	Supramolecular Chemistry	-	III
8.	CHE B03	Inorganic Polymers	-	III
9.	CHE B04	Advanced Bioinorganic Chemistry	CHE B01	IV
10.	CHE B05	Materials and Industrial Chemistry	-	IV
11.	CHE B06	Photoinorganic Chemistry	-	IV
12.	CHE C01	Advanced Electrochemistry – I	-	III
13.	CHE C02	Advanced Chemical Kinetics – I	-	III
14.	CHE C03	Chemical Analysis	-	III
15.	CHE C04	Advanced Chemical Kinetics – II	CHE C02	IV
16.	CHE C05	Advanced Electrochemistry – II	CHE C01	IV
17.	CHE C06	Advanced Nanoscience and Nanotechnology	-	IV
18.	CHE D01	Biomolecules – I	-	II
19.	CHE D02	Heterocyclic Chemistry – I	-	III
20.	CHE D03	Natural Product – I	-	III
21.	CHE D04	Medicinal Chemistry – I	-	III
22.	CHE D05	Heterocyclic Chemistry – II	CHE D02	IV
23.	CHE D06	Natural Product – II	CHE D03	IV
24.	CHE D07	Medicinal Chemistry – II	CHE D04	IV
25.	CHE E01	Pharmaceutical Chemistry –I		III
26.	CHE E02	Biomolecules II	CHE D01	III
27.	CHE E03	Pharmaceutical Chemistry –II	CHE E01	IV
28.	CHE E04	Advanced Pharmaceutical Chemistry	-	IV
29.	CHE A11	Elective laboratory – 1	-	I
30.	CHE A12	Elective laboratory – 2	-	II
31.	CHE B11	Elective laboratory – 3	-	III
32.	CHE C11	Elective laboratory – 3	-	III
33.	CHE D11	Elective laboratory – 3	-	III
34.	CHE E11	Elective laboratory – 3	-	III
35.	CHE A21	Project Work – PRJ	-	IV

- Department will inform the students about the minimum/maximum number of Elective courses offered to students at the beginning of each semester based on the courses opted by students and availability of faculty.
- In semesters III and IV, Theory elective papers 1-3 to be opted out of one of four elective groups offered (B,C,D,E). Pharma group students may opt D04 and D07 as third elective in III and IV semester, respectively. Elective Laboratory – 3 will be according to the opted Elective Theory group.

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CHE 701: ADVANCED INORGANIC CHEMISTRY – I
(Theories of Bonding, Spectroscopic methods and Nuclear Chemistry)

UNIT - I

4 Credit (4 hrs/week)

Stereochemistry and Bonding in Main Group Compounds:
Limitations of VSEPR Theory, dπ-pπ bond, Bent rule and energetics of hybridization, some simple reactions of covalently bonded molecules

Metal Ligand Bonding:
Limitation of crystal field theory, molecular orbital theory, and introduction to ligand field theory: σ-bonding in octahedral and tetrahedral complexes, π-bonding and molecular orbital theory.

UNIT - II

Electronic Spectra of Transition Metal Complexes
Spectroscopic ground states, correlation diagrams, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of Dq, Racah parameters (B) and nephelauxetic ratio (β) parameters, charge transfer spectra.

UNIT - III

Optical Rotatory Dispersion (ORD), Circular Dichroism (CD) and Magnetic Properties of Transition Metal Complexes
Spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical conformation, anomalous magnetic moments, magnetic exchange coupling and spin crossover.

UNIT – IV

Nuclear and Radiochemistry:
Laws of radioactive decay; Detection of radiations; Geiger-Nuttal rule; GM tubes and their characteristics; Ionization chamber, Proportional counters, Scintillation counters; Solid state detectors; Calibration of counting equipments; Determination of absolute disintegration rates.
Activation analysis: Principles; Various methods of activation; Methodology; Advantages, limitations and applications.

SUGGESTED BOOKS AND REFERENCES

1. Inorganic Chemistry, Principles of structure and Reactivity, 4th Edition; James E. Huheey: Ellen A. Keiter: Richard L. Keiter.
2. Advanced Inorganic Chemistry; F.A. Cotton and G. Wilkinson.
3. Theoretical Inorganic Chemistry; Day and Selbin.
4. Concepts and Models in Inorganic Chemistry; Doughlas Mc Daniel.
5. Physical Methods in Inorganic Chemistry; R. S. Drago.
6. Chemistry of the Elements; N.N. Greenwood and A. Earnshow, Pergamon, 1984.
7. Inorganic Electronic Spectroscopy; A.B.P. Lever, Elsevier, 1968.
8. Comprehensive Coordination Chemistry eds., G. Wilkinson, R.D. Gillard and J.A. Mc Cleverty, Pregamon, 1987; Vol. 2.
9. Nuclear and Radiochemistry; G. Friedlander, J. W. Kennedy, E. S. Macias and J. M. Miller; 3rd Edn., Wiley: NY, 1981.
10. Essentials of Nuclear Chemistry, H. J. Arnikar; 4th Eds., New Age International N Delhi, India, 2011.
11. Nuclear and Radiochemistry: Fundamental and Applications, 2 Vols., Jens-Volker Kratz and Karl Heinrich Lieser; 3rd Edn., John Wiley & Sons: UK, 2013.

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CHE 702: ORGANIC REACTION MECHANISM

4 Credit (4 hrs/week)

UNIT- I

Reaction Mechanism: Structure and Reactivity

A review of types of mechanisms and reactions, methods of determining reaction mechanism, thermodynamic and kinetic requirements for reaction, kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett Principle, Isotope effects. Effects of structure on reactivity, resonance and field effects, steric effects. Quantitative treatment of the effect of structure on reactivity. The Hammett equation and linear free energy relationship, substituent and reaction constants, Taft equation.

Aromaticity: Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternant hydrocarbons. Huckel's rule, energy level of π-molecular orbitals, annulenes, anti-aromaticity, homo-aromaticity, PMO approach, energetic and magnetic concept.

UNIT - II

Aliphatic Nucleophilic Substitution

The S_Ni, S_N2, mixed S_Ni-S_N2 and SET mechanisms. The S_Ni mechanism. The neighbouring group mechanism - participation by π and σ bonds, anchimeric assistance. Classical and nonclassical carbocations, phenonium ions, norbornyl system. Application of NMR spectroscopy in the detection of carbocations. Nucleophilic substitution at the allylic, aliphatic trigonal and a vinylic carbon.

Reactivity - effect of substrate structure, attacking nucleophile, leaving group and reaction medium. Ambident nucleophile, regioselectivity.

Aromatic Nucleophilic Substitution

The S_NAr, S_Ni, benzyne and $S_{RN}i$ mechanisms. Reactivity - effect of substrate structure, leaving group and attacking nucleophile. The von Richte, Sommelet-Hauser and Smiles rearrangements.

UNIT - III

Aliphatic Electrophilic Substitution

Bimolecular mechanisms - S_E2 and S_Ei. The S_Ei mechanism - electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and solvent polarity on reactivity.

Aromatic Electrophilic Substitution

The arenium ion mechanism, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles. Diazonium coupling, Vilsmeir reaction, Gattermann-Koch reaction.

Free Radical Reactions

Types of free radical reactions, free radical substitution mechanism, mechanism at an aromatic substrate, neighbouring group assistance. Reactivity of aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenations (NBS). Oxidation of aldehydes to carboxylic acids, autooxidation, coupling of alkynes and arylation of aromatic compounds by diazonium salts. Sandmeye reaction. Free radical rearrangement. Hunsdiecker reaction.

UNIT - IV

Addition to Carbon-Carbon Multiple Bonds

Mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals, regio- and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Hydroboration. Michael reaction, Sharpless asymmetric epoxidation.

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Addition to Carbon-Heteroatom Multiple Bonds

Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acids, esters and nitriles. Addition of Grignard reagent, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Introduction to condensation reactions involving enolates - Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions.

Elimination Reactions

The E2, El and ElcB mechanisms. Steric orientation of the double bond. Reactivity, effect of substrate structure, the attacking base, the leaving group and the medium. Mechanism and orientation in pyrolytic eliminations.

SUGGESTED BOOKS AND REFERENCES

1. Advanced Organic Chemistry: Reactions Mechanisms and Structure by Jerry March, McGraw Hill.
2. Mechanism and Structure in Organic Chemistry – E. S. Gould (Holt, Rinehart and Winston).
3. Advanced Organic Chemistry Part-A. F.A. Carey and R.J. Sundberg, 5th Ed. Springer (2007).
4. Physical Organic Chemistry – J. Hine.
5. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes. Longman
6. Organic Chemistry – J. Clayden, N. Greeves, S. Warren and P. Wothers. Oxford University Press (2001)
7. Structure and Mechanism in Organic Chemistry. C.K. Ingold. Cornell University Press.
8. Organic Chemistry. R.T. Morrison and R N. Boyd. Prentice-Hall.
9. Modern Organic Reactions. H O House, Benjamin.
10. Principles of Organic Synthesis. R O C Norman and J.M. Coxon. Blackie Academic & Professional.
11. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan.

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CHE 703: QUANTUM, SURFACE AND ELECTROCHEMISTRY

4 Credit (4 hrs//week)

UNIT – I

Introduction: Historical background – Black body Radiation, de-Broglie concept, Heisenberg's Uncertainty Principle. Postulates of Quantum Mechanics, Operators - Linear, Commutator, Hamiltonian, Hermitian and Angular Momentum Operators, Eigen Value and Eigen Functions, Schrodinger's equation, wave function, physical significance of ψ^2.

Application of Schrodinger's Equation to (i) particle in one dimensional box, (ii) particle in three dimensional box, (iii) Simple Harmonic Oscillator, (iv) Rigid Rotor and (v) Hydrogen atom; Radial and angular wave functions, quantum numbers and their significance.

UNIT-II

Angular Momentum: Ordinary angular momentum, Eigen functions and Eigen values of angular momentum, Ladder Operator, Addition of Angular Momentum; Spin, antisymmetry and Pauli's exclusion principle.

Approximation Method: The Variation theorem, linear variation principle, perturbation method (First order and nondegenarate). Application of variation method and perturbation method to Helium atom.

Molecular Orbital Theory: Basic ideas, criteria of forming MOs, LCAO Concept. Huckel's Molecular Orbital (HMO) theory for conjugated organic systems. Application of HMO to ethylene, allylic, cyclopropanyl, butadiene and cyclobutadiene system.

UNIT - III

Surface Chemistry

Adsorption: Surface tension, capillary action, pressure difference across curved surface (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, estimation of surface area (BET equation), surface films on liquids (Electro-kinetic phenomenon)

Micelles : Surface active agents, classification of surface active agents, micellization, hydrophobic interaction , critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization -phase separation and mass action models, solubilization, micro emulsion, reverse micelles.

UNIT - IV

Electrochemistry

Electrochemistry of solutions, Debye-Huckel-Onsager treatment and its extension, ion solvent interactions. Debye-Huckel-Jerum mode. Thermodynamics of electrified interface equations. Derivation of electro capillarity, Lippmann equations (surface excess), methods of determination. Structure of electrified interfaces, Guoy-Chapman, Stern, Graham Devanatham-Mottwatts, Tobin, Bockris, Devanathan models, Over potentials, exchange, current density derivation of Butler Volmer equation, Tatel plot. Polarography theory, Ilkovic equation; half wave potential and its significance.

SUGGESTED BOOKS AND REFERENCES

1. Physical Chemistry by P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.
3. Quantum Chemistry. Ira N. Levine, Prentice Hall.
4. Quantum Chemistry; R.K. Prasad, New Age International
5. Micelles, Theortical and Applied aspects; V. Morai, Plenum Press.
6. Modern Electrochemistry Vol. I & II; J.O.M. Bockris and A.K.N. Reddy Plenum Press, New York.
7. Physical Chemistry by Puri, Sharma and Pathania Vishal Publications.

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CHE 711: CHEMISTRY CORE LAB – I

6 Credit (9 hrs/week)

A. **Qualitative analysis of mixture consisting of eight cationic / anionic radicals including:**
   a. Interfering anionic radical
   b. Insolubles : oxides, sulphates and halides
   c. Less common metal ions : Tl, W, Mo, Se, Te, V, Th, Ti, Zr, Ce, Li

B. Purification techniques and Qualitative analysis

a. Demonstrations of purification, drying and storage of solvents using various techniques – distillation, steam distillation, vacuum distillation, etc.

b. Separation of Organic binary mixtures [(one liquid and one solid) or (two solids)] using H_2O, HCl, NaOH, $NaHCO_3$, Ether or other reagent and identification of components using chemical tests, IR spectra for functional group identification and preparation of derivatives.

C. **Experiments based on**

Surface tension

i. To study surface tension concentration relationship for solution (Gibbs equation).
ii. To determine the critical micelle concentration (CMC) of SDS and CTAB by surface tension techniques.

Adsorption

i. Adsorption of Oxalic acid
ii. Acetic acid on charcoal

Viscosity, Solubility and Molecular weight determination

i. Experiments based on determination of viscosity of given liquid using Ostwald's viscometer.
ii. Study the variation of viscosity of pure liquid with temperature and determination of temperature coefficient of viscosity of the liquid.
iii. Determination of Solubility of various salts like NaCl, KCl, KNO_3 and $NaNO_3$ at different temperature and draw the solubility Curve.
iv. Determination of molecular weight of given polymer (Polyvinyl alcohol, polystyrene, methyl acrylate, etc.) using viscometer
v. Determination of molecular weight of non-volatile and non-electrolyte/electrolyte by cryoscopic method and to determine the activity coefficient of an electrolyte

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CHE A01: SPECTROSCOPY –

4 Credit (4 hrs/week)

UNIT - I

Introduction: Interaction of light with matter, mechanism of absorption and emission of radiation.

Microwave Spectroscopy: Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, intensities, non-rigid rotor; stark effect, nuclear and electron spin interaction and effect of external field applications.

Vibrational Spectroscopy: Vibrational energies of diatomic molecules, zero point energy, force constant and bond strengths; anharmonicity, Morse potential energy diagram, vibration-rotation spectroscopy. P.Q.R. branches, breakdown of Oppenheimer approximation; vibrations of polyatomic molecules; selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factors affecting the band positions and intensities, far IR region, metal ligand vibrations.

Raman Spectroscopy: Origin, rotational and vibrational Raman Spectra of diatomic molecules.

UNIT - II

Electronic Spectroscopy

Atomic Spectroscopy: Energies of atomic orbitals, vector representation of momenta and vector coupling, spectra of hydrogen atom and alkali metal atoms.

Molecular Spectroscopy: Energy levels, molecular orbitals, vibronic transitions, vibrational progressions and geometry of the excited states, Franck-Condon principle, electronic spectra of polyatomic molecules. Emission spectra; radiative and non-radiative decay, internal conversion, spectra of transition metal complexes, charge-transfer spectra.

Photoelectron Spectroscopy: Photo-electric effect, ionization process, Koopman's theorem, photoelectron spectra of simple molecules, ESCA, chemical information from ESCA; Auger electron spectroscopy-basic idea.

UNIT-III

Magnetic Resonance Spectroscopy

Nuclear Magnetic Resonance: Basic Principle, Spin quantum number, interaction between Spin and a Magnetic Field, Larmor Precession, Relaxation Times; Continuous Wave NMR Spectroscopy, Fourier Transform NMR Spectroscopy; Introduction to Chemical Shift, Spin-spin coupling, Coupling constant. Nuclei other than hydrogen: Nuclei with spin ½ (^{13}C, ^{19}F, ^{31}P, ^{117}Sn, ^{119}Sn, etc.). Nuclei with spin greater than ½ (^{14}N, ^{11}B). Quadrupole effects; factors effecting chemical shift in inorganic compounds - geometry, electronegativity, charge, oxidation state, coordination number. Coupling between two or more than two types of NMR active nucleus in a compound (e.g. $CHFCl_2$, $HPFCl$, $OP(O)FH$, $HP(O)F_2$, BH_4).

Electron Spin Resonance: Basic principles, zero field splitting and Kramer's degeneracy, Isotropic and anisotropic Hyperfine coupling, spin-orbit coupling and significance of g tensors, factors affecting the 'g' value, its applications to the study of free radicals & fast reactions andapplication to transition metal complexes; spin Hamiltonian, spin densities and McConnell relationship. Applications - spin polarization for atoms and transition metal ions.

UNIT-IV

Mossbauer Spectroscopy: Basic principles, spectral parameters and spectrum display, applications of the techniques to the studies of (i) bonding and structures of Fe^{2+} and Fe^{3+} compounds including those

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of intermediate spin; (ii) Sn^{2+} and Sn^{4+} compounds, nature of M-L bond, coordination number, structure; and (iii) detection of oxidation state and in equivalent MB atoms.

Electron Microscopy: Basic principles of Electron Microscopy SEM, TEM, AFM; and their applications in structural analysis.

SUGGESTED BOOKS AND REFERENCES

1. Fundamentals of Molecular Spectroscopy, Banewell and McCash
2. Modern Spectroscopy, J.M. Hollas, John Wiley.
3. Applied Electron Spectroscopy for Chemical Analysis D. H. Windawi and F.L. Ho, Wiley Interscience.
4. Physical Methods in Chemistry, R.S. Drago, Saunders College.
5. Chemical Applications of Group Theory, F.A. Cotton.
6. Introduction to Molecular Spectroscopy, G.M. Barrow, Mc Graw Hill.
7. Electronic Absorption Spectroscopy and related Techniques, D N Sanyanarayana
8. Basic Principles of Spectroscopy, R. Chang, Mc Graw Hill.
9. Theory and Application of UV Spectroscopy, H.H. Jaffe and M. Orchin, IBH-Oxford.
10. Introduction to Photoelectron Spectroscopy, P.K. Ghosh, John Wiley.
11. Introduction to Magnetic Resonance. A Carrington and A.D. Maclachalan, Harper & Row.
12. NMR Spectroscopy in Inorganic Chemistry, J.A. Iggo, Oxford University Press: Oxford, 1999, pp 1-21; 31-35.
13. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, R.V. Parish, Ellis Harwood.

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CHE A02: ANALYTICAL TECHNIQUES

4 Credit (4 hrs/week)

UNIT I

Statistics – Introduction to Chemometrics
Limitations of analytical methods, Errors and classification, Determinant, constant and indeterminate, accuracy, precision, minimization of errors, significant figures and computation rules, mean and standard deviation, distribution of random errors, variance and confidence interval, paired *t*-test, least square method, correlation and regression, linear regression.

UNIT II

Sampling in analysis
Definition, theory, basis and techniques of sampling, sampling statistics, sampling and physical state, crushing and grinding, hazards in sampling, techniques of sampling of gases, fluid, solids, and particulates, minimization of variables, transmission and storage of samples, high pressure ashing techniques (HPAT), particulate matter, its separation in gas stream, filtering and gravity separation, analysis of particulate matter like asbestos, mica, dust and aerosols etc.
Solvent extraction method in analysis
Principle, classification, theory, instrumentation and applications.

UNIT III

Conductometry:
Important laws, definitions, relations, effect of dilution on conductivity, measurement of conductivity, types of conductometric titrations, its applications and limitations.
Potentiometry:
Principle, instrumentation, types of potentiometric titrations and its applications, pH measurements, determination of pH, ion selective electrodes, instrumentation and applications.

UNIT IV

Coulometry:
Introductions, principle, experimental details of coulometry at constant current and constant potential, titrational applications.
Atomic Absorption Spectroscopy:
Introduction, principle, Grotrian diagram, instrumentation, applications, detection limit, sensitivity and disadvantages.

SUGGESTED BOOKS AND REFERENCES

1. Mendham J., Denney R.C., Barnes J. D., Thomas M.J.K., Vogels' text book of quantitative chemical analysis, 6th edition, Prentice Hall, 2000.
2. Skoog Douglas A., Holler F. James, Nieman Timothy A., Principles of instrumental analysis, Saunders College Pub., 1998.
3. Day R. A and A. L. Underwood, Quantitative analysis, Prentice Hall, 1999.
4. Drago R. S., Physical methods in Chemistry, Saunders, 1999.
5. Peters D.G, J. M. Hayes and G. M. Hefige, A brief introduction to Modern chemical analysis, Philadelphia: Saunders, 1976.
6. Ebsworth E.A.V, DWA Rankin and C. Craddock, Structural methods in inorganic chemistry, ELBS.
7. Khan JAD Butter Worth, Photoelectron spectroscopy.
8. Eliel E.L, Stereochemistry of carbon compounds, Tata-McGraw-Hill

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CHE A03: GREEN AND SUSTAINABLE CHEMISTRY

4 Credit (4 hrs/week)

UNIT – I

Introduction, principle and concepts of Green Chemistry

Need for green chemistry; Inception and evolution of green chemistry; Twelve principles of green chemistry with their explanations and examples; Designing a green synthesis using these principles; Green chemistry in day to day life.

UNIT – II

Non-traditional greener alternative approaches

Different approaches to green synthesis: (a) Uses of green reagents in organic synthesis - Dimethyl carbonate, polymer supported reagents - per acids and chromic acid (b) Green catalysts, role of catalysis in sustainable development, homogeneous and heterogeneous catalysts; Introduction, advantages and applications of - (i) Nanocatalysts, (ii) Phase transfer catalysts, (iii) Biocatalysts, (iv) Organocatalysts, in organic synthesis.

UNIT – III

Applications of non-conventional energy sources

Introduction of microwave induced synthesis: Microwave activation, equipment, time and energy benefits, limitations; Organic transformations under microwaves - Fries rearrangement, Diels-Alder reaction, decarboxylation, saponification of ester, alkylation of reactive methylene compounds; Heterocyclic synthesis - β-Lactams, pyrrole, quinoline.

Introduction of ultrasound assisted green synthesis: Instrumentation, physical aspects, applications in organic transformations.

Electrochemical synthesis: Introduction, synthesis of sebacic acid and adiponitrile.

UNIT – IV

Environmentally Benign Solutions to Organic Solvents

Ionic liquids as green solvents: Introduction, properties and types of ionic liquids. Synthetic applications - Diels-Alder reaction, epoxidation and Heck reaction.

Aqueous phase reactions: Enhancement of selectivity, efficiency. Synthetic applications - 1,3-Dipolar Cycloadditions. Carbon-Carbon bond-forming processes and bromination reactions.

Fluorous solvents in green chemistry: Scope, definition and their synthetic applicability.

Role of supercritical carbon dioxide in green chemistry.

Ethyl lactate as a renewable green solvent: Properties and applications.

SUGGESTED BOOKS AND REFERENCES:

1. P.A.G. Blackie, Organic synthesis in water, Springer.
2. P.T. Anastas, J.C. Warner, Green Chemistry, theory and practice, Oxford University Press.
3. M. Lancaster, Green Chemistry: An introductory text, Royal Society of Chemistry.
4. V. Polshettiwar, T. Asefa, G. Hutchings, Nanocatalysis: Synthesis and applications, Wiley.
5. M.A. Ryan, M. Tinnesand, Introduction to Green Chemistry, American Chemical Society.
6. P.T. Anastas, Handbook of Green Chemistry, John Wiley and Sons.
7. V.K. Ahluwalia, M. Kidwai, New Trends in Green Chemistry, Springer.

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CHE A11: CHEMISTRY ELECTIVE LAB-1

A. Laboratory Estimations — 6 Credits (9 hrs/week)

i. Estimation of an acid using another standard acid
ii. Estimation of a base using another standard base
iii. Estimation of boric acid
iv. Determination of percentage purity of commercial soda
v. Determination of percentage of $CaCO_3$ in precipitated chalk sample
vi. Determination of percentage purity of caustic soda
vii. Determination of alkali content-antacid tablet using HCl

B. Organic Preparations (single step)

i. Preparation of *p*-bromoacetanilide from acetanilide.
ii. Preparation of *p*-bromoaniline from *p*-bromoacetanilide.
iii. Preparation of *m*-dinitrobenzene from nitrobenzene.
iv. Preparation of *m*-nitroaniline from *m*-dinitrobenzene.
v. Synthesis of adipic acid from cyclohexanol.
vi. Preparation of 1,1-bis-2-naphthol (BINOL) from β-naphthol.
vii. Green synthesis of 7-hydroxy-4-methylcoumarin (Pechmann condensation).
viii. More one step preparations may be carried out according to requirement of curriculum

C. Experiments based on -

Phase Equilibrium:

i. Determination of congruent composition and temperature of a binary system (e.g., diphenylamine-benzophenone system).
ii. To construct the phase diagram for three component system (e.g., chloroform-acetic acid water).
iii. Study of distribution of benzoic acid in benzene and water to show that benzoic acid dimerise in benzene.
iv. Determine the equilibrium constant for the reaction $KI + I_2 \rightarrow KI_3$ by distribution method.

Conductometry

v. Varification of Onsager's equation for strong electrolytes (NaCl, HCl, KNO_3, KCl) and determination of constant A and B.
vi. Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometerically.
vii. Determination of the strength of strong and weak acids in a given mixture conductometrically.

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CHE 801: ADVANCED INORGANIC CHEMISTRY– II

(Group Theory, Molecular rearrangement processes & Inorganic reaction mechanisms)

4 Credit (4 hrs/week)

UNIT-I

Symmetry and Group Theory in Chemistry

Symmetry elements and symmetry operation, definition of group, subgroup, conjugacy relation and classes. Point symmetry group. Schonfilies symbols, representations of groups by matrices (representation for the C_{nh}, C_{nv}, etc, group to be worked out explicity). Character of a representation. The great orthogonality theorem (without proof) and its importance. Character tables and their use; spectroscopy. Derivation of character table for C_{2v} and C_{3v} point group. Symmetry aspects of molecular vibrations of H_2O molecule.

UNIT-II

Molecular Rearrangement Processes

Electron transfer reactions (outer and inner sphere), HOMO and LUMO of oxidant and reductant, chemical activation. Precursor complex formation and rearrangement, nature of bridge ligands, fission of successor complexes, Two-electron transfers, Synthesis of coordination compounds using electron transfer reactions, mixed valence complexes and internal electron transfer.

UNIT-III

Inorganic Reaction Mechanism- I

Basic principles; lability, inertness, stability and instability of coordination compounds; general principles and mechanisms of substitution reactions of tetrahedral, square planar, trigonal bipyramidal, square pyramidal and octahedral complexes; potential energy diagrams, transition states and intermediates, isotope effects, Berry's pseudo rotation mechanism, Swain -Scott equation.

UNIT-IV

Inorganic Reaction Mechanism- II

Substitution reactions of octahedral complexes; nature of substitution reactions; Theoretical approach to substitution mechanisms; mechanism of substitution reaction of complexes of cobalt; acid hydrolysis and base hydrolysis of Co (III) complexes.

Substitution reactions of square planar complexes; reaction of Pt (II) complexes; trans effect and its applications to synthesis of complexes; theories of trans effect; mechanism of substitution - kinetics of substitution of Pt(II) complexes; factors affecting the reactivity of square planar complexes.

SUGGESTED BOOKS AND REFERENCES

1. Inorganic Chemistry, Principles of Structure and Reactivity, 4thEdition, James E. Huheey: Ellen A. Keiter: Richard L. Keiter.
2. Advanced Inorganic Chemistry. F.A. Cotton and G. Wilkinson.
3. Theoretical Inorganic Chemistry, Day and Selbin.
4. Concepts and Models in Inorganic Chemistry, Doughlas Mc Daniel.
5. Introductory Quantum Chemistry, A.K. Chandra (Tata McGraw Hill)
6. Chemical Applications of Group Theory, F.A. Cotton.

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CHE 802: STEREOCHEMISTRY AND ORGANIC REACTION MECHANISM II

4 Credit (4 hrs/week)

UNIT I

Stereochemistry

Optical activity and chirality, elements of symmetry, specification of configuration - molecules with more than one chiral center. D/L, R/S and Threo/Erythro nomenclature.

Prochirality, Homotopic and Heterotopic ligands and faces, Enantiotopic groups and faces, Re/Si Nomenclature. Stereospecific and stereoselective reactions.

Optical activity in the absence of chiral carbon (biphenyls, allenes, spiranes, ansa compounds). Chirality due to helicity. Chirality in the compounds containing N, S and P.

Geometrical isomerism in cyclic and condensed systems, Conformational analysis of cycloalkanes, decalins, effect of conformation on reactivity.

Cram's, Prelog's and Horeau's rules. Circular birefringence, CD, ORD, Octant rule, Cotton effect. The axial haloketone rule. Determination of configuration (absolute and relative) and conformation.

UNIT II

Organic Photochemistry

Photochemical excitation – interaction of electromagnetic radiation with organic molecules, types of excitations, fate of excited molecules - Jablonskii diagram, intersystem crossing, energy transfer, photosensitization, quenching, quantum yield, Frank-condon principle.

Photochemical reactions of ketones – Norrish type I cleavage, Norrish type II cleavage; photo reductions; Paterno-Buchi reactions; photochemistry of α,β-unsaturated ketones, β,γ-unsaturated ketones.

Photochemistry of alkenes: intramolecular reactions of the olefinic bond – cis-trans isomerisation (stilbene), cyclization reactions.

Photochemistry of aromatic compounds: photochemical rearrangement, photostationary state, isomerizations.

UNIT III

Pericyclic Reactions

Characteristics and Classification of pericyclic reactions, thermal and photochemical reactions. Molecular orbital symmetry. Woodward-Hoffmann selection rules, Fukui's FMO approach, Woodward-Hoffmann's Conservation of orbital symmetry and correlation diagrams and PMO method.

Electrocyclic reactions: conrotatory and disrotatory motions, 4n, 4n+2 π electron and allyl systems. Valence Tautomerism.

Cycloadditions: antarafacial and suprafacial additions, 4n and 4n+2 π electron systems. Diels-Alder reaction – stereoselectivity (endo, exo), and regioselectivity; normal and inverse electron demand Diels-Alder reactions; asymmetric Diels-Alder reactions; retro-Diels-Alder reactions; 2+2 addition of ketenes, 1,3-dipolar cycloadditions. Cheletropic reactions.

Sigmatropic rearrangements: suprafacial and antarafacial shifts of C-H and C-C bonds. Retention & inversion of configuration. 3,3- and 5,5-sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements. Fluxional tautomerism. Ene reaction.

UNIT IV

Molecular Rearrangements

Mechanistic aspects, nature of the migration, migratory aptitudes, memory effects. A detailed study of the following rearrangements: Benzil-benzilic acid rearrangement, Favorskii rearrangement, Neber rearrangement, Beckmann rearrangement, Hoffmann rearrangement, Curtius rearrangement, Lossen

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rearrangement, Wolff rearrangement, Wittig rearrangement, Fritsch-Buttenberg-Wiechell rearrangement, Stevens rearrangement, Chapman rearrangement, Wallach rearrangement. Photochemical rearrangements: rearrangement of 1,4- and 1,5-dienes, di-π methane rearrangement, rearrangement of cyclohexadienone (conjugate and cross conjugate), Dienone-Phenol rearrangement.

SUGGESTED BOOKS AND REFERENCES

1. E. L. Eliel and Samuel H. Wilen, Stereochemistry of Carbon Compounds, Wiley-Interscience, 1994.
2. D. Nasipuri, Stereochemistry of Organic Compounds, Principles and Applications, New Academic Science Ltd., 2012.
3. P. S. Kalsi, Stereochemistry: Conformation and Mechanism, 7th edition, New Age International Publisher Ltd, New Delhi, 2009.
4. J. Clayden, N. Greeves, S. Warren and P. Wothers, Organic Chemistry, Oxford University Press, 2001.
5. Jerry March, Advanced Organic Chemistry: Reactions Mechanisms and Structure, McGraw Hill, 1977.
6. E. S. Gould, Mechanism and Structure in Organic Chemistry, Holt, Rinehart and Winston.
7. FA Carey and RJ Sundberg, Advanced Organic Chemistry Part-A, 5th Ed. Springer (2007).
8. Peter Sykes, A Guide Book to Mechanism in Organic Chemistry, Longman.
9. C.K. Ingold, Structure and Mechanism in Organic Chemistry, Cornell University Press.
10. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice-Hall.
11. H.O. House, Benjamin, Modern Organic Reactions.
12. R O C Norman and J.M. Coxon, Principles of Organic Synthesis, Blackie Academic & Professional.
13. S.M. Mukherji and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan.
14. R. B. Woodward and R. Hoffmann, Conservation of Orbital Symmetry, Verlag Chemie: Weinheim (1970).
15. Ian Fleming, Pericyclic Reactions, Oxford Chemistry.
16. S. Sankararaman, Pericyclic Reactions- A Textbook, Wiley-VCH, Weinheim, 2005.
17. Gilbert A and Baggott J., Essentials of Molecular Photochemistry, Blackwell Scientific Publication.
18. Turro N.J., W.A. Benjamin, Molecular Photochemistry.
19. Cox A. and Camp T., Introductory Photochemistry, McGraw Hill.
20. Fleming I., Molecular orbitals and photochemical reactions,
21. Coxon J. and Halton B., Organic Photochemistry, Cambridge University Press.
22. Albright T., Burdet J and Whango M, Orbital interaction in chemistry, Wiley VCH

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CHE 803: THERMODYNAMICS AND CHEMICAL KINETICS

Classical Thermodynamics **UNIT-I** **4 Credit (4 hrs/week)**

Brief resume of concept of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar properties; partial molar free energy, partial molar volume and partial molar heat content and their significances. Determinations of these quantities. Concept and determination of fugacity. Non-ideal systems: Excess functions for non-ideal solutions. Activity, activity coefficient and its determination. Debye-Huckel theory for activity coefficient of electrolytic solutions; determination of activity and activity coefficients; ionic strength.

Application of phase rule to three component systems; second order phase transitions.

Statistical Thermodynamics **UNIT-II**

Concept of distribution, thermodynamic probability and most probable distribution. Ensemble averaging, postulates of ensemble averaging. Canonical, grand canonical and microcanonical ensembles, corresponding distribution laws (using Lagrange's method of undetermined multipliers). Partition functions-translation, rotational, vibrational and electronic partition functions. Calculation of thermodynamic properties in terms of partition functions. Application of partition functions. Heat capacity behavior of solids-chemical equilibria and equilibrium constant in terms of partition functions. Fermi-Dirac statistics, distribution law and applications to metal. Bose-Einstein statistics distribution Law and application to helium.

Chemical Kinetics - I **UNIT-III**

Methods of determining rate laws, collision theory of reaction rates, steric factor, activated complex theory, Arrhenius equation and the activated complex theory; ionic reactions, kinetic salt effects ; steady state kinetics, kinetic and thermodynamic control of reactions, treatment of unimolecular reactions.

Dynamic chain reactions (hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane), photochemical reactions (hydrogen-bromine and hydrogen-chlorine).

Chemical Kinetics - II **UNIT-IV**

General features of fast reactions, study of fast reactions by flow method, relaxation method, flash photolysis and the nuclear magnetic resonance method.

Collision' theory of reaction rates, Arrhenius equation and the effect of temperature on reaction rate.

Activated complex theory, Modified collision theory (steric effect)

Dynamics of unimolecular reactions (Lindemann Hinshelwood and Rice-Ramsperger-Kassel-Marcus (RRKM) theories of unimolecular reactions).

SUGGESTED BOOKS AND REFERENCES

1. P. W. Atkins, Physical Chemistry, ELBS.
2. K.J. Laidler, Chemical Kinetics, McGraw Hill.
3. J. Rajaraman and J. Kuriacose, Kinetics and Mechanism of Chemical Transformation, Plenum.
4. Samuel Glasstone, Thermodynamics for Chemist, East West Press.
5. R. P. Rastogi and R. R. Mishra, Introduction to Chemical Thermodynamics, Vikash Publication House.
6. Puri, Sharma and Pathaniya, Principles of Physical Chemistry, Vishal Publication.

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CHE 811: CHEMISTRY CORE LA.3 -2

6 Credits (9 hrs/week)

A. Inorganic Preparations: Following selected inorganic compounds and their studies by IR spectra, Mössbauer, ESR and Magnetic susceptibility measurements. Handling of air and moisture sensitive compounds under vacuum.

i. Sodium thiosulphate, $Na_2S_2O_3.5H_2O$
ii. $CuCl_2.2DMSO$
iii. Tetraamine cupric sulphate $[Cu(NH_3)_4SO_4].H_2O$
iv. N,N-bis(salicylaldehyde)ethylenediamine, Salen H_2, Co(Salen)
v. Copper glycine complex – *cis*- and *trans*-bis(glycinato)Copper (II)
vi. Cis- and trans-dichlorobis(ethylenediammine)cobalt(III) chloride, $[Co(en)_2Cl_2]Cl$
vii. $Na[Cr(NH_3)_2(SCN)_4]$
viii. $[Ni(NH_3)_6]Cl_2$

B. Two Step Organic Synthesis

i. Aniline → 2,4,6-Tribromoaniline → 1,3,5-Tribromobenzene
ii. Aniline → Diazoaminobenzene → *p*-Aminoazobenzene
iii. Phthalic anhydride → Fluorescein → Eosin
iv. Phthalic anhydride → Phthalimide → Anthranilic acid
v. Acetanilide → *p*-Nitroacetanilide → *p*-Nitroaniline
vi. More two step organic preparations involving general organic reactions may be carried out.

The products to be characterized by m.pt / spectral techniques.

C Experiments based on -

Chemical Kinetics

i. Determination of the primary salt effect on the kinetics of ionic reactions and testing of the Bronsted relationship (iodide ion is oxidized by persulphate ion).
ii. Determination of the effect of (a) Change of temperature (b) Change of concentration of reactant and catalyst and (c) Ionic strength of the media on the velocity constant of hydrolysis of an ester/ionic reactions.
iii. Determination of the velocity constant of hydrolysis of an ester/ionic reaction in micellar media.
iv. Determination of the rate constant for the oxidation of iodide ions by peroxide studying the kinetics as an iodine clock reaction

Thermodynamics

i. Determination of partial molar volume of solute (e.g. KCl) and solvent in a binary mixture.
ii. Determination of the temperature dependence of the solubility of a compound in two solvents having similar intramolecular interactions (benzoic acid in water and in DMSO-water mixture) and calculate the partial molar heat of solution.

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CHE A04: SPECTROSCOPY-II

UNIT I

4 Credit (4 hrs/week)

Ultraviolet and Visible Spectroscopy

Various electronic transitions (185-800 nm) Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Woodward-Fieser rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds. Steric effect in biphenyls.

Infrared Spectroscopy

Characteristic vibrational frequencies of aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance.

UNIT II

Mass spectrometry

Introduction, ion production - EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds common functional groups, molecular ion peak, metastable peak. McLafferty rearrangement. Ring rule, Nitrogen rule. High resolution mass spectrometery. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

UNIT III

Proton Magnetic Resonance Spectroscopy

Chemically nonequivalent protons, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides and mercapto). Chemical exchange, effect of deuteration. Complex spin-spin interaction between two, three, four and five nuclei (first order spectra). Stereochemistry, hindered rotation. Karplus curve-variation of coupling constant with dihedral angle. Simplification of complex spectra - nuclear magnetic double resonance, NMR shift reagents, solvent effects. Fourier transform technique, nuclear overhauser effect (NOE).

UNIT IV

Carbon-13 NMR Spectroscopy

General consideration, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimension NMR spectroscopy COSY, NOESY, DEPT, INEPT, APT and INADEQUATE techniques.

Applications of Spectroscopy - Problems based on UV, IR, NMR spectroscopy and Mass spectrometry for structural elucidation of organic compounds.

SUGGESTED BOOKS AND REFERENCES

1. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Hassler and T.C. Morrill, John Wiley.
2. Fundamentals of Spectroscopy by Banwell and McCash
3. Introduction to NMR Spectroscopy, R.J. Abraham, J. Fisher and P. Lofitus, Wiley.
4. Application of Spectroscopy of Organic Compounds, J.R Dyer, Prentice Hall.
5. Spectroscopic Methods in Organic Chemistry D.H. Williams, I. Fleming, Tata McGraw-Hill.
6. Organic Spectroscopy, William Kemp, Macmillan.

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CHE A05: ENVIRONMENTAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Atmospheric Chemistry

Atmospheric layers, Vertical temperature profile, heat/radiation budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature inversion. Calculation of Global mean temperature of the atmosphere. Pressure variation in atmosphere and scale height. Biogeochemical cycles of carbon, nitrogen, sulphur, phosphorus oxygen. Residence times. Sources of trace atmospheric constituents: nitrogen oxides, sulphur dioxide and other sulphur compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry

Mechanism of photochemical decomposition of NO_2 and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reactions of OH radicals with SO_2 and NO_2. Formation of Nitrate radical and its reactions. Photochemical smog meteorological conditions and chemistry of its formation.

UNIT-II

Air Pollution: Air pollutants and their classifications. Aerosols-sources, size distribution and effect on visibility, climate and health.

Acid Rain: Definition, Acid rain precursors and their aqueous and gas phase atmospheric oxidation reactions, damaging effects on aquatic life, plants, buildings and health. Monitoring of SO_2 and NO_x, acid rain control strategies.

Stratospheric Ozone Depletion: Mechanism of ozone formation, Mechanism of catalytic ozone depletion, discovery of Antarctic ozone hole and role of chemistry and meteorology, control Strategies.

Green House Effect : Terrestrial and solar radiation spectra, major green house gases and their sources and global warming potentials. Climate change and consequences.

Urban Air Pollution: Exhaust emissions, damaging effects of carbon monoxide, monitoring of CO, control strategies.

UNIT-III

Aquatic Chemistry and Water Pollution

Redox chemistry in natural waters. Dissolved oxygen, biological oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphur and nitrogen compounds in water, acid-base chemistry of fresh water and sea water. Aluminium, nitrate and fluoride in water, petrification, sources of water pollution, treatment of waste and sewage, purification of drinking water, techniques of purification and disinfection.

UNIT-IV

Environmental Toxicology

Toxic Heavy Metals: Mercury, lead, arsenic and cadmium, causes of toxicity, bioaccumulation, sources of heavy metals, chemical speciation of Hg, Pb, As, and Cd, biochemical and damaging effects.

Toxic Organic Compounds: Pesticides, classification, properties and uses of organochlorine and organophores pesticides, detection and damaging effects.

Polychlorinated Biphenyls: Properties, use and environmental contamination and effects.

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Polynuclear Aromatic Hydrocarbons: Source, structures and as pollutants.
Soil and Environmental Disasters: Soil composition, micro and nacronutrients, soil pollution by fertilizers, plastic and metals. Methods of re-mediation of soil. Bhopal gas tragedy, Chernobyl, three mile island, Minamata disease, Sevoso (Italy), London smog.

SUGGESTED BOOKS AND REFERENCES

1. Environmental Chemistry, Colin Baird, W.H. Freeman Co. New York 1998.
2. Chemistry of Atmospheres. R.P. Wayne, Oxford.
3. Environment Chemistry, A.K. De, Wiley Eastern, 2004.
4. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
5. Introduction to Atmospheric Chemistry, P.V. Hobbs, Cambridge.

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CHE D01: BIOMOLECULES I

4 Credit (4 hrs/week)

UNIT-I

Carbohydrates

Structure and biological functions of derivatives of monosaccharides like, Amino sugars - Glucosamine and N-Acetylglucosamine; Carboxylic acid sugars- Glucuronic acid and Gluconic acid; Sugar phosphates- Adenosine triphosphate (ATP); Sugar alcohols- Maltitol and Lactitol. Structure, nomenclature, properties and reactions of oligosaccharides. Structure and biological functions of derivatives of polysaccharides - chondroitin sulphate, heparin and hyaluronan.

Unit-II

Lipids

Introduction, nomenclature, classification, and physical properties of fatty acids. Chemical properties of fatty acids - methylation of carboxyl groups, halogen addition reactions, transformation of isolene-type fatty acids to conjugated fatty acids and hydrogenation. Nomenclature, classification, structure, and function of triacylglycerols, Phospho- and Glycolipids, Definition and classification of lipoproteins. Involvement of lipids in the formation of biological membranes, Introduction of diol lipids, higher alcohols (Waxes and alkoxy lipids) and Cutin.

UNIT -III

Amino-acids, Peptides and Protein

Peptide bond, Chemical and enzymatic hydrolysis of proteins to peptides. Synthetic Amino Acids Utilized for Increasing the Biological Value of Food (Food Fortification) - Glutamic Acid, Aspartic Acid, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan. General Remarks, Nomenclature, physical properties and sensory properties of Peptides. Structure and use of peptides of interest to food chemists - Glutathione, Carnosine, Anserine and Balenine, Nisin and Lysine Peptides. Secondary structure of proteins-α-helix, β-sheet, forces responsible for holding the secondary structures of proteins.

UNIT-IV

Transmission of Genetic Information from the Gene to the Protein

Nucleic acid structure and function - DNA, double helix, DNA replication, Mutation and DNA repair, RNA, types of RNA, transcription, RNA modification, Genetic code, Translation, Transfer RNA, Steps of translation-initiation, elongation and termination, Chromosome organization, Repetitive DNA sequences.

Prokaryotic regulation of gene expression, Eukaryotic control of gene expression, transcriptional regulations.

BOOKS SUGGESTED:

1. Principles of Biochemistry, A. L. Lehninger, Worth Publishers.
2. Biochemistry, L.Stryer, W.H.Freeman.
3. Biochemistry, J. David Rawn, Neil Patterson.
4. Biochemistry, Voet and Voet, John Wiley.
5. Outlines of Biochemistry, B.E. Conn and P.K. Stumpf, John Wiley.
6. Food Chemistry, H.D. Belitz et.al., Springer

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CHE A12: CHEMISTRY ELECTIVE LAB-2

Laboratory Estimations **6 Credits (9 hrs/week)**

i. Estimation of ferric ions in ferric alum.
ii. Estimation of Cr^{3+} ions in tannery waste.
iii. Estimation of available chlorine in bleaching powder.
iv. Analysis of bauxite with respect to Aluminium (gravimetrically).

Synthesis of inorganic compounds and their characterization by IR spectroscopy

i. Sodium hexanitritocobaltate(III), $Na_3[Co(NO_2)_6]$
ii. Sodium tetrathionate $Na_2S_4O_6$
iii. Prussian blue, $Fe_4[Fe(CN)_6]_3$
iv. Pentaamminechlorocobalt(III)chloride, $[CoCl(NH_3)_5]Cl_2$
v. Hexaamminecobalt(III)chloride, $[Co(NH_3)_6]Cl_3$
vi. *Cis-* and *trans*-$K[Cr(C_2O_4)_2(H_2O)_2].2H_2O$

B. Organic Quantitative Analysis

i. Estimation of amines using bromate-bromide solution or acetylation method.
ii. Estimation of phenols using bromate-bromide solution or acetylation method.
iii. Determination of number of hydroxyl groups in an organic compound by acetylation method.
iv. Estimation of sugars using Fehling solution method.
v. Determination of Neutralization Equivalent of given carboxylic acid.
vi. Determination of Iodine number and saponification value of an oil sample.
vii. Estimation of sulphur by Messenger or Fusion method.

C. Potentiometry:

i. Determination of strengths of halides in a mixture potentiometrically.
ii. Determination of the valency of Given ions potentiometrically.
iii. Determination of activity and activity coefficient of the given electrolytes.

Conductometric Experiments

iv. Double displacement & acid base titration
   a. NH_4Cl – NaOH – Mixture of CH_3COOH & HCl
   b. NH_4Cl – NaOH – Mixture of NH_4Cl & HCl
v. Precipitation titration
   a. KCl – $AgNO_3$ – KCl
   b. K_2SO_4 – $BaCl_2$ – K_2SO_4
vi. Determination of dissociation constant of weak acids

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CHE 901: ORGANOTRANSITION METAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Synthesis, Properties, Structure and Bonding of:
(Giving some specific examples)

(i) η^1 - bonded alkyl complexes
(ii) η^1 - carbene and carbyne complexes
(iii) η^2 - alkene and alkyne complexes
(iv) η^3 - allyl complexes
(v) η^4 - dienyl complexes
(vi) η^5 - dienyl complexes

UNIT-II

Metal nitrosyls, cyanides and isocyanides:
Synthesis, reactions, structure and bonding in metal nitrosyls: nitrosyl complexes, metal cyanides and isocyanides: cyanogens, cyanates and its analogue. Sulfur, selenium and tellurium ion. Diisocyanides, reactions of isocyanide complexes and their uses.

UNIT-III

Synthetic and Catalytic Aspects of Organotransition Metal Chemistry:

(i) Transition metal organometallics in organic synthesis
(ii) Homogenous catalysis by transition metal organometallics
(a) Hydrogenation of alkenes
(b) Hydrosilylation of alkenes
(c) Metathesis of alkenes
(d) Oligomerization and polymerization of alkenes and alkynes
(e) Hydroformylation of alkenes
(f) Acetic acid synthesis and other carbonylation reactions
(g) Oxidation of alkenes

UNIT-IV

Catalysis

(a) Heterogenous catalysis by organotransition metal compounds
(b) Fisher-Tropsch synthesis: Methanation reactions, Synthesis of methanol, gasoline production, function of ZSM-5 Zeolite in stabilization of carbine molecule, application of reaction to industry.
(c) Water gas shift reaction: Role of ZnO/Cr_2O_3 in the reaction, Acetic acid synthesis from water gas shift, Role of Co catalyst.
(d) Fluxional organometallic compounds: Rate of rearrangement, Simple examples of non rigid molecules in different coordination geometries, classification, future developments.

SUGGESTED BOOKS AND REFERENCES

1. J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, Principles and Applications of Organotransition Metal Chemistry, University Science Books, 1987.
2. R.H. Crabtree, The Organometallic Chemistry of Transition Metals, John Willey, 1989.
3. A.J. Pearson, Metalloorganic Chemistry, Wiley, 1985.
4. R. C. Mehrotra and A. Singh, Organometallic Chemistry, New Age International, 1991.
5. J.P. Candlin K. Aayler and D.T Thomson, Reaction of Transition Metal Complexes, Elsevier
6. M.L.H. Green, Organometallic Compounds, Vol. II, Methuen, 1968.

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CHE 902: ORGANIC SYNTHESIS-I

4 Credit (4 hrs/week)

UNIT - I

Enolate Chemistry

Formation of enolates, kinetic and thermodynamic control. Reactions of enolate anions with electrophiles: O vs C alkylation. Enolate condensation reactions: Synthetic applications of inter- and intramolecular Aldol condensations, Claisen, Dieckmann, Knovenagel, Stobbe condensations, Mukaiyama Aldol reaction. Boron enolates. Nozaki-Hiyama-Kishi coupling. Stereoselective enolate reactions: diastereoselection, Zimmermann-Traxler model, Evans model, Noyori open-chain model. Michael addition and related reactions. Baylis-Hillmann reaction, Robinson annulations. α-Halogenation, Reformatski reaction.

UNIT - II

Metal and non-metal mediated oxidation

Mechanism, selectivity, stereochemistry and applications of Oppenauer oxidations, aromatization, dehydrogenation, cleavage of C=C bond, ozonolysis, epoxidation using peracids, Baeyer-Villeger oxidation. Oxidations using $FeCl_3$, DDQ, NBS, lead tetraacetate, selenium dioxide, Ag, Cr and Mn reagents, periodic acid and osmium tetraoxide. DMSO-based oxidations. Oxidation of S, Se and N containing compounds.

Hydroboration: Introduction, preparation of alkyl- and alkenylboranes. Synthetic transformations: protonolysis, hydrohalogenation, coupling, isomerisation and displacement reactions. Preparation of amines and sulfides *via* hydroboration.

UNIT - III

Metal and non-metal mediated reduction

Mechanism, selectivity, stereochemistry and applications of catalytic hydrogenations (using Pd, Pt and Ni catalysts), Clemmensen reduction, Wolff-Kishner reduction, Meerwin-Ponndorf-Verley reduction, dissolving metal reductions, metal hydride reductions ($NaBH_4$, $LiAlH_4$, DIBAL). Stereoselectivity in hydride transfer reductions, Wilkinson's catalysis. Boranes in reduction. Hydrosilylation. Photoreduction.

UNIT – IV

New Synthetic Reactions

a. Metal mediated C-C and C-X coupling reactions: Suzuki, Heck, Stille, Sonogashira cross coupling, Buchwald-Hartwig amination and Negishi, Kumada coupling reactions.
b. C=C Formation Reactions: Shapiro, Bamford-Stevens, McMurrey reactions, Julia-Lythgoe olefination and Peterson's stereoselective olefination.
c. Multicomponent Reactions: Mannich, Biginelli, Hantzsch, Passerini, Ugi reaction.
d. Ring Formation Reactions: Pausan-Khand reaction, Bergman cyclisation, Nazarov cyclisation.
e. Click Chemistry: Criteria for Click reaction, Sharpless azide cycloadditions.
f. Olefin metathesis: Shrocks, Grubb's 1st and 2nd generation catalyst, Grubb-Hoveyda catalyst and applications.
g. Olefin cross metathesis (OCM), ring closing metathesis (RCM), ring opening metathesis (ROM) and applications.
h. Other important synthetic reactions: Eschenmoser-Tanabe fragmentation, Mitsunobu reaction, Stork-enamine reaction.

SUGGESTED BOOKS AND REFERENCES

1. Carey A and Sundberg R.J., Advanced Organic Chemistry, Part B: Reaction and Synthesis, Springer, 2008.

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2. March J, Advanced organic chemistry: Reactions, mechanism and stereochemistry, John Wiley, 2013.
3. Perkanyi C., Theoretical organic chemistry, Elsevier, 1997.
4. Kurti L, Czako B, Strategic applications of named reactions in organic synthesis, Academic Press, 2005.
5. Smith M.B., Organic synthesis, McGraw Hill, 2002.
6. Nicolaou E.J., Classics in total synthesis, Chemie Verlag, 1996.
7. Corey E.J. and Cheng X.M., The logic of chemical synthesis, John Wiley & Sons, 1989.
8. Fieser and Fieser, Reagents for organic synthesis, Wiley, 1967.
9. Wipf P, Handbook of reagents for organic synthesis, John Wiley & Sons, 2005.
10. Greene T, Wuts P.G.M., Protecting group in organic synthesis, John Wiley & Sons, 1989.
11. Carruther W., Modern methods of organic synthesis, Cambridge University Press, 1971.
12. Smith W.A., Bochkor A.F., Caple, R., Organic synthesis: The science behind art, RSC, 1998.

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CHE 903: BIO-PHYSICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT I

Biological Cell and its Constituents:
Biological Cell, Structure and functions of proteins, DNA and RNA in living system, Helix Coil Transition.

Cell Membrane and transport of Ions:
Structure and functions of cell membrane, ion transport through cell membrane, irreversible thermodynamic treatment of membrane transport, Nerve conduction, Domman membrane equilibrium. Active transport mechanisms. Autoanalyzers. Biological Half life, effective half life, Stable isotopes, Radioactive tracer and dilution analysis.

UNIT II

Bioenergetics:
Standard free energy change in biological reactions, Exergonic and endergonic processes, Hydrolysis of ATP, Synthesis of ATP from ADP.

Biopolymer Interactions:
Forces involved in biopolymers interactions, Electrostatic charges and molecular expansions, hydrophobic forces, dispersion forces, Multiple Equilibria and various binding process in biological systems. Hydrogen ion titration curve.

UNIT III

Statistical Methods in Biopolymer:
Chain Configuration of macromolecules, statistical distribution end to end dimensions, calculations of average dimension of various chain structure. Polypeptide and protein structure. Introduction to protein folding problems.

Molecular weights of biopolymers:
Evaluations of size, shape and extent of hydration of biopolymers by various experiments, determination of molecular weight of biopolymers by light scattering, sedimentation, viscosity and osmotic pressure methods. Bio-degradable polymers.

UNIT IV

Biosensors
Definition, Biosensor system, Bio receptors, surface attachment of biological elements. Electrochemical transducers, placement of biosensors.

Applications:
Glucose monitoring, food analysis, DNA biosensors, microbial biosensors, commercialized biosensors, identification of blood glucose (diabetes) and pregnancy test by colorimetric and electrochemical strip.

SUGGESTED BOOKS AND REFERENCES

1. Sitake and Iqbal, Biophysical Chemistry, Discovery Press, 2003.
2. James P Allen, Biophysical Chemistry, Wiley-Blackwell Publisher, 2008.
3. Alan Cooper, Biophysical Chemistry, RSC Publication, 2004, ISBN: 978-0-85404-480-1.
4. Upadhyay, Biophysical Chemistry, Himalaya Publishing Publication House, 2014.
5. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applications, Academic Press, Elsevier, 2008.

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CHE 911: CHEMISTRY CORE LAB – 3

6 Credit (9 hrs/week)

A. Laboratory Estimations

i. Spectrophotometric determination of Iron-phenanthroline complex: Job's method of continuous variations.
ii. Spectrophotometric determination of nickel as nickel dimethyl glyoximate complex.
iii. Find out the stability constant of metal complexes by Bjerrum's Method.
iv. Analyse the given sample of Copper Ferrite ($CuFe_2O_4$) & determine the amount and percentage of Copper and Iron volumetrically.
v. Determination of ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions in the given solution.
vi. Determination of Ca^{2+} and Mg^{2+} ions in a given solution and estimation of total hardness of water.
vii. Estimation of H_2O_2 by iodometric method.
viii. Estimation of Zinc involving Potassium ferrocyanide.
ix. Estimation of sulphate as barium sulphate gravimetrically.
x. Estimate Ni in a given sample complexometrically using murexide as an indicator.
xi. Analysis of the given sample of iron ore & determination of Silica – Gravimetrically, Iron Volumetrically to find out their percentages in the given sample.
xii. Estimation of Iron in Portland cement.

B. Separation & Purification Techniques:

i. Extraction of organic compound using separating funnel, Soxhlet extraction method
ii. Purification of organic compounds using Chromatographic methods
iii. Isolation of caffeine, casein, chlorophyll.

Quantitative estimations

iv. Estimation of number of Functional groups (phenol, amino, methoxy groups) in given organic compounds
v. Estimation of amino acids and sugar in given samples.
vi. Estimation of citric acid / vitamin C in citrus juice.

C. Chemical Analysis

i. Determine the dissolved oxygen (DO) of the given water sample.
ii. Determine the biological oxygen demand (BOD) of the given water sample.
iii. Determine the Chemical Oxygen Demand (COD) of the given water sample
iv. Determine the Nitrate (NO_3^-) in drinking water sample.
v. Determine the phenolic substance in the waste water sample.
vi. Determine the amount of free Chlorine in given water sample.
vii. Determine the amount of Fluoride in given water sample.
viii. Determine the dissolved CO_2 in the given water sample.

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CHE 601: BIOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT - I

Metals in Life Processes:

Role of metal ions in biological systems; essential and non-essential elements- macro minerals and essential trace elements- synergism and antagonism among essential trace elements; active transport of Na, K, Mg and Ca ions across the biological membrane; elements of bioenergetics with special reference to elements of high energy phosphate bond.

UNIT - II

Electron Carriers and Photosynthesis:

(a) Electron transfer in biology: Structure and functions of electron transfer proteins. Cytochromes and respiratory chain, iron-sulphur proteins rubredoxin and ferridoxins. Synthetic models for Fe_4S_4 cluster only.

(b) Photosynthetic pigments: Photochemistry of chlorophyll molecules, mechanism of photosynthesis, Calvin cycle and Quantum efficiency. Function of photosystem- I and photosystem-II. Cyclic and noncyclic phototphosphorylation.

UNIT - III

Transport and Storage of Dioxygen:

Haem proteins and oxygen uptake. Structure and function of haemoglobin, mygolobin. Structural model for dioxygen binding-co-operativity, Perutz mechanism and Bohr effect; non-haem oxygen carriers in some lower animals, haemocyanin and haemerythrin. Model synthetic complexes of iron, cobalt and copper.

UNIT - IV

Nitrogen Fixation:

Nitrogen in biosphere, nitrogen cycle, role of microorganisms in nitrification, nitrogen fixation in soils. Biological nitrogen fixation and its mechanism, nitrogenase, Chemical nitrogen fixation and other nitrogenase model systems.

SUGGESTED BOOKS AND REFRENCES

1. S. J. Lippard and J. M. Berg, Principles of Bioinogranic Chemistry, University Science Books, Mill Valley, CA, 1994.
2. H.v.I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, Bioinorganic Chemistry, University Science Books, Mill Valley, CA (USA), 1994.
3. P.S. Kalsi and J.P. Kalsi, Bio-organic, Bio-inorganic and Supramolecular Chemistry, New Age International, 2010
4. G.L. Eichhorn (ed.), Inorganic Biochemistry vol. I and II, Elsevier Scientific Publishing Co., Amsterdam 1973.
5. Stephen J. Lippard (ed.), Progress in Inorganic Chemistry, Vol 18 and 38, Wiley, 2009.

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CHE B02: SUPRAMOLECULAR CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Introduction

Definition and development of supramolecular chemistry, classification of supramolecular host-guest compounds. Nature of supramolecular interactions: ion-ion interactions, ion-dipole interactions, dipole-dipole interactions. Cation binding hosts, binding of anions, binding of neutral molecules, binding of organic molecules.

UNIT-II

Molecular Recognition and Crystal Engineering

Receptors, design and synthesis of co receptors and multiple recognition. Hydrogen bonds, strong, weak and very weak H-bonds, utilization of H-bonds to create supramolecular structures, use of H-bonds in crystal engineering and molecular recognition.

UNIT-III

Supramolecular Reactivity and Catalysis

Supramolecular metallocatalysis, biomolecular and abiotic catalysis. Transport processes and carrier design, cation carriers, anion carriers, coupled transport processes.

UNIT-IV

Devices and Chemistry

Supramolecular devices, supramolecular photochemistry, molecular and supramolecular photonic devices, photosensitive molecular receptors. Supramolecular chemistry of Fullerene, Fullerene as guests, Fullerene as hosts, Fullerene as superconducting intercalation compounds.

SUGGESTED BOOKS AND REFERENCES

1. J.M. Lehn, Supramolecular Chemistry – Concept and Perspectives, VCH, 2006.
2. J.W. Steed and J.L. Atwood, Supramolecular Chemistry, John Wiley & Sons. Inc., 2009.
3. Bio-organic, Bio-inorganic and Supramolecular Chemistry, P.S. Kalsi and J.P. Kalsi, New Age International, 2010.

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CHE B03: INORGANIC POLYMERS

4 Credit (4 hrs/week)

UNIT-I

Basic Concepts

Classification by connectivity, and classification by dimensionality, metal/backbone classification of metal-containing polymers, linear inorganic polymer.

Unit-II

Synthesis and Characterization

Step-growth synthesis, chain polymerization, ring-opening polymerization, reductive coupling and other redox polymerization reactions, Inorganic polymer characterization: average molecular masses, and characterizing methods using Gel permeation chromatography and viscosity, degree of polymerization

Unit-III

Applications

Polysiloxane and polyphosphazene elastomers, inorganic medical polymers: polysiloxanes and polyphosphazene as bio polymers, Inorganic polymer conductivity: main group inorganic polymers, metal-containing polymers, Luminescent inorganic polymers: Ruthenium polymers for solar energy conversion.

Unit-IV

Polymetallocenes

Introduction, Polymetallocenes with short spacers obtained by condensation routes, ring-opening polymerization (ROP) of strained Metallocenophanes, thermal ROP of silicon-bridged [1]Ferrocenophanes, thermal ROP of other strained metallocenophanes, transition metal catalyzed ROP of strained metallocenophanes.

SUGGESTED BOOKS AND REFERENCES

1. Ronald D. Archer, Inorganic and Organometallic Polymers, Wiley-VCH
2. J.E. Huheey, Inorganic Chemistry, Harper Row.
3. M.F. Lappert and G.J. Leigh, Developments in Inorganic Polymer Chemistry, ACS Publications, 1963.
4. N.H. Ray, Inorganic Polymers, Academic Press, NY, 1979.
5. F.W. Billimeyer Jr., Textbook of Polymer Science, Wiley, NY, 1977.
6. H.R. Alcock and F.W. Lambe, Contemporary Polymer Chemistry, Prentice Hall
7. I. Manners, Synthetic Metal-Containing Polymers, Wiley-VCH, Weinheim, 2004.
8. A. S. Abd-El-Aziz, I. Manners Eds., Frontiers in Transition Metal-Containing Polymers, Wiley-Interscience, 2007.

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CHE C01: ADVANCED ELECTROCHEMISTRY- I

4 Credit (4 hrs/week)

UNIT-I

Fuel Cells

Electrochemical Generators (Fuel Cells): Hydrogen oxygen cells. Hydrogen Air Cell, Hydrocarbon air cell, alkaline fuel cell, Phosphoric acid fuel cell, Direct NaOH fuel cells, applications of fuel cells.

Electro-chemical Energy Storage

Properties of Electrochemical energy storages: measure of battery performance, Charging and discharging of batteries, Storage density, Energy density.

Classical Batteries: (i) Lead Acid (ii) Nickel-Cadmium (iii) Zinc – Manganese dioxide. Modern Batteries: (i) Zinc- Air (ii) Nickel- Metal hydride (iii) Lithium Battery. Future electricity stores: Storage in (i) Hydrogen (ii) alkali metals (iii) Non-aqueous solutions

UNIT-II

Corrosion and Passivity

Electrochemical mechanism of corrosion of metals, thermodynamics and stability of metals, potential - pH (or Pourbaix) Diaphragms, uses and abuses, corrosion current and corrosion potential - Evans diagrams.

Measurement of corrosion rate: weight loss method and Electrochemical method. Inhibition of Corrosion (i) by addition of substrates to the electrolyte environment (ii) By charging corroding method from external source, anodic protection, organic inhibitors. The Fuller theory, Green inhibitors.

Passivation : Structure of passivation films, mechanism of passivation, spontaneous passivation, nature's method for stabilizing surfaces.

UNIT-III

Bio-electrochemistry and Bioelectrocatalysis

Membrane potential, simplistic and modern theory, Electrical conductance in biological organisms, electrochemical mechanism of nervous systems, enzymes as electrodes, Biosensors, Bio-electrocatalysis. Enzymes as biological catalysts, immobilization, methods of immobilization.

UNIT-IV

Kinetics of Electrode Process

Essentials of electrode reaction, significance of current density and overpotential in electrode processes, Standard rate constant (k^0) and Electron Transfer coefficien (α) and its significance, exchange current density. Criteria of irreversibility information from irreversible wave. Koutecky's method, Meits Israel and Gelling's method for determining kinetic parameters for quasireversible and irreversible waves.

SUGGESTED BOOKS AND REFERENCES

1. John O'M. Bockris and Amulya K.N. Reddy, Modern Electrochemistry, Volume 2A & 2B, Springer, 200
2. Brett CMA and Brett AMO, Electrochemistry: Principle and Applications, Oxford Press, 2005.
3. Joseph Wang, Analytical Electrochemistry, Wiley-VCH Publication, 1985.
4. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applications, Academic Press, Elsevier, 2008.
5. A.J. Fry and W.E. Britton, Topics in Organic Electrochemistry, Plenum publishing press, New York, 19
6. M. M. Baizer and H. Lund, Organic Electrochemistry, Marcel Dekker, New York, 1985.

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CHE C02: ADVANCED CHEMICAL KINETICS-I 4 Credit (4 hrs/week)

UNIT I

Kinetics of Atmospheric Reactions
Physical structure of atmosphere. Chemical composition of atmosphere Kinetics and mechanism of NO_x, ClO_x cycles and $H_2 + O_2$ reaction. Mechanism of general methane oxidation. Kinetics and mechanism of low temperature oxidation of methane.

UNIT - II

Radiation Chemistry
Radiation chemistry and Photochemistry. Radiation chemistry of water and aqueous solutions. Hydrogen atom and hydroxyl radical-oxidizing and reducing conditions. Kinetics and mechanism of photochemical and photosensitized reactions (one example in each case). Stern-Volmer equation and its application. Hole-concept in the presence of semi-conductor photo-catalysts. Kinetics of exchange reactions (mathematical analysis).

UNIT - III

Dynamics of Gas-Surface Reactions
Adsorption/desorption, kinetics and transition state theory, Dissociative adsorption and precursor state. Mechanism of Langmuir's adsorption of the oxidation of carbon monoxide to carbon dioxide. True and apparent activation energies. Industrial importance of heterogeneous catalysis.

Transition State:
A brief aspect of statistical mechanics and transition state theory, application in calculation of the second order rate constant for reactions with collision for (i) atom + atom (2) atom + molecule (3) molecule (for both linear and non-linear molecules) + molecule reactions. Static solvent effects and thermodynamic formulations. Adiabatic electron transfer reactions, energy surfaces.

UNIT - IV

Enzymes and Inhibitors
Enzyme catalyzed models of 1:2 type enzyme-substrate systems. Kinetics of one enzyme-Two substrate systems and their experimental characteristics. Enzyme inhibitors and their experimental characteristics. Kinetics of enzyme inhibited reactions.

Micelles Catalysis and Inhibition
(a) Micelles and their classification, Kinetics and mechanism of micelle catalyzed reactions (first and second order). Various type of micelle catalyzed reactions. Micelle inhibited reactions.
(b) Kinetics and Mechanism of Substitution Reaction: Classification of ligand substitution mechanism, anation and base catalysed Kinetics of anation reactions. Aquation and acid catalysed Kinetics of aquation reactions (octahedral complexes).

SUGGESTED BOOKS AND REFERENCES

1. Henry Taube, S Lippard (Ed.), Progress in Inorganic Chemistry, Vol 30, John Wiley & Sons, NY, 19
2. R. Lumry and R.W. Raymond, Electron transfer reaction, Inter-Science Publication, 1997.
3. N.L. Bender, Mechanism of homogeneous Catalysis from protein to protein, Wiley, 1971.
4. A.G. Sykes, Kinetics of Inorganic reactions, Pergamon Press, 1966.
5. S.W. Benson, Jacob Kleinberg, R. Kent Murmana, R.T.M. Fraser, John Bauman, Mechanism of Inorganic Reactions, Academic Press, 1965.
6. H.Taube, Electron transfer reactions in solution, Academic Press, London, 1970.

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CHE C03: CHEMICAL ANALYSIS

4 Credit (4 hrs/week)

UNIT-I

Water Analysis

Sources of water pollution domestic, industrial, agricultural soil and radioactive wastes as sources of pollution. Objectives of analysis-parameter for analysis color, turbidity, total solids, conductivity, acidity, alkalinity, hardness, chloride, sulphate, fluoride, silica, phosphates and different forms of nitrogen. Heavy metal pollution-public health significance of cadmium, chromium, copper, lead, zinc, manganese, mercury and arsenic. General survey of instrumental technique for the analysis of heavy metals in aqueous systems. (Measurement of DO, BOD and COD). Pesticides as water pollutants and analysis. Water pollution laws and standards.

UNIT-II

Food Analysis

Moisture, ash, crude protein, fat, crude fiber, carbohydrates, calcium, potassium, sodium and phosphate. Food adulteration-common adulterants in food, contamination of food stuffs. Microscopic examination of foods for adulterants. Pesticide analysis in food products. Extraction and purification of sample: HPLC, Gas chromatography for organophosphates. Thin-layer chromatography for identification of chlorinated pesticides in food products.

UNIT-III

Soil and Fuel Analysis

(a) Analysis of soil, moisture, pH, total nitrogen, phosphorus, silica lime, magnesia, manganese, sulphur and alkali salts.

(b) Fuel analysis: liquid and gas. Ultimate and proximate analysis, heating values-grading of coal. Liquid fuels flash point, aniline point, octane number and carbon residue. Gaseous fuels-producer gas and water gas-calorific value.

UNIT-IV

Body Fluids and Drug Analysis

Composition of blood collection and preservation of samples. Serum electrolytes, blood glucose, blood urea nitrogen, uric acid albumin, globulins acid and alkaline phosphatases, Immunoassay: Principle of radio immunoassay (RIA) and applications. The blood gas analysis trace elements in the body.

Narcotics and dangerous drugs classification of drugs. Screening by gas and thin layer chromatography and spectrophotometric measurements.

SUGGESTED BOOKS AND REFERENCES

1. G.D. Christian, P.K. Dasgupta, K.A. Schug, Analytical Chemistry, Wiley, 7th edn., 2013.
2. D.A. Skoog, D.M. West and F.J. Hooler, S.R. Crouch, Fundamentals of Analytical Chemistry, 9th edn., 2014.
3. J.H. Kennedy, Analytical Chemistry – Principles, Saunders College Publishing, New York, 2nd edn., 1990.
4. L.G. Hargis, Analytical Chemistry - Principles and Techniques, Prentice Hall, 1988.
5. R.A. Day, Jr. and A.L. Underwood, Quantitative Analysis, 6th edn., Prentice Hall, 1991.
6. S.M. Khopkar, Environmental Solution, Wiley Eastern.
7. S.M. Khopkar, Basic Concepts of analysis Chemistry, New Age International, 1998.
8. Alka L. Gupta, Analytical Chemistry, Pragati Publication, 2014.
9. D C Das, Analytical Chemistry, Prentice Hall India Learning Private Limited, 2010.

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CHE D02: HETEROCYCLIC CHEMISTRY– I

4 Credit (4 hrs/week)

UNIT-I

Nomenclature of Heterocycles
Replacement and systematic nomenclature (Hantzsch-Widman system) for monocyclic, fused, spiro and bridged heterocycles.

Aromatic Heterocycles
General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in ^{1}H NMR-spectra, empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations). Heteroaromatic reactivity.

UNIT-II

Non-aromatic Heterocycles
Strain - bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3-diaxial interactions. Stereo-electronic effects; anomeric and related effects. Attractive interactions - hydrogen bonding and intermolecular nucleophilic electrophilic interactions.

UNIT - III

Small Ring Heterocycles
Three-membered and Four-membered Heterocycles: Synthesis and reactions of aziridines, oxiranes, thiiranes, oxaziridines, azetidines, oxetanes, thietanes and azetedinones.

UNIT-IV

Five-membered Heterocycles with Two Heteroatoms
Synthesis and reactions of 1,2- & 1,3-diazoles, oxazoles, thiazoles and azaphospholes.

Benzo-fused five-membered Heterocycles
Synthesis, reactions and medicinal applications of benzopyrroles, benzofurans, benzothiophenes and benzimidazoles.

SUGGESTED BOOKS AND REFERENCES

1. R.R. Gupta, M. Kumar and V. Gupta, Heterocyclic Chemistry Vol. 1& 2. Springer India, 1998 & 1999.
2. T Eicher and S. Hauptmann, The Chemistry of Heterocycles, Wiley-VCH, 2003.
3. J.A. Joule, K. Mills and G.F Smith, Heterocyclic Chemistry, Chapman and Hall, 1995.
4. T.L. Gilchrist, Heterocyclic Chemistry, Longman Scientific & Technical, 1992.
5. G.R. Newkome and W.W. Paudler, Contemporary Heterocyclic Chemistry, Wiley-Inter Science, 1982.
6. R.M. Acheson, An Introduction to the Heterocyclic Compounds, John Wiley, 1977.
7. A.R. Katritzky, C.W. Rees and E.F.V. Scriven (Eds.), Comprehensive Heterocyclic Chemistry II, ISBN: 9780080965185, Elsevier, 1996.

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CHE D03: NATURAL PRODUCTS – I

4 Credit (4 hrs/week)

UNIT- I

Terpenoids and Carotenoids

Introduction, occurrence, nomenclature, general methods of structure determination; isoprene rule, stereochemistry and synthesis of following representative molecules: Citral, Geraniol, α-Terpineol, Menthol, Farnesol, Zingiberene, Phytol, and Abietic acid. Biosynthesis of Terpenoids. General methods of structure determination of β-Carotene and Lycopene.

UNIT-II

Alkaloids

Introduction, occurrence, nomenclature, classification based on structure, isolation, general methods of structure elucidation of alkaloids, stereochemistry and synthesis of the following: Narcotine, Quinine, Reserpine and Morphine.

UNIT - III

Sterolds

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation, structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Estrogen and Progesterone. Biosynthesis of cholesterol.

Plant Hormones

Introduction, occurrence, isolation and physiological effects of Auxins, Gibberellins (Synthesis of GA_3), Cytokinins and Abscisic acid.

Nutraceuticals and Natural Products

Occurrence, isolation, biological function and structure elucidation by spectroscopic methods) of Curcumin, Silymarin, 5-hydroxytryptophan, Chlorogenic acid and Vinpocetine.

UNIT-IV

Natural Pigments

Occurrence, nomenclature and general methods of structure determination. Isolation, structure determination and synthesis of Luteolin, Quercetin, Luteolin, Diadzein, Genistein, and Cyanidin chloride.

Porphyrins: Structure, reactions and synthesis of haemoglobin, chlorophyll, chlorins, bacteriochlorins and purpurin anhydride. Photosensitizers in Photodynamic Therapy.

SUGGESTED BOOKS AND REFERENCES

1. J. Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthrope and J.B. Harborne, Natural Products, Chemistry and Biological Significance, Prentice Hall, 1994.
2. I. L. Finar, Organic Chemistry: Vol. 2, ELBS, Longman, 1996.
3. M. Norgradi, Stereoselective Synthesis; A Practical Approach, Wiley-VCH, 1994.
4. S.V. Bhat, B.A. Nagasampagi and M. Sivakumar, Chemistry of Natural Products, Narosa Publishing House, 2015.
5. Ed. Kurt Hostettmann, M.P. Gupta and A. Marston, Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americas, Harwood Academic Publishers, 1999.
6. B.A. Bohm, Introduction to Flavonoids, Harwood Academic Publishers, 1998.
7. Atta-ur-Rahman and M.L. Choudhary, New Trends in Natural Products Chemistry, Harwood Academic Publishers, 1998.

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CHE D04: MEDICINAL CHEMISTRY - I

4 Credit (4 hrs/week)

UNIT-I

Drug Design

Development of new drugs, procedures followed in drug design, concepts of prodrugs and soft drugs, structure-activity relationship (SAR and QSAR). Factors affecting bioactivity –resonance, inductive effect, isosterism, bio-isosterism, spatial consideration. Theories of drug activity. Elementary treatment of drug receptor interactions.

UNIT-II

Pharmacodynamics : Definition, Receptors and specificity, agonists and antagonists, Site(s) of drug action, Mechanism of Drug action: therapeutic and side effects, elementary treatment of enzyme stimulation, enzyme inhibition, membrane active drugs, Drug metabolism, xenobiotics, biotransformation significance of drug metabolism in medicinal chemistry.

Pharmacokinetics : Introduction to drug absorption, disposition and elimination using pharmacokinetics, Clinical Pharmacokinetics: bioavailabilty, volume of distribution, clearance, elimination, Design and optimization of dosage regimen, Therapeutic drug monitoring, importance of pharmacokinetics and pharmacodynamics in drug development process.

UNIT-III

Posology : Definition, dose-response relationship, potency and effective dose 50 (ED 50), minimal effective concentration, efficacy: time-response graph, onset, duration and termination of action.

Drug Toxicity and Poisoning : Types of therapeutic drug toxicity, Mechanism of Toxicity, Dose response complexities, Therapeutic Index, Lethal Dose 50 (LD 50), Adverse drug effects, Principles of treatment of poisoning, Mechanism of Detoxification and testing.

UNIT-IV

Bio-statistics : Introduction its role and use, Collection, Organization: Graphics and pictorial representation of data, Sampling: Random and non random sampling methods, standard deviation and coefficient of variation, Probability, student t-test, F-Test, chi square test, correlation and regression.

SUGGESTED BOOKS AND REFERENCES

1. J. Stringer, Basic Concepts in Pharmacology, 3rd edn., McGraw-Hill Professional, 2005.
2. B. Katzung, Basic and clinical pharmacology, 11th edn., McGraw-Hill medical, 2009.
3. Goodman & Gilman, Pharmacological basis of Therapeutics, McGraw-Hill, 2005.
4. A. Burger & M.E. Wolff (Ed.), Medicinal Chemistry and Drug Discovery, Vol-1, John Wiley, 1994.
5. S.S. Pandeya & J.R Dimmock, Introduction to drug design, New Age International, 2000.
6. D. Lednicer, Strategies for organic drug Synthesis and Design, John Wiley, 1998.
7. Graham & Patrick, Introduction to medicinal Chemistry, 3rd edn., OUP, 2005.
8. Bernard Rosner, Fundamental of Biostatistics, 8th edn, CENGAGE Learning Custom Publisher, 2016.
9. Skoog & West, Fundamentals of analytical chemistry, CENGAGE, 2013.
10. J. Susan Milton, Statistical methods in biological and health sciences, Tata McGraw-Hill Int. Edition, 1984.
11. J. Susan Milton, Introduction to statistics, Tata McGraw-Hill Int. Edition, 1996.
12. B.K. Mahajan, Methods in Biostatistics, JayPee Brothers, New Delhi, 2002

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CHE E01: PHARMACEUTICAL CHEMISTRY I

4 Credit (4 hrs/week)

UNIT- I

Chemistry of acids and bases

Dissociation of weak acids and bases, Hydrolysis of salts, Amphiprotic salts, Buffer solutions, Buffer capacity, Biological buffers, Ionization of drugs, pKa values of drug molecules, pH indicators .

Partition coefficient and biopharmacy

Experimental measurement of partition coefficient , Drug absorption, distribution and bioavailability , Passive diffusion, The pH partition hypothesis, Active transport mechanisms, The action of local anaesthetics, Excretion and reabsorption of drugs.

UNIT- II

Drug metabolism

Metabolic pathways, Cytochromes P450, Enzyme induction and inhibition, Drug conjugation reactions (Phase 2) Glucuronic acid conjugation, Sulfate conjugation, Amino acid conjugation, Metabolic pathways for common drugs Amfetamines, Barbiturates, Phenothiazines, Sulfonamides, Cocaine, Phenmetrazine, Ephedrine and caffeine, Factors affecting drug metabolism.

UNIT III

Stability of drugs and medicines

Oxidation, Stability of free radicals, Prevention of oxidative deterioration, Autoxidation of fats and oils, Ageing, Hydrolysis, Examples of drugs susceptible to hydrolysis, Other mechanisms of degradation.

UNIT IV

Kinetics of drug stability

Rate, order and molecularity, Rate equations and first-order reactions, Half-life, Shelf-life, Second-order reactions, Zero-order reactions, Reaction rates and temperature .

BOOKS AND REFERENCES

1. Essentials of Pharmaceutical Chemistry (third edition) by Donald Cairns, Pharmaceutical Press
2. Organic Medicinal and Pharmaceutical Chemistry, John M. Beale, Jr., John H. Block, Wolters Kluwer
3. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Wolters Kluwer
4. Drug delivery: principles and applications, Binghe Wang, Teruna Siahaan, Richard soltero, John Wiley & Sons

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CHE E02: BIOMOLECULES II

4 Credit (4 hrs/week)

UNIT-I

Fuel Molecule Metabolism

Glycogenesis and glycogenolysis. Aerobic Respiration, glycolysis and regulation of glycolysis, citric acid cycle, regulation of the citric acid cycle, Electron transport chair Oxidative Phosphorylation , Regulation of Oxidative Phosphorylation, oxidative stress, anaerobic pathways, Lactic acid fermentation, pentose phosphate pathway.

UNIT-II

Enzymes

General Remarks, Isolation and Nomenclature of enzymes Enzyme structure and function, Factors that affects enzyme function- enzyme kinetics, Michaelis–Menten kinetics, Cooperativity, Control of enzyme activity- feedback regulation, enzyme inhibition, covalent modification. Enzyme Cofactors Theory of Enzyme Catalysis and Enzymatic Analysis.

UNIT-III

Marine Biomolecules and Application

Introduction and history of marine biomolecules, Discovery and development of marine pharmaceuticals, Isolation and screening of marine biomolecules, Occurence, Structure and function of furanone, kainic acid , tyrian purple, ziconotide and dolastatin,

UNIT-IV

Fungal Biomolecules and Biomolecules of Mushrooms

Fungi as cell factories, Fungal Biofilms: an overview, Fungal biomolecules for food industry. Bioactive biomolecules of mushrooms: food function and medicinal effect of mushroom fungi. Biomolecules and nanotechnology.

BOOKS AND REFERENCES

1. www.mhpracticeplus.com/BBFLS_MCAT/mca88351_V1
2. Biomolecules and Nanotechnology, David S. Goodsell,American Scientist
3. Food Chemistry, H.D. Belitz et.al., Springer
4. Fungal Biomolecules: Sources, Applications and Recent Developments, V.K. Gupta et.al. Wiley-Blackwell
5. http://booksite.elsevier.com/9780120885305/casestudies/02-Ch27-P088030web.pdf
6. Bioactive biomoleoules of mushrooms: Food function and medicinal effect of mushroom fungi, Takashi Mizuno, Food Reviews International Volume 11, 1995

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CHE B11: CHEMISTRY ELECTIVE LAB-3

Inorganic chemistry group

1. **Chromatographic separation** and identification by paper chron atography and determination of Rf values:
   a. Cadmium and Copper.
   b. Zinc and Mangnese.
   c. Arsenic, Antimony and Tin.
   d. Lithium, Sodium and Potassium.
   e. Fe^{3+} , Al^{3+} and Cr^{3+}
   f. Ca^{2+} , Sr^{2+} and Ba^{2+}
   g. Ni^{2+} , Co^{2+}, Mn^{2+} and Zn^{2+}
   h. Cu^{2+} , Fe^{3+}, Ni^{2+} and Ti^{4+}

2. **Cerimetric titration :**
   a. Standardization of ceric sulphate solution using ferrous ammon um sulphate as intermediate solution
   b. Determination of the percentage of $H_2C_2O_2$ in oxalic acid crysta ls.
   c. Determination of percentage purity of a sample of sodium nitrit e.

2. **Quantitative analysis:**
   Separation and determination of two metal ions involving Volumetric and Gravimetric methods:
   b. Copper – Nickel
   c. Copper – Zinc
   d. Iron– Nickel

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CHE C11: CHEMISTRY ELECTIVE LAB-3

Physical Chemistry group

A. Chemical Kinetics

i. Determining the energy of activation and entropy of activation in $KMnO_4$-benzyl alcohol reaction measuring the rate constant at least at three temperatures.
ii. Determining the Formation Constant for the $[Ce^{+4}$-$H_3PO_2]$ intermediate complex and also the rate constant of its decomposition.
iii. Determine the rate constant in bleaching of malachite green in the basic medium.
iv. Determine the order with respect to Ag (I) in the oxidation of Mn (II) by $S_2O_8^{-2}$ and the rate constant for the unanalyzed reaction.
v. Investigate the autocatalysed reaction between $KMnO_4$ and Oxalic Acid.
vi. Kinetics of enzyme catalyzed reactions.
vii. Flowing clock reaction (Ref: Experiments in physical Chemistry by Snowmaker). Oscillatory reaction

B. Spectrophotometry / Colorimetry

i. Verify Beer's Law for the solution of potassium permanganate ($KMnO_4$) and determine the concentration of the given aqueous solution of unknown concentration of this salt.
ii. Determine the pH of the solution employing methyl red indicator spectrophotometrically.
iii. Determine indicator constant (pKa) of methyl red, spectrophotometrically.
iv. Determine stability constant of $FeSCN^{+2}$ complex ion spectrophotometrically keeping strength constant.

C. Electrochemistry

i. Identification and Estimation of metal ions such as Cu^{+2},Cd^{+2}, Ni^{+2}Voltammetrically.
ii. To plot a cyclic voltammogram of a reversible system and calculate the number of electron in the redox process.
iii. To plot a voltammogram of a organic compound (such as nitroaniline, picric acid, m-dinitrobenzene) and verification of RandelSevcik equation (current vs scan rate and current vs concentration)
iv. Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
v. Determination of the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.

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CHE D11: CHEMISTRY ELECTIVE LAB-3

Organic Chemistry group

A. **Multi-step Organic synthesis based on Name Reactions**

The exercise should illustrate the use of organic reagents and mechanism. Purification of products by chromatographic techniques.

i. Photochemical reaction :
   (Benzophenone → Benzpinacol → Benzpinacolone)
ii. Beckman Rearrangement : Benzanilide from benzene
   (Benzene → Benzophenone → Benzophenone oxime → Benzan lide)
iii. Benzilic acid rearrangement : Benzilic acid from benzoin
   (Benzoin → Benzil → Benzilic acid).
iv. Synthesis of heterocyclic compounds
   a. Skraup synthesis: Preparation of quinoline from aniline
   b. Fisher Indole synthesis: Preparation of 2-phenylindole from phenylhydrazine.
v. Diazocoupling: Phthalic anhydride → Phthalamide → anthranilic acid → methyl red.
vi. More Name reaction based organic synthesis based on curricula may also be carried out.

B. **Qualitative analysis:** Separation of three component organic mixture and identification of its components, Preparation of their derivatives and verification with the help of IR and NMR spectral data provided

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CHE E11: CHEMISTRY ELECTIVE LAB-3

Pharmaceutical Chemistry group

i. Identification reactions of ions such as aluminium, ammonium salts, arsenic, calcium and sodium chloride.
ii. Identification reactions of functional groups such as Alkaloids, Barbiturates (non nitrogen substituted, Lactates, Tartrates.
iii. Assay of Hydrogen Peroxide Solution and Isolation of Bismuth from Pepto-Bismol
iv. The Isolation of Lactose from Milk
v. Assay for Galacturonic Acid
vi. Separation of Fatty Acids and Glycerol and Extraction of Glycerol
vii. Color Reactions of Proteins-Biuret Reaction, Ninhydrin Reaction, Xanthoproteic,Ehrlich Diazo Reaction
viii. Pharmacopoeal qualifications of active pharmaceutical ingredients such as chloral hydrate, hexobarbital, caffeine, acetyl salicylic acid, atropine sulphate and quinine hydrochloride
ix. Preparations of Benzocaine and Acetaminophen
x. Assay of Sulfadiazine Tablets and Assay of Amitriptyline HCl
xi. Thiamine Assay of Vitamin B Complex Tablets
xii. Determination of Vitamin C content of Commercial Tablets

Books suggested

1. Experiments in Pharmaceutical Chemistry, Second Edition, Charles Dickson, CRC Press
2. Pharmaceutical Chemistry I- laboratory Experiments and Commentary, Attila Almasi et.al, EU Social Fund Project

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CHE X01: SOLID STATES AND NANOMATERIALS

4 Credit (4 hrs/week)

UNIT-I

Solid State Chemistry

Introduction to the solid state, defects of solids, classification of imperfections, Electronic defects, atomic defects, Lattice imperfections, thermodynamics of Schottky defect and Frenkel defect. Electrical, optical, magnetic and thermal properties of inorganic materials.

Solid State Reactions: general principles, types; sintering; nucleation; Factors influencing the reactivity of solids; co-precipitation as a precursor to solid state reactions, kinetics of solid state reactions.

UNIT-II

Superconductors

Superconductors, with special emphasis on the synthesis and structure of high temperature superconductors; solid state LASERS (Ruby, YAG and tunable lasers): Inorganic phosphor materials; synthesis and advantages of optical fibers over conducting fibres, diffusion in solids, catalysis and zone refining of metals.

UNIT-III

Diffraction Methods

A. X-ray Diffraction

Bragg condition, Miller indices, Laue Method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern, Structure of simple lattices and X-ray intensities, structure factor and its relation to intensity and electron density, phase problem; description of the procedure for an X-ray structure analysis, absolute configuration of molecules.

B. Electron Diffraction

Scattering intensity vs. scattering angle, Wierl equation, measurement technique, elucidation of structure of simple gas phase molecules, low energy electron difffraction and structure of surfaces.

UNIT-IV

Nanomaterials

Various preparative approaches and techniques; characteristic differences of nanomaterials over bulk materials; dynamic light scattering, atomic force microscopy and characterization of nanomaterials; imaging techniques: electron microscopy (Scanning Electron Microscopy, Transmittance Electron Microscopy). Applications of nanomaterials.

SUGGESTED BOOKS AND REFERENCES

1. H.V. Keer, Principles of the Solid State; Wiley Eastern Ltd.: New Delhi, 1993.
2. A.R. West, Solid State Chemistry and its Applications; 2nd Edn, John Wiley and Sons, 2014.
3. N. B. Hannay, Treatise on Solid State Chemistry; Plenum, 1976.
4. A. K. Cheetham and P. Day, Eds. Solid State Chemistry Techniques; Clarendon Press, Oxford, 1987.
5. John Wulff, The structure and properties of materials, John Wiley & Sons, Trans edition, 1966.
6. L. V. Azaroff, J. J. Brophy, Electronic processes in materials, Mc Craw Hill, 1967.
7. D. K. Chakrabarty, Solid State Chemistry, New Wiley Eastern, 2009.
8. M.C. Day, J. Selbin, Theoretical Inorganic Chemistry, Reinhold Publishing, NewYork, 1962.
9. A.W. Adamson and A.P. Gast, Physical Chemistry of Surfaces, Wiley-Interscience; 6th Ed 1997.
10. G. Timp, Ed. Nanotechnology; Springer-Verlag: N. Y., 1999
11. B. D. Fahlman, Materials Chemistry, Springer, 2007.

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CHE X02: ORGANIC SYNTHESIS – II

4 Credit (4 hrs/week)

UNIT-I

Retrosynthetic Analysis

An introduction to synthons and synthetic equivalents. Disconnection approach, good disconnections, functional group inter-conversions, importance of the order of events in organic synthesis. One group C-X disconnections. Chemoselectivity. Two group C-X disconnections.

Reversal of polarity (Umpolung), generation of acyl anion equivalent-1,3-dithiane from carbonyl compounds, use of methylthio-methylsulfoxide via cyanide ion and cyanohydrin ethers, nitro compounds and metallated vinyl ethers.

Protecting Groups: Principle of protection of carbonyl, hydroxyl, amino and carboxyl groups.

Enamines: Preparation and synthetic applications

UNIT –II

One Group C-C Disconnections

One group C-C disconnection involving alcohols and carbonyl compounds, regioselectivity. Alkene synthesis, use of acetylenes, aliphatic nitro compounds in organic synthesis.

Two group C-C Disconnections

Diels-Alder reaction. 1,3-Difunctionalised compounds; α,β-unsaturated carbonyl compounds; control in carbonyl condensation; 1,5-difunctionalised compounds, Michael addition and Robinson annulation.

1,2-Difunctionalised compounds. Radical reactions in synthesis. 1,4-Difunctionalised compounds. Reconnections. 1,6-Difunctionalised compounds.

UNIT III

Ring Synthesis

Introduction to ring synthesis of saturated heterocycles. General strategy and stereoselectivity. 3-Membered rings from cyclisations and insertion reactions. Rerarrangements in synthesis. 4-Membered rings from photocycloadditions and use of ketenes.

Five-membered rings from 1,4- and 1,6-dicarbonyl compounds. Pericyclic rearrangements and special methods. 6-Membered rings from carbonyl condensations, Diels-Alder reactions and reduction of aromatic compounds. Synthesis of aromatic Heterocycles.

UNIT IV

Asymmetric Synthesis

Concepts of prochirality, enantioselectivity and diastereoselectivity. Methods for determination of enantiomer purity. Stereogenic skeletal bond forming reactions, synthesis of a racemate and resolution. Asymmetric synthesis, enantiomeric excess, chiral pool, chiral auxiliaries, chiral reagents and chiral catalysts.

Organic Transformations by C-H functionalization

Introduction to C-H Activation and C-H functionalization, Transition metal catalyzed C-C bond and C-X bond formation *via* C-H functionalization. Metal free organic transformations via C-H functionalization.

SUGGESTED BOOKS AND REFERENCES

1. Smith M.B., Organic synthesis, McGraw Hill, 2002.
2. Warren S. & Wyatt P., Organic synthesis: The disconnection approach 2nd edn., John Wiley & Sons, 2008.

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3. Warren S, Wyatt P, Workbook for Organic Synthesis: The Disconnection Approach, 2nd edn., John Wiley & Sons, 2009. ISBN: 978-0-470-71227-6
4. Warren S., Designing organic synthesis: The synthon approach, Wiley, 1978 (Reprinted 2002).
5. Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers, Organic Chemistry, Oxford University Press, 2001.
6. Fuhrhop J and Li G, Organic Synthesis – Concepts, Methods and Starting Materials, Wiley-VCH, 2003.
7. Kalsi P S, Organic synthesis through disconnection approach, Scientific International, 2014
8. Carruther W., Modern Methods of Organic Synthesis, Cambridge University Press, 2004.
9. House H.O., Modern Synthetic Reactions: Organic chemistry monograph series, W.A. Benjamin, 1972.
10. Xiao-Feng Wu, Transition Metal-Catalyzed Heterocycle Synthesis via C-H Activation, Wiley, 2015. ISBN: 978-3-527-33888-7.

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CHE X03: ADVANCED PHYSICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Quantum Mechanical aspects of Chemical bonding:

Molecular orbital (MO) theory: LCAO concept, orbital interaction diagram, MO energy levels, orbital symmetry, MO of simple organic molecules like ethelene, allylic compounds, cyclobutadiene, butadiene and benzene. Application of MO Theory to Hydrogen Molecule Ion (H_2^+). Born Oppenheimer's Approximation. Valence Bond (VB) Theory and its application to H_2 molecule. Extended HMO Theory, Advanced techniques in PMO and FMO theory. Introduction to Molecular mechanics, semiempirical, *ab* initio Hartree-Fock, DFT methods.

UNIT-II

Non Equilibrium Thermodynamics and Magnetochemistry:

Thermodynamic criteria of non-equilibirium state, Entropy production and entropy flow, Entropy balanced equations for different irreversible states (e.g. Heat flow, chemical reaction etc), transformations of generalized fluxes and forces, non-equilibirium stationary state, phenomenological equation, Microscopic reversibility and Onsager's reciprocity relations, electro-kinetics phenomenon and electrical conduction.

Magnetochemistry: Introduction, Magnetic Susceptibility and its determination, theories of paramagnetism and ferromagnetism, effect of temperature on magnetic behavior of substances.

UNIT-III

Macromolecules – I

Basic Concepts: Monomers, repeat units, degree of polymerization, linear, branched and network polymers. Classification: condensation, addition, radical, ATRP, RAFT, polymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous systems. Measurement of molecular weights by viscosity, light scattering, osmotic pressure and ultracentrifugation methods.

UNIT-IV

Macromolecules – II

Chemical Analysis of polymers by spectroscopic methods. X-ray diffraction study of polymers. Morphology and order in crystalline polymers-configurations of polymer chains. Crystal structures of polymers. The glass transition temperature, effects of molecular weight, chemical structure, branching and cross linking. Polyethylene, polyvinylchloride, polyamides, polyesters, phenolic resins and epoxy resins polymers. Functional polymers – fire retarding polymers and electrically conducting polymers. Biomedical applications of polymers – contact lens, dental polymers, artificial heart, kidney, skin and blood cells.

SUGGESTED BOOKS AND REFERENCES

1. P. Bahadur, Principles of polymer Science, Narosa Publication, 2002.
2. V. R. Gowariker, N.V. Vishwanathan and Jayadev Sreedhar, Introduction to Polymer Science, New Age International, 1986.
3. R. P. Rastogi and R. R. Mishra, Introduction to Chemical Thermodynamics, Vikash Publication House, 2000.
4. Gurdeep Raj, Advanced Physical Chemistry, KrishnaPrakashan, 2003.
5. A K Chandra, Quantum Chemistry, Tata McGraw Hill, 2011.

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CHE B04: ADVANCED BIOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Metalloenzymes:

Structure and functions of the following enzymes: carbonicanhydrase, carboxypeptidase, alchoholdehydrogenase, catalalse and peroxidase, cytochrome P-450, super oxide dismutase and xanthin oxidase, coenzyme, vitamin B12.

UNIT-II

Metal Storage and Transport:

Iron storage and transport for mammalia systems, transferrin, ferritin, Transport of iron in microorganism, siderophores, types of siderophores - The catecholate siderophores (eg: enterobactin) and hydroxamate siderophores (eg: ferrichrome), Mechanism involved in binding of Iron(III) siderophores complexes to receptors and the release of Iron into the Cytoplasm. Other storage & transport systems: ceruloplasmin and serum albumin for copper, metalothioneins and phytochepatins.

UNIT-III

Metal/Nucleic Acid Interactions

Metal complexes of polynucleotide, nucleosides and nucleic acids (DNA and RNA), Fundamental interactions with nucleic acids, Fundamental reactions of transition metal complexes with nucleic acids, Applications of different Metal Complexes that bind nucleic acids.

UNIT-IV

Metal Deficiency and Diseases:

Iron, zinc and copper deficiency, metal ion toxicity, copper over load and Wilson's disease, iron toxicity, toxicity of arsenic, cadmium, mercury and lead, metal complexes in medicine – chelation therapy – BAL, penicillamine, polyamino carboxyclic acids and desferrioxamine – gold compounds and rheumatoid arthritis – platinum complexes as anticancer, drugs – metal complexes in radio diagnosis and magnetic resonance imaging.

SUGGESTED BOOKS AND REFRENCES

1. S. J Lippard & J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books.
2. S. J. Lippard, Progress in Inorganic Chemistry, Vols. 18 and 38, Wiley-Interscience.
3. I Bertini, H.B. Gray. S.J. Lippard and J. S. Valentine, Bioinorganic Chemistry, University Science Books.
4. G.L. Eichhorn (Ed.), Inorganic Biochemistry Vols I and II Elsevier.

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CHE B05 – MATERIALS AND INDUSTRIAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT – I

Industrial Chemistry : Ferrous and non-ferrous metal industries - quality control methods, general principles applied in studying an industry; manufacture of iron, steel and alloy steels; introduction to metallurgy; metallurgy of iron, aluminium, copper, gold and silver; contaminants; waste management; recycling and pollution control; deformation in metals; modes of failure analysis; an overview of corrosion & its protection; industrial shaping of metals.

UNIT –II

Cement : Classification of cement, manufacture of portland cement, setting and hardening of cement, chemical constitution of portland cement and their characteristics, special cements and their uses, Cement Industries in India.

Ceramics : Classification of ceramics, basic raw materials, manufacture and applications, components imparting colours, comparison of pottery porcelain and china ware. Glass-raw materials, manufacture and applications: special glass, optical, borosilicate, flint and coloured glasses.

UNIT III

Chemistry of Selective Materials

Solid electrolytes: AgI, $RbAg_4I_5$, β-Alumina – NASICON – Principles and Applications of solid electrolytes.

Ferroelectric, piezoelectric and pyroelectric materials – principle, properties and applications. LED – principle – types – advantages and disadvantages of LED displays

Liquid crystal display LCD – properties – twisted nematic field display – Advantages and disadvantages of LCD – comparison of LCD & LED.

Shape Memory alloys (SMA) – classification – working principles. Non linear optical materials – second harmonic generators

UNIT IV

Chemistry of Inorganic Materials : Refractories – characterization properties and applications. Microscopic composites; dispersion strengthened and particle – reinforced, fibre- reinforced composites, macroscopic composites. Nanocrystalline phase, preparation procedures, special properties and applications.

SUGGESTED BOOKS AND REFERENCES

1. Harold H. Trimm, William Hunter III, Harold Henry Trimm, Industrial Chemistry: New Applications, Processes and Systems, Apple Academic Press, Inc., 2011
2. Fontana and Greene, Corrosion Engineering; McGraw Hill Publication, 1986.
3. E. Stocchi, Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK, 1990.
4. R.M. Felder, R.W. Rousseau, Elementary Principles of Chemical Processes, Wiley, New Delhi.
5. George Austin, Shreve's Chemical Process Industries, McGraw-Hill Book Company, 1985.
6. R.M.E. Diamant, Applied Chemistry for Engineer, Pitman Publishing, 3rd Edition, 1972.
7. Alan Heaton, An Introduction to Industrial Chemistry, Springer, 1996.
8. R.N. Sherve, "Chemical process industries", McGraw-Hill, Kugakuisha Ltd., Tokyo, 1984.
9. Riegels Hand Book of Industrial Chemistry, 9th edition, J.A. Kent (Ed), New York, 1992
10. J.A. Kent, Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
11. Mark Anthony Benvenuto, Industrial Chemistry, de Gruyter GmbH, 2013.
12. S.S. Dara, S.S. Umare, A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi, 2013.
13. Study Material in vocational subject, Industrial Chemistry (UGC Sponsored).

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CHE B06: PHOTOINORGANIC CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Basic Concept

Introduction, Photochemical laws and photochemical kinetics. Physical properties of the electronically excited molecules; Photophysical processes in electronically excited molecules

UNIT-II

Photophysical Properties

Photophysical kinetics of Biomolecular processes; kinetics of collisional quenching: Stern-Volmer Equation, Concentration dependence of quenching and excimer formation, charge transfer mechanism and energy transfer mechanism.

UNIT-III

Photochemical Reactions

Photoelectochemistry of excited state redox reactions. Photosensitization. Types of Photochemical reactions; substitution, decomposition and fragmentation, rearrangement, and redox reactions, photochemistry of metallocenes.

UNIT-IV

Redox Reactions by Excited Metal Complexes

Redox reactions of metal complexes in excited states, excited electron transfer, examples using $[Ru(bpy)_3]^{2+}$ complex and $[Fe(bpy)_3]^{3+}$ complex. Role of spin-orbit coupling, life-times of excited states in these complexes.

Metal Complex Sensitizers: Electron relay, semiconductor supported metal oxide systems, water-photolysis, nitrogen fixation and carbon dioxide reduction.

SUGGESTED BOOKS AND REFERENCES:

1. K.K.Rohatagi-Mukherjee, Fundamentals of Photochemistry, WileyEastern, 1986
2. A.W. Adamson and P.D. Fleischauer, Concepts of Inorganic Photochemistry, Wiley, NY., 1975.
3. G.L.Geoffrey and M.S. Wrighton, Organometallic Photochemistry, Academic Press, 1979.
4. Inorganic Photochemistry, J. Chem. Educ. vol. 60 No. 10, 1983.
5. Coordination Chem. Revs., vol. 39, 121, 1231, 1981; 14, 321,1975; 97, 313 1990.
6. V. Balzari and V. Carassiti, Photochemistry of Coordination Compounds, Academic Press, 1970.
7. G.J. Ferraudi, Elements in Inorganic Photochemistry, Wiley, NY, 1988.
8. S.J. Lippard, ed., Progress in Inorganic Chemistry, Vol. 30. Wiley, 2009.

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CHE C04: ADVANCED CHEMICAL KINETICS - II

4 Credit (4 hrs/week)

UNIT - I

Induced Phenomena:

Induced reactions, kinetics of Induced reactions and their characteristics. Induction factor and its mechanistic significance. Mechanism of –

(i) Fe (II) induced oxidation of iodide by Cr (VI).

(ii) As (III) induced oxidation of Mn (II) by chromate in acid solutions.

(iii) Kinetics and mechanism of induced reactions in metal complexes (octahedral complexes of cobalt (III) only).

UNIT II

Metal-ion Catalysis: Kinetics and Mechanism of following Reactions

(i) When reaction rate is independent of one of the reactants in presence of metal ion catalyst.

(ii) When reaction rate is retarded by one of the products in presence of metal ion catalyst.

(iii) When metal ion catalysis indicates an intermediate species.

(iv) Cyclodextrines are acting as catalyst mode of catalysis. Analysis of one full case study of B-cyclodextrine, catalysed reaction, Hydroformylation reaction

UNIT – III

Oscillatory Reactions: Autocatalysis and oscillatory reactions, thermodynamics approach of oscillatory reactions, Kinetics and mechanism of Belousov-Zhabotinski (B-Z) reaction

Substitution Reaction: Classification of ligand substitution reaction, Kinetics and mechanism of Anation reaction, base catalyzed reaction and acid catalyzed reaction. Kinetics and mechanism of 1:1, 1:2 and 1:3 metal-substrate complexes as intermediates.

UNIT – IV

Electron Transfer Reactions in Metal Complexes:

Inner-sphere and outer-sphere reactions, Mechanism of inner sphere and outer sphere mode of electron transfer reactions. Henry Taube's classical reaction, its kinetics and mechanism, experimental analysis by chromatographic and spectroscopic techniques. Pattern of reaction via adjacent and remote attacks, linkage isomerism.

Marcus -Cross-relation in outer-sphere reactions, (no mathematical derivation) in following reactions-

$$Fe(CN)_6^{4-} + Fe(CN)_6^{3-} = Fe(CN)_6^{3-} + Fe(CN)_6^{4-}$$

$$Ce(IV) + Fe(CN)_6^{4-} = Ce(III) + Fe(CN)_6^{3-}$$

Bridged outer-sphere electron transfer mechanism.

SUGGESTED BOOKS AND REFEREN

1. Henry Taube, S Lippard (Ed.), Progress in Inorganic Chemistry, Vol 30, John Wiley & Sons, NY, 1983.
2. R. Lumry and R.W. Raymond, Electron transfer reaction, Inter-Science Publication, 1997.
3. M. L. Bender, Mechanism of homogeneous Catalysis from protein to protein. Wiley, 1971.
4. A. G. Sykes, Kinetics of Inorganic reactions, Pergamon Press, 1966.
5. S. W. Benson, Jacob Kleinberg, R. Kent Murmana, R. T. M. Fraser, John Bauman, Mechanism of Inorganic Reactions, Academic Press, 1965.
6. H Taube, Electron transfer reactions in solution, Academic Press, London, 1970.

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CHE C05: ADVANCED ELECTROCHEMISTRY – I

4 Credit (4 hrs/week)

UNIT-I

Electrochemical analysis

Introduction to electrochemical methods, electrochemical cells, diffusion controlled limiting current, voltage scanning polarography, shape and interpretation of polarographic wave, current –voltage relationship during electrolysis. General Principle and applications of Linear Sweep Voltammetry (LSV), Cyclic Voltammetry (CV), Square Wave Voltammetry (SWV), and Differential pulse Voltammetry (DPV). Stripping voltammetry: Principle, classification and Applications.

UNIT-II

Electro-catalysis

Chemical catalysis and Electro-catalysis, cathodic and anodic electro catalysis; electrocatalysis of mixed oxides of titanium dopped with rare earth oxides (Ebonex); Electrolysis in simple redox reactions. Electrocatalysis of bimettalic nanostructured materials.

Photoelectrochemistry: introduction, Principle of photoelectrochemistry, types of photoassisted redox reaction, organic photo-electrochemical reactions. Examples of some abnormal electro-organic synthesis.

UNIT-III

Electro-organic Synthesis

Types of electro organic reactions, constant current and constant potential electrolysis, cell design, effect of variable, nature of medium, nature of electrode materials, over-voltage, effect of redox couple, application to sewage waste water treatment, electro-chemical incineration of human waste in combined space. Electro-organic synthesis of novel drugs.

UNIT-IV

Electrochemical Sensors

Electrochemical Sensors for Nitric Oxide (NO), pesticides, glucose and superoxide species, Electrochemical sensors based on carbon nano tubes and their applications.

Energy Options: Hydrogen Economy, Introduction, Hydrogen Production, Hydrogen Transmission, storage and distribution, Hydrogen fueled equipments, local electricity production from hydrogen, Hazards and safety aspects of hydrogen.

SUGGESTED BOOKS AND REFERENCES

1. Joseph Wang, Analytical Electrochemistry, Wiley-VCH Publication, 1998.
2. Zhang, Ju and Joseph Wang, Electrochemical Sensors, Biosensors and their Bio-medical Applications, Academic Press, Elsevier, 2008.
3. A. J. Fry and W. E. Britton, Topics in Organic Electrochemistry, Plenum publishing press, New York, 1981.
4. Baizer Organic Electrochemistry, Marcel Dekker Press, 1980.
5. D K Sharma, Electrochemical Incineration of human waste in confined spaces, Lambert Publications, Germany, 2012.
6. Bockris and Reddy, Modern Electrochemistry, Volume 2A & 2B, Springer.
7. Brett and Brett, Electrochemistry: Principle and Applications, Oxford Press, 2005.

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CHE C06: ADVANCED NANOSCIENCE AND NANOTECHNOLOGY

4 Credit (4 hrs/week)

UNIT-I

Nanoscience and Nanotechnology

Basic concepts of Nano science and technology, Quantum wire, Quantum well, Quantum dot, Properties and technological advantages of Nano materials, Material processing by Sol. Gel method, Chemical Vapour deposition and Physical Vapour deposition methods

UNIT II

Synthesis

Top-down (Nanolithography, CVD), Bottom-up (Sol-get processing, chemical synthesis). Wet Deposition techniques, Self-assembly (Supramolecular approach), Characterization TEM, SEM and SPM technique, Fluorescence Microscopy and Imaging.

Use of bacteria, fungi, Actinomycetes for nanoparticle synthesis, Magnetotactic bacteria for natural synthesis of magnetic nanoparticles; Viruses as components for the formation of nanostructured materials; Synthesis process and application, Role of plants in nanoparticle synthesis.

UNIT III

Nanoscale Carbon

Introduction –Carbon molecules-nature of the carbon bond-new carbon structures-discovery of C60-structure of C60 and its crystal- From a Graphene Sheet to a Nanotube, Single wall and Multi walled Nanotubes, Zigzag and Armchair Nanotubes, Euler's Theorem in Cylindrical and Defective Nanotubes.

History Molecular and Super molecular Structure-Intrinsic properties of individual carbon nano tubes-Synthesis -Arcing in the present and absent of catalyze-laser method-Chemical Vapour Deposition - ball milling.

UNIT IV

Applications

Solar energy conversion and catalysis, Polymers with a special architecture, Liquid crystalline systems, Applications in displays and other devices, Advanced organic materials for data storage, Photonics, Plasmonics, Chemical, electrochemical and biosensors, Nanomedicine, Nanofoods, Nano-cosmetics and Nanobiotechnology.

SUGGESTED BOOKS AND REFERENCES

1. B. Vishwanathan, Nano materials, Narosa Publication, 2009.
2. Foster Lynn E, Nanotechnology, Pearson education, 2005.
3. T. Varghese and K M Balakrishna, Nanotechnology, Thomas Atlantic Publication, 2005.
4. J.J. Ramsden, Nanotechnology: An Introduction, Elesevier Publication, 2004
5. B.K. Parathasarathy, An Introduction to Nanotechnology, Isha publication, 2007.
6. K.K. Chartopadhyay, Introduction to Nanoscience and Nanotechnology, PHI Publication, 2009.
7. Frank Owens, Introduction to Nanotechnology, Wiley, 2007.

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CHE D05: HETEROCYCLIC CHEMISTRY – II

4 Credit (4 hrs/week)

UNIT – I

Five-membered Heterocycles with more than two Heteroatoms: Synthesis and reactions of triazoles, tetrazoles, oxadiazoles, thiadiazoles and diazaphospholes.

Meso-ionic Heterocycles: General classification, chemistry of some important meso-ionic heterocycles of type A and B and their applications.

UNIT –II

Six-Membered Heterocycles with one Heteroatom: Synthesis and reactions of pyrylium salts, pyrones, coumarins, chromones and phosphorine (phosphabenzene).

Six-Membered Heterocycles with two or more Heteroatoms: Synthesis and reactions of diazines, triazines, tetrazines and azaphosphorine.

UNIT –III

Oxazines, Benzoxazines; synthesis and reactions.

Thiazines, 1,4-benzothiazines and phenothiazines; synthesis and reactions.

Diazepines, 1,4- or 1,5-benzodiazepines; synthesis and reactions.

Thiazepines, 1,4- or 1,5-benzothiazepines; synthesis and reactions.

UNIT-IV

Large membered heterocycles

Eight-membered : 1-Azocine, Diazocine, synthesis and reactions.

Nine-membered : 1-Azonine, 2-Oxonine, synthesis and reactions.

Ten or large membered rings, synthesis and reactions.

SUGGESTED BOOKS AND REFERENCES

1. R.R. Gupta, M. Kumar and V. Gupta, Heterocyclic Chemistry Vol 1-3, Springer Verlag, 1998, 1999 & 2006.
2. T Eicher and S. Hauptmann, The Chemistry of Heterocycles, Wiley-VCH, 2003.
3. J.A. Joule, K. Mills and G.F Smith, Heterocyclic Chemistry, Chapman and Hall, 1995.
4. T.L. Gilchrist, Heterocyclic Chemistry, Longman Scientific & Technical, 1992.
5. G.R. Newkome and W. W. Paudler, Contemporary Heterocyclic Chemistry. Wiley Inter Science, 1982.
6. A.R. Katrizky & C W Rees (eds), Comprehensive Heterocyclic Chemistry, Pergamon Press, 1984.

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CHE D06: NATURAL PRODUCTS – II

4 Credit (4 hrs/week)

UNIT-I

Extraction Techniques for Natural Products

Supercritical Fluid Extraction – Introduction, Principle of Solvent-Free Extraction Process, Applications to the extraction of natural products.

Microwave Assisted Extraction – Introduction, Principle of the method and heating mechanism Instrumentation, Applications to the extraction of natural products.

Ultrasound Assisted Extraction – Introduction, Principle of the method, nstrumentation, Applications to the extraction of natural products.

Pressurised Solvent Extraction- Introduction, instrumentation, Applications to the extraction of natural products

UNIT –II

Isolation and Separation of Natural Products

Isolation of Natural Products by Low-Pressure Column Chromatography – Introduction, Separation Processes (Adsorption & Size Exclusion), Types of Stationary Phases: Adsorption Stationary Phases and Size-Exclusion Stationary Phases. Column Operation - Selection of Stationary Phase, Column Packing and Equilibration, Sample Application, Column Development and detection.

Planar Chromatography - Introduction, Basic Principles of TLC, Mechanisms of Separation, Applications of TLC, System Selection and Choice of Development. Detection of Natural Products in TLC: Ultraviolet detection and Spray Detection. Preparative Thin-Laye Chromatography (PTLC) - Introduction, Scale Up from Analytical to PTLC, Commercially Available PTLC Plates, Sample Application, Development and Detection, Desorption and Recovery of Natural Products. Assessment of purity by TLC. Techniques for Detection of Phytochemical Groups in Extracts. .

UNIT -III

Biosynthesis of Natural Products

Introduction, Applications of Condensation reaction, Alkylation Reactions and Wagner-Meerwein Rearrangements to synthesis of natural products. Mevalonate biosynthetic pathway. Biosynthesis of fatty acids, aromatic rings and Pyridoxal Phosphate.

UNIT –IV

Structure elucidation of Some Naturally occurring compounds

Structure elucidation of ferulic acid, beta-sitosterol, stigmasterol, curcumin e, plumericin, Abietic acid, taxol, lanosterol, lupeol, strychnine, camptothecin, Usnic acid and quercetin by IR, UV, NMR and mass spectral data.

SUGGESTED BOOKS AND REFERENCES

1. J. Mann, Secondary Metabolism, 2nd Edition, Oxford University Press, 1987.
2. J. Mann, Chemical aspects of Biosynthesis, Oxford University Press, 1995.
3. P. Yates, W.A. Benjamin, Structure Determination, Inc., New York, 1967
4. E. Manitto, Biosynthesis of Natural Products. John Wiley & Sons, 1981.
5. From Biosynthesis to Total Synthesis: Strategies and Tactics for Natural Products, Alexandros L. Zografos, Wiley, ISBN: 978-1-118-75173-2
6. Natural Products Isolation, Edited by Satyajit D. Sarker, Humana Press Inc. New Jersey, 2006 Second Edition.
7. Natural Products Chemistry: Sources, Separations and Structures, R Cooper G Nicola, CRC press, 2015.
8. Recent Extraction Techniques for Natural Products: Microwave-assisted Extraction and Pressurised Solvent Extraction, B. Kaufmann and P. Christen, *Phytochem. Anal.* 13, 105–113 (2002).
9. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/lipids.htm#synth

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CHE D07: MEDICINAL CHEMISTRY – II

4 Credit (4 hrs/week)

UNIT-I

Antineoplastic agents : Introduction to cancer chemotherapy, Classification of antineoplastic agents. role of alkylating agents and antimetabolites in treatment of cancer. Carcinolytic antibiotics and mitotic inhibitors. Synthesis of Cyclophosphamide, Melphalan, Fluorouracil. Recent development in cancer chemotherapy.

Local Antiinfective drugs : Introduction. Synthesis and general mode of action of Furazolidone, Ciprofloxacin, Dapsone, Isoniazid, Fluconazole. Antimalarials: Synthesis and general mode of action of Chloroquin.

UNIT-II

Cardiovascular Drugs : Introduction, Classification and general mode of action, Cardiovascular disease, drug inhibitors of peripheral sympathetic function, Synthesis of Sorbitrate, Diltiazem, Verapamil, Methyldopa, Atinolol.

Diuretics : Introduction, Classification and general mode of action, Synthesis of Acetazolamide, Chlorothiazide, Frusemide, Spironolactone, Triamterene.

Hypoglycaemic Agents : Introduction, General mode of action, Insulin and insulin preparations, Oral hypoglycemic agents: Classification, Synthesis of Tolbutamide.

UNIT-III

Psychoactive drugs : Introduction, Neurotransmitters, CNS depressants, general anaesthetics, mode of action of hypnotics, sedatives, antianxiety drugs.

Anticonvulsant Drugs : Introduction, Classification and general mode of action, synthesis of Phenytoin sodium, Troxidone, Ethosuximide, Primidone.

Antiviral Drugs : Introduction, Classification and general mode of action, synthesis of Amantadine Hydrochloride, Idoxuridine, Methisazone.

UNIT-IV

Antibiotics : Antibiotics inhibiting protein synthesis, β-lactam rings. Synthesis of Penicillin-G, Ampicillin, Amoxycillin, Chloramphenicol, Cephalosporin, Tetracyclin and Streptomycin.

Antihistamines : Introduction, Classification and general mode of action, Synthesis of Pheniramine, Promethazine, Ranitidine, Sodium Cromoglycate.

Analgesics and Antipyretics : Classification, Nonnarcotic analgesic. Synthesis of Mefenamic acid, Diclofenac.

SUGGESTED BOOKS AND REFERENCES

1. J. Stringer, Basic Concepts in Pharmacology (3rd edn.), McGraw-Hill Professional, 2005.
2. B. Katzung, Basic and clinical pharmacology (11th edn.), McGraw-Hill medical, 2009.
3. A. Burger, M.E. Wolff, Medicinal Chemistry and Drug Discovery, Vol-I, John Wiley, 1994.
4. Goodman & Gilman, Pharmacological basis of Therapeutics, McGraw-Hill, 2005.
5. S.S. Pandeya & J.R Dimmock, Introduction to drug design, New Age International, 2000.
6. A. Kar, Medicinal Chemistry, New Age International, 2007.
7. H. Singh & V. K. Kapoor, Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, New Delhi, 2004.
8. D. Lednicer, Strategies for organic drug Synthesis and Design, John Wiley, 1998.
9. A. Gringauz, Introduction to Medicinal Chemistry: How drugs act and Why? John Wiley and Sons, 1997.
10. Graham and Patrick, Introduction to medicinal Chemistry (3rd edn.), OUP, 2005.

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CHE E03: PHARMACEUTICAL CHEMISTRY II

4 Credit (4 hrs/week)

Unit I

Dosage Form Design

Need for dosage form, General considerations for dosage form design, Definition and types of pharmaceuticals ingredients and excipients, Flavouring, sweetening and colouring pharmaceuticals,Preservatives -sterilization and preservation, preservative selection, general consideration, and mode of action

Unit II

Solid Modified –Release Drug Delivery System

Rationale for extended release pharmaceuticals, Drug candidates for extended-release products, Extended-release technology for oral dosage forms, Delayed- release oral dosage forms.

Transdermal drug delivery systems

Transdermal drug delivery systems- introduction, factors affecting percutaneous absorption, percutaneous absorption enhancers, Advantages and disadvantages of TDDSs

Unit III

Novel Dosage Forms

Novel drug delivery systems- introduction and composition, Iontophoresis (IP) and phonophoresis, Mucoadhesive system, Medicated gums, Intravaginal drug delivery system, Intrauterine progesterone drug delivery system , Bioadhesive vaginal gel, Dinoprostone Vaginal Insert, Estring Long-acting parenteral systems, Liposomes as drug delivery vehicles

Unit IV

Products of Biotechnology

Introduction, Techniques for the production of biotechnologic products, Products of biotechnology such as Anticoagulant Drug: Lepirudin (Refludan) Antisense Drugs: Fomivirsen Sodium (Vitravene), Erythropoietins, Epoetin Alfa, Growth Factor: Becaplermin, Human Growth Hormone, Systemic Growth Hormone, Interferons and Interleukins

BOOKS AND REFERENCES

1. Organic Medicinal and Pharmaceutical Chemistry, John M. Beale, Jr., John H. Block, Wolters Kluwer
2. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Wolters Kluwer
3. Drug delivery : principles and applications , Binghe Wang, Teruna Siahaan, Richard soltero, John Wiley & Sons,

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CHE E04: ADVANCED PHARMACEUTICAL CHEMISTRY

4 Credit (4 hrs/week)

UNIT-I

Biotechnological Applications of Enzymes

Large-scale production and purification of enzymes, techniques and methods of immobilization of enzymes, effect of immobilization on enzyme activity, application of immobilized enzymes, use of enzymes in food and drink industry-brewing and cheese-making, syrups from crown starch, enzymes as targets for drug design. Clinical uses of enzymes, enzyme therapy, enzymes and recombinant DNA technology.

UNIT II

Prodrugs Approaches to Drug Delivery

Introduction, Basic concepts: definition and applications, Prodrug design considerations, Prodrugs of various functional groups- Ester prodrugs of compounds containing -COOH or -OH, Prodrugs of compounds containing amides, imides, and other acidic NH (Mannich bases and N-a-Acyloxyalkyl derivatives, Prodrugs of amines, Prodrugs for compounds containing carbonyl groups

UNIT III

Radiopharmaceutical:

Introduction, Background information, Therapeutic use of radiopharmaceuticals, Representative radiopharmaceutical drugs and primary uses, Mode of actions of some important radiopharmaceuticals such as Technetium-99 m, Strontium-89 Chloride, Yttrium-90 and Thallous 201 Chloride.

UNIT IV

Non radioactive Pharmaceuticals in Nuclear Medicine

Introduction, Mode of action and use of Acetazolamide, Cimetidine, Dipyridamole Adenosine, Furosemide and Vitamin B12, Practice of nuclear pharmacy, Procurement and storage.

SUGGESTED BOOKS AND REFERENCES

1. Bioorganic Chemistry: A chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.
2. Understanding Enzymes, Trevor Palmer, Prentice Hall.
3. Enzyme Chemistry: Impact and Applications, Ed. Collin J Suckling, Chemistry.
4. Drug Delivery: Principles and Applications, BingheWanget.al., Wiley Interscience
5. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen junior et al., Wolters Kluwel

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CHE A21: PROJECT WORK

Project Work: 12 Credits (180 hrs)
EoSE: Max. Marks: 100

Project report duly signed by the project guide will be submitted at the end of Project work. The EoSE assessment of the Project Work shall be as per University guidelines.

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GLOBAL P.G. COLLEGE
(Affiliated to University of Rajasthan)
Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Master of Science (Mathematics)

Duration – 2 Years

GLOBAL P.G. COLLEGE

(Affiliated to University of Rajasthan)

Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn both basic and advanced areas of mathematics, including algebra, analysis, topology, differential equations, and applied mathematics.

PEO2: Students will develop professional skills, follow ethical practices, and pursue continuous learning for careers in academia or industry.

PEO3: Students will learn to use mathematical thinking and methods to solve both theoretical and real-world problems.

PEO4: Students will clearly understand their chosen subjects, useful topics, which will help them in higher studies or getting jobs.

PEO5: Students will be prepared for careers in teaching, research, and industries requiring strong mathematical skills.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will learn, understand, and apply advanced mathematical concepts and methods to solve problems.

PO2: Students will learn to develop models and solve complex problems in both pure and applied mathematics.

PO3: Students will learn to apply statistical methods to model, analyze, and visualize mathematical problems.

PO4: Students will apply mathematical knowledge to conduct research in various fields and solve real-world problems.

PO5: Students will apply critical thinking, logical reasoning, and sound decision-making in research and professional work.

PSO1: Students will study advanced topics in pure and applied mathematics to prepare for research, teaching, and careers in related fields.

PSO2: Students will apply analytical methods to model, study, and solve real-world problems in science, engineering, and industry.

PSO3: Students will integrate their mathematical knowledge with other fields to solve complex problems in science, technology, and industry.

PSO4: Students will develop problem-solving skills using logical reasoning, numerical methods, and abstract concepts.

PSO5: Students will be prepared for higher studies such as Ph.D., competitive exams, and professional certifications in mathematics and related fields.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

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UNIVERSITY OF RAJASTHAN
JAIPUR

SYLLABUS

M.A./M.SC. MATHEMATICS
Semester Scheme

I/II Semester Examination 2024-2025
III/IV Semester Examination 2025-2026

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University of Rajasthan, Jaipur

M.A./M.Sc. Syllabus in Mathematics as per new scheme: credit-based Semester System (Four Semesters in two years) with continuous assessment [30% with non-inclusion in Cumulative Grade point average (CGPA)].

To obtain a Master's Degree M.A./M.Sc. in Mathematics, a candidate is required to earn 120 credits with grade E or higher. For this each Semester will offer 36 credits. To earn credits for a paper, a candidate shall be required to obtain grade E or higher (or equivalent marks percentage) in the theory/practical examination. A candidate has to pass in the continuous assessment (internal) as well as in that paper separately. However, the grade point/marks obtained in the continuous assessment will not be included in Semester Grade Point Average (SGPA). In continuous assessment and End of Semester Examination (EoSE) separate grades will be awarded. The candidate will not be permitted to appear in EoSE of a particular credit (i) if he/she does not meet out 75% attendance requirement, or (ii) he/she fails to secure a Semester Grade Point Average (SGPA) of 1.5 in the continuous assessment.

The Credit Courses have been classified as

a) Compulsory Core Courses (CCC)

b) Elective Core Courses (ECC)

A course is identified by a course code designated by a string of six alphanumeric characters and a course title. In a course code the first three characters of the string indicate the Department offering the course and the later three alphanumeric characters designate a particular course. In the case of compulsory core course the fourth character identifies the semester numeric digit and in case of the elective core courses the fourth character indicates the cluster of specialization. For compulsory or elective theory core courses the fifth character is '0' and for laboratory core course it is '1'.

First Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours per week	EoSE Duration (Hrs.)
1.	MAT 701	Algebra-I	CCC	6	6	3
2.	MAT 702	Real Analysis	CCC	6	6	3
3.	MAT 703	Differential Equations-I	CCC	6	6	3
4.	MAT 704	Differential Geometry	ECC	6	6	3
5.	MAT 705	Dynamics of Rigid Bodies	ECC	6	6	3
6.	MAT 706	Calculus of Variation and Special Function-I	ECC	6	6	3
		Total Credits in the Semester		36		

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Second Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours per week	EoSE Duration (Hrs.)
1.	MAT 801	Algebra-II	CCC	6	6	3
2.	MAT 802	Topology	CCC	6	6	3
3.	MAT 803	Differential Equations-II	CCC	6	6	3
4.	MAT 804	Riemannian Geometry and Tensor Analysis	ECC	6	6	3
5.	MAT 805	Hydrodynamics	ECC	6	6	3
6.	MAT 806	Special Functions-II	ECC	6	6	3
		Total Credits in the Semester		36		

EoSE : End of Semester Examination

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Elective Core Courses

Specialization Clusters

A. CM Continuum Mechanics
B. BLT Boundary Layer Theory
C. MP Mathematical Programming
D. CGT Combinatorics and Graph Theory
E. ITE Integral Transforms and Integral Equations
F. RC Relativity and Cosmology
G. IM Industrial Mathematics
H. MHD Magnetohydrodynamics
I. NA Numerical Analysis
J. CA Computer Applications

Elective Course	Specialization	Paper	Prerequisite	Credit
MAT A01	CM	Continuum Mechanics-I	-	6
MAT A02	CM	Continuum Mechanics-II	MAT A01	6
MAT B01	BLT	Boundary Layer Theory-I	-	6
MAT B02	BLT	Boundary Layer Theory-II	MAT B01	6
MAT C01	MP	Mathematical Progamming-I	-	6
MAT C02	MP	Mathematical Programming-II	MAT C01	6
MAT D01	CGT	Combinatorics and Graph Theory-I	-	6
MAT D02	CGT	Graph Theory-II	MAT D01	6
MAT F01	RC	Relativistic Mechanics	-	6
MAT F02	RC	General Relativity and Cosmology	MAT F01	6
MAT G01	IM	Industrial Mathematics-I	-	6
MAT G02	IM	Industrial Mathematics-II	MAT G01	6
MAT H01	MHD	Magnetohydrodynamics-I	-	6
MAT H02	MHD	Magnetohydrodynamics-II	MAT H01	6
MAT I01	NA	Numerical Analysis-I	-	6
MAT I02	NA	Numerical Analysis-II	MAT I01	6
MAT J01	CA	Computer Applications-Theory	-	6
MAT J11	CA	Computer Applications-Practical	MAT J01	6

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Third Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours per week	EoSE Duration (Hrs.)
1.	MAT 901	Functional Analysis-I	CCC	6	6	3
2.	MAT 902	Viscous Fluid Dynamics-I	CCC	6	6	3
3.	MAT 903	Integral Transforms	CCC	6	6	3

Candidates are required to opt any four elective core courses (6 credits each) from MAT A01, MAT B01, MAT C01, MAT D01, MAT F01. MAT G01, MAT H01, MAT I01, MAT J01.

Total Credits in the Semester 36

Fourth Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours per week	EoSE Duration (Hrs.)
1.	MAT X01	Functional Analysis-II	CCC	6	6	3
2.	MAT X02	Viscous Fluid Dynamics-II	CCC	6	6	3
3.	MAT X03	Integral Equations	CCC	6	6	3

Candidates are required to opt the corresponding four elective core courses of same specialization cluster obtained in Semester Third (6 credits each) from MAT A02, MAT B02, MAT C02, MAT D02, MAT F02. MAT G02, MAT H02, MAT I02, MAT J11.

Total Credits in the Semester 36

Program Outcomes (PO)

PO1: To expose students various branches of pure and applied mathematics such as algebra, analysis, topology, fluid dynamics, boundary layer theory, integral transforms, numerical analysis etc.

PO2: The program enables students to enrich with appreciation for ideas amenable to mathematical treatment.

PO3: The program is a launching pad for research wherein mathematics comes out to be great support in terms of theoretical construct and practical applications.

PO4: The program enables students to take on research in interdisciplinary research endeavours.

PO5: The program being bouquet of various domains of mathematical branches enable students to inculcate appreciation for mathematical rigour.

PO6: Program offers opportunities for students to be a quality teacher and researcher.

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PO7: The program traces the journey of mathematical domains involved ideas intertwined with applications and infuse natural urge for possible further enrichment.

Program Specific Outcomes (PSO)

PSO1: The program would facilitate robust understanding of ideas and mathematical construct in the fields of core subjects such as algebra, analysis and topology, graph theory, differential geometry, numerical analysis, fluid dynamics, integral transforms etc.

PSO2: The program would facilitate students to enrich knowledge in applied mathematics viz. numerical analysis, boundary layer theory, magnetohydrodynamics, graph theory, mathematical programming etc.

PSO3: The program would enable students to imbibe various concepts in diverse mathematical domains.

PSO4: The program would help students enriched with mathematical skills to take on further studies in mathematics.

PSO5: The program would create a launching pad for interdisciplinary research in real-world problems where mathematics could be a pertinent designing tool.

PSO6: The program would enable students to take on carriers where robust understanding of mathematics is a prerequisite.

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MA/M.Sc. Mathematics Examination
Scheme of Examination
Semester I and II

Semester – I

Note: Continuous assessment (internal) will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate.
Maximum marks in continuous assessment of each paper is 100.

Paper- 1: MAT 701 : Algebra-I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT- 701 Algebra-I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT- 701	Algebra-I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of advanced concepts in group theory and field theory. Students will explore the structure and classification of groups through the direct product, isomorphism theorems, and Sylow's theorems. Additionally, the course will cover essential topics in field theory, including polynomial rings, extension fields, and Galois theory, enabling students to analyze the solvability of polynomial equations and understand the relationships between algebraic structures.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain

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four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Analyze various algebraic structures and associated properties in the form of lemma and theroems:** Demonstrate a thorough understanding of the direct product of groups, isomorphism theorems, and conjugate classes, with the ability to apply these concepts to solve problems in group theory.
2. **Evaluate Normal Series and Solvability:** Examine the concepts of commutators, derived subgroups, normal series, and solvable groups, and apply the Jordan-Hölder theorem to categorize and refine group structures.
3. **Apply Field Theory Principles:** Understand and apply irreducibility criteria in polynomial rings, identify different types of extension fields, and differentiate between algebraic and transcendental extensions.
4. **Utilize Galois Theory:** Analyze the connections between field extensions and group theory through Galois theory, including the fundamental theorem of Galois theory, and evaluate the solvability of polynomial equations by radicals, particularly addressing the insolvability of the general equation of degree five.
5. **Apply Abstract Mathematical theories**, such as group theory, field theory, and Galois theory, to real-world applications, including securing online communications, simulating physical systems, and solving complex engineering problems, thereby recognizing the profound impact of these concepts on technology and the natural sciences.

Unit-1

Direct product of groups (External and Internal). Isomorphism theorems – Diamond isomorphism theorem, Butterfly Lemma, Conjugate classes (Excluding p-groups). Sylow's theorems (without proof), Cauchy's theorem for finite abelian groups.

Unit - 2

Commutators, Derived subgroups. Normal series and Solvable groups, Composition series, Refinement theorem and Jordan-Holder theorem for infinite groups.

Unit - 3

Polynomial rings and irreducibility criteria. Field theory – Extension fields, Algebraic and Transcendental extensions, Separable and inseparable extensions, Normal extensions. Splitting fields.

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Unit -4 Galois theory – the elements of Galois theory, Automorphism of extensions, Fundamental theorem of Galois theory, Solutions of polynomial equations by radicals and Insolvability of general equation of degree five by radicals.

Reference Books:

1. Deepak Chatterjee, Abstract Algebra, Prentice – Hall of India (PHI), New Delhi, 2004
2. N.S.Gopalkrishnan, University Algebra, New Age International, 1986.
3. Qazi Zameeruddin and Surjeet Singh, Modern Algebra, Vikas Publishing,2006
4. D. S. Chauhan and K. N. Singh, Studies in Algebra, JPH, 2006
5. G.C.Sharma, Modern Algebra, Shivlal Agrawal & Co., Agra,1998.
6. Joseph A. Gallian, Contemporary Abstract Algebra (4th Ed.), Narosa Publishing House, 1999.
7. David S. Dummit and Richard M. Foote, Abstract Algebra (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd, Singapore, 2004.
8. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra (4th Edition), Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
9. I.N. Herstein, Topics in Algebra (2nd edition), John Wiley & Sons, 2006.
10. Michael Artin, Algebra (2nd edition), Pearson Prentice Hall, 2011.

Paper – 2 : MAT 702 : Real Analysis
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT 702 : Real Analysis**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	**MAT 702**	**Real Analysis**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a deep understanding of measure theory and its applications in real analysis. Through a systematic exploration of algebra of sets, measurable functions, and convergence, students will gain the foundational knowledge necessary to work with Lebesgue measure and integration. The course will also					

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	introduce students to key theorems related to function approximation and Fourier analysis, equipping them with the tools to analyze and manipulate functions in various mathematical contexts.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. Understand Measure Theory: Develop understanding of algebra of sets, Borel sets, and Lebesgue measure, including the definitions and properties of measurable and non-measurable sets.
2. **Analyze Measurable Functions:** Identify and construct measurable functions, realizing non-negative measurable functions as limits of increasing sequences of simple functions, and apply convergence concepts in measure.
3. **Apply Integral Theory:** Utilize the Lebesgue integral for bounded measurable functions, demonstrating knowledge of Weierstrass's theorem on function approximation and the passage to the limit under the integral sign.
4. **Explore Summability and Fourier Analysis:** Investigate summable functions and the space of square summable functions, applying Parseval's identity and understanding the Riesz-Fisher theorem in the context of Fourier series.
5. The ideas taught in this paper would create an appreciation of involved intricacies having applications in telecommunications, data compression, financial engineering, and medical imaging, while gaining proficiency in applying these theories to practical challenges in science, engineering, and technology.

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Unit - 1

Algebra and algebras of sets, Algebras generated by a class of subsets, Borel sets, Lebesgue measure of sets of real numbers, Measurability and Measure of a set, Existence of Non-measurable sets.

Unit - 2

Measurable functions, Realization of non-negative measurable function as limit of an increasing sequence of simple functions, Structure of measurable functions, Convergence in measure, Egoroff's theorem.

Unit - 3

Weierstrass's theorem on the approximation of continuous function by polynomials, Lebesgue integral of bounded measurable functions, Lebesgue theorem on the passage to the limit under the integral sign for bounded measurable functions.

Unit - 4

Summable functions, Space of square summable functions. Fourier series and coefficients, Parseval's identity, Riesz-Fisher Theorem.

Reference Books:

1. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co., N.D., 1995.
2. S.C.Malik and Savita Arora, Mathematical Analysis, New Age International, 1992.
3. T. M. Apostol, Mathematical Anslysis, Narosa Publishing House, New Delhi, 1985.
4. R.R. Goldberg, Real Analysis, Oxford & IBH Publishing Co., New Delhi, 1970.
5. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
6. Walter Rudin, Real and Complex Analysis, Tata McGraw-Hill Pub. Co. Ltd., 1986.
7. I.N. Natansen, Theory of Functions of a Real Variable, Fredrik Pub. Co., 1964.

Paper – 3 : MAT 703 : Differential Equations- I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 703 : Differential Equations- I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits

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I	MAT 703	Differential Equations- I				6
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**
		Theory	**Practical**	**Total**		
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of non-linear ordinary differential equations (ODEs) and partial differential equations (PDEs). Students will explore various solution techniques for specific forms of ODEs, including Riccati's equation and total differential equations, as well as series solutions and methods applicable to second-order PDEs. This foundational knowledge will enable students to analyze complex dynamical systems and understand the geometrical interpretations of differential equations.				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Solve Non-linear ODEs:** Analyze and solve non-linear ordinary differential equations, particularly Riccati's equation, utilizing known particular solutions to derive general solutions.
2. **Understand Total Differential Equations:** Recognize forms of total differential equations, apply necessary and sufficient conditions for their solutions, and interpret their geometric meanings, including those involving three and four variables.
3. **Apply Series Solution Techniques:** Determine the radius of convergence for series solutions, differentiate power series, and solve Cauchy-Euler equations and problems near regular singular points using the method of Frobenius.

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4. **Address Second-Order PDEs:** Employ Monge's method to solve partial differential equations of second order with variable coefficients, demonstrating an understanding of the complexities involved in such equations.
5. **Communicate Mathematical Concepts:** Effectively communicate the methods and solutions of differential equations through written reports and presentations, showcasing the ability to articulate complex mathematical ideas clearly.

Unit - 1

Non-linear ordinary differential equations of particular forms. Riccati's equation –General solution and the solution when one, two or three particular solutions are known.

Unit - 2

Total Differential equations. Forms and solutions, necessary and sufficient condition, Geometrical Meaning Equation containing three and four variables, total differential equations of second degree.

Unit - 3

Series Solution: Radius of convergence, method of differentiation, Cauchy-Euler equation, Solution near a regular singular point (Method of Forbenius) for different cases, Particular integral and the point at infinity.

Unit - 4

Partial differential equations of second order with variable co-efficients- Monge's method.

Reference Books:

1. J.L.Bansal and H.S.Dhami, Differential Equations Vol-II, JPH, 2004.
2. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
3. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
4. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.
5. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
6. Frank Ayres, Theory and Problems of Differential equations, TMH, 1990.
7. D.A. Murray, Introductory Course on Differential Equations, Orient Longman,1902.
8. A.R.Forsyth, A Treatise on Differential Equations, Macmillan & Co. Ltd., London, 1956.

Paper- 4 : MAT 704 : Differential Geometry
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT 704 : Differential**	**3 Hrs**	**100**	

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	Geometry			

Semester	**Code of the Course**	**Title of the Course/Paper**				**NHEQF Level**	**Credits**
I	**MAT 704**	**Differential Geometry**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with an in-depth understanding of differential geometry, focusing on the properties and characteristics of curves and surfaces in three-dimensional space. Students will explore fundamental concepts such as curvature, torsion, and the various forms and metrics of surfaces. This foundational knowledge will enable them to analyze and apply geometric principles to both theoretical and practical problems in mathematics and physics.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Analyze Space Curves:** Understand and compute the properties of space curves, including tangent, curvature, and torsion, and apply Serret-Frenet formulas to describe their geometric behavior.

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2. **Characterize Surfaces:** Identify and categorize various types of surfaces, including ruled and developable surfaces, and apply the necessary conditions for a surface to be classified as developable.
3. **Compute Principal Curvatures:** Determine normal curvature, principal directions, and mean curvature, and relate these concepts to the fundamental forms associated with surfaces.
4. **Explore Asymptotic Lines:** Derive and solve differential equations related to asymptotic lines, and compute the curvature and torsion of these lines while applying Gauss's formulas and Weingarten equations.
5. **Apply Differential Geometry Concepts:** Utilize the fundamental existence theorem for surfaces and analyze Gaussian and mean curvature in the context of parallel surfaces, demonstrating a comprehensive understanding of differential geometry principles.

Unit - 1

Space curves, Tangent, Contact of curve and surface, Osculating plane, Principal normal and Binormal, Curvature, Torsion, Serret-Frenet's formulae, Osculating circle and Osculating sphere, Existence and Uniqueness theorems, Bertrand curves, Involute and Evolutes.

Unit - 2

Conoids, Inflexional tangents, Singular points, Indicatrix. Ruled surface, Developable surface, Tangent plane to a ruled surface. Necessary and sufficient condition that a surface $\zeta = f(\xi,\eta)$ should represent a developable surface. Metric of a surface, First, Second and Third fundamental forms. Fundamental magnitudes of some important surfaces, Orthogonal trajectories.

Unit - 3

Normal curvature. Pricipal directions and Principal curvatures, First curvature, Mean curvature, Gaussion curvature, Radius of curvature of a given section through any point on $z = f(x,y)$. Lines of curvature, Principal radii, Relation between fundamental forms.

Unit - 4

Asymptotic lines, Differential equation of an asymptotic line, Curvature and Torsion of an asymptotic line. Gauss's formulae, Gauss's characteristic equation, Weingarten equations, Mainardi-Codazzi equations. Fundamental existence theorem for surfaces, Parallel surfaces, Gaussian and mean curvature for a parallel surface.

Reference Books:

1. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.
2. Mittal and Agarwal, Differential Geometry, Krishna publication, 2014.

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3. Barry Spain, Tensor Calculus, Radha Publ. House Calcutta,1988.
4. J.A. Thorpe, Introduction to Differential Geometry, Springer-Verlog , 2013.
5. T.J. Willmore - An Introduction to Differential Geometry. Oxford University Press.1972.
6. Weatherbum, Reimanian Geometry and Tensor Clculus, Cambridge Univ. Press, 2008.
7. Thorpe, Elementary Topics in Differential Geometry, Springer Verlag, N.Y. (1985).
8. R.S. Millman and G.D. Parker, Elements of Differential Geometry, Prentice Hall, 1977.

Paper- 5 : MAT 705: Dynamics of Rigid Bodies
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT 705: Dynamics of Rigid Bodies**	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 705	Dynamics of Rigid Bodies					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of classical mechanics, focusing on the dynamics of rigid bodies and the principles governing their motion. The course will cover fundamental concepts such as D'Alembert's principle, conservation laws, and the equations of motion in various contexts, including both analytical and geometric approaches. Students will also explore advanced topics such as Lagrangian and Hamiltonian mechanics, equipping them with the tools to analyze complex dynamical systems.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Apply D'Alembert's Principle:** Utilize D'Alembert's principle to derive the general equations of motion for rigid bodies, understanding both the motion of the center of inertia and motion relative to it.
2. **Analyze Compound Pendulums:** Investigate the dynamics of compound pendulums, calculate the center of percussion, and apply conservation laws of linear and angular momentum in both finite and impulsive contexts.
3. **Understand Motion in Three Dimensions:** Describe motion in three dimensions using Euler's dynamical and geometrical equations, and analyze scenarios involving motion under no forces and impulsive forces, including the dynamics of spinning tops.
4. **Utilize Lagrangian Mechanics:** Formulate Lagrange's equations for holonomic systems, derive energy equations for conservative fields, and analyze small oscillations, enhancing understanding of the principles of analytical mechanics.
5. **Explore Hamiltonian Dynamics:** Apply Hamilton's equations of motion and comprehend Hamilton's principle and the principle of least action, demonstrating the ability to analyze and solve complex dynamical problems using advanced theoretical frameworks.

Unit - 1

D'Alembert's principle. The general equations of motion of a rigid body. Motion of centre of inertia and motion relative to centre of inertia. Motion about a fixed axis.

Unit - 2

The compound pendulum, Centre of percussion. Conservation of momentum (linear and angular) and energy for finite as well as impulsive forces.

Unit - 3

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Motion in three dimensions with reference to Euler's dynamical and geometrical equations. Motion under no forces, Motion under impulsive forces, Motion of a top,

Unit - 4

Lagrange's equations for holonomous dynamical system, Energy equation for conservative field, Small oscillations, Hemilton's equations of motion, Hamilton's principle and principle of least action.

Reference Books:

1. N. C. Rana and P.S. Joag, Classical Mechanics, Tata McGraw-Hill, 1991.
2. M. Ray and H.S. Sharma, A Text Book of Dynamics of a Rigid Body, Students' Friends & Co., Agra, 1984.
3. H. Goldstein, Classical Mechanics, Narosa, 1990.
4. J. L. Synge and B. A. Griffith, Principles of Mechanics, McGraw-Hill, 1991.
5. L. N. Hand and J. D. Finch, Analytical Mechanics, Cambridge University Press, 1998.

Paper – 6 : MAT 706: Calculus of Variation and Special Function-I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 706: Calculus of Variation and Special Function-I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 706	Calculus of Variation and Special Function-I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to develop a deep understanding of the calculus of variations and special functions, particularly focusing on functionals, their variations, and solutions to variational problems.					

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	Students will explore the properties of the Gauss hypergeometric function, Kummer's confluent hypergeometric function, and Legendre polynomials, equipping them with the analytical tools necessary for solving complex mathematical problems in applied mathematics and physics.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Calculus of Variations:** Define and analyze functionals, variations, and their properties. Formulate and solve variational problems with fixed boundaries using Euler's equation.
2. **Explore Functionals involving Higher-Order Derivatives:** Investigate functionals that depend on higher-order derivatives and functions of multiple independent variables, and solve variational problems presented in parametric form.
3. **Analyze Gauss Hypergeometric Functions:** Derive and apply properties of the Gauss hypergeometric function, including its series solution, integral representation, and transformation formulas, as well as understand contiguous function relations.
4. **Utilize Kummer's Confluent Hypergeometric Function:** Study Kummer's confluent hypergeometric function, its properties, and integral representation, and apply it to solve Legendre's equation.
5. **Work with Legendre Polynomials:** Define and compute Legendre polynomials and functions $P_n(x)$ and $Q_n(x)$, and apply them in relevant mathematical and physical contexts, demonstrating proficiency in dealing with special functions.

Unit - 1

Calculus of variation – Functionals, Variation of a functional and its properties, Variational problems with fixed boundaries, Euler's equation, Extremals, Functional dependent on several unknown functions and their first order derivatives.

Unit - 2

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Functionals dependent on higher order derivatives, Functionals dependent on the function of more than one independent variable. Variational problems in parametric form.

Unit - 3

Gauss hypergeometric function and its properties, Series solution of Gauss hypergeometric equation. Integral representation, Linear and quadratic transformation formulas, Contiguous function relations, Differentiation formulae, Linear relation between the solutions of Gauss hypergeometric equation, Kummer's confluent hypergeometric function and its properties, Integral representation, Kummer's first transformation and series solution of Legendre's equation.

Unit - 4

Legendre polynomials and functions $P_n(x)$ and $Q_n(x)$.

Reference Books:

1. J.L.Bansal and H.S.Dhami, Differential Equations Vol-II, JPH, 2004.
2. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
3. J.N.Sharma and R.K.Gupta, Differential Equations with Special Functions, Krishna Prakashan , 1991.
4. Earl D. Rainville, Special Functions, Macmillan Company, New York, 1960.
5. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
6. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.

Semester – II

Note: 1. All six papers in Semester II are compulsory. (CCC)

2. Continuous assessment (internal) will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in continuous assessment of each paper is 30.

Paper- 1 : MAT 801 : Algebra II
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 801 : Algebra II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
I	MAT 801	Algebra II		6

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Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of linear algebra, focusing on linear transformations, dual spaces, and the properties of matrices. Students will explore eigenvalues and eigenvectors, determinants, and inner product spaces, equipping them with the analytical skills necessary to solve complex problems in vector spaces and linear mappings. Additionally, the course will cover orthogonality and important theorems related to self-adjoint and orthogonal transformations.				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Linear Transformations:** Define and analyze linear transformations between vector spaces, including dual spaces, dual basis, and properties of dual maps and annihilators.
2. **Work with Matrices:** Compute and interpret the matrices of linear maps, composition maps, and dual maps, and understand the concepts of eigenvalues, eigenvectors, rank, nullity, and invertibility of matrices.
3. **Calculate Determinants:** Compute determinants of matrices and derive the characteristic and minimal polynomials, understanding their relation to eigenvalues.

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4. **Understand properties of Inner Product Spaces and applications:** Utilize concepts from real inner product spaces, including the Schwarz inequality, to analyze vector relationships and perform computations related to orthogonality.
5. **Explore Orthogonal Transformations:** Investigate properties of adjoint and self-adjoint linear transformations, apply Bessel's inequality, and utilize the Principal Axis Theorem to analyze the geometry of transformations and matrices.

Unit - 1

Linear transformation of vector spaces, Dual spaces, Dual basis and their properties, Dual maps, Annihilator.

Unit - 2

Matrices of linear maps, Matrices of composition maps, Matrices of dual map, Eigen values, Eigen vectors, Rank and Nullity of linear maps and matrices, Invertible matrices, Similar matrices.

Unit - 3

Determinants of matrices and their computations. Characteristic polynomial, minimal polynomial and eigen values. Real inner product space, Schwartzs inequality.

Unit - 4

Orthogonality, Bessel's inequality, Adjoint, Self adjoint linear transformations and matrices, Othogonal linear transformation and matrices, Principal Axis Theorem.

Reference Books:

1. Deepak Chatterjee, Abstract Algebra, Prentice – Hall of India (PHI), New Delhi, 2004
2. N.S.Gopalkrishnan, University Algebra, New Age International, 1986.
3. Qazi Zameeruddin and Surjeet Singh, Modern Algebra, Vikas Publishing,2006
4. D. S. Chauhan and K. N. Singh, Studies in Algebra, JPH, 2006
5. G.C.Sharma, Modern Algebra, Shivlal Agrawal & Co., Agra,1998.
6. Joseph A. Gallian, Contemporary Abstract Algebra (4th Ed.), Narosa Publishing House, 1999.
7. David S. Dummit and Richard M. Foote, Abstract Algebra (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd, Singapore, 2004.
8. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra (4th Edition), Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
9. I.N. Herstein, Topics in Algebra (2nd edition), John Wiley & Sons, 2006.
10. Michael Artin, Algebra (2nd edition), Pearson Prentice Hall, 2011.

Paper – 2 : MAT 802 : Topology
(Teaching 6 hours per week)

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Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 802 : Topology	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 802	Topology					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to introduce students to the fundamental concepts of topology, emphasizing the properties and structures of topological spaces. Students will explore open and closed sets, continuous mappings, and various separation axioms. The course will also cover compactness, connectedness, and the construction of product and quotient spaces, equipping students with the tools necessary to analyze and understand advanced topics in topology.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

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1. **Define Topological Spaces:** Identify and characterize topological spaces, including subspaces, open sets, closed sets, and neighbourhood systems, and construct bases and sub-bases for topological spaces.
2. **Analyze Continuous Mappings:** Understand and apply the concepts of continuous mappings and homeomorphisms, and utilize nets and filters to analyze convergence and continuity in topological spaces.
3. **Apply Separation Axioms:** Recognize and differentiate between various separation axioms (T_0, T_1, T_2, T_3, T_4) and understand their implications for the structure of topological spaces, particularly in relation to compact and locally compact spaces.
4. **Examine Compactness:** Explore the relationship between continuity and compactness, and apply compactness concepts to solve problems in topology.
5. **Work with Product and Quotient Spaces:** Construct and analyze product and quotient spaces, understand the one-point compactification theorem, and investigate the properties of connected and locally connected spaces, particularly in relation to continuity and connectedness.

Unit - 1

Topological spaces, Subspaces, Open sets, Closed sets, Neighbourhood system, Bases and sub-bases.

Unit - 2

Continuous mapping and Homeomorphism, Nets, Filters.

Unit - 3

Separation axioms (To, T_1, T_2, T_3, T_4). Compact and locally compact spaces. Continuity and Compactness.

Unit - 4

Product and Quotient spaces. One point compactification theorem. Connected and Locally connected spaces, Continuity and Connectedness.

Reference Books:

1. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co., N.D., 1995.
2. S.C.Malik and Savita Arora, Mathematical Analysis, New Age International, 1992.
3. James R. Munkres, Topology, 2nd Edition, Pearson International, 2000.
4. J. Dugundji, Topology, Prentice-Hall of India, 1975.
5. George F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 1963.

Paper 3 : MAT 803: Differential Equation-II
(Teaching 6 hours per week)

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Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 803 : Differential Equation-II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 803	Differential Equation-II					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of linear partial differential equations (PDEs) and boundary value problems. Students will explore the classification and canonical forms of second-order linear PDEs, the theory of Sturm-Liouville problems, and methods for solving both homogeneous and non-homogeneous boundary value problems. The course will also cover Green's functions and their applications in solving differential equations, equipping students with the analytical tools necessary for advanced studies in applied mathematics and engineering.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

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1. **Classify PDEs:** Identify and classify linear partial differential equations of second order, determining their canonical forms and applying Cauchy's problem concepts for first-order PDEs.
2. **Solve Boundary Value Problems:** Analyze and solve linear homogeneous boundary value problems, understanding the concepts of eigenvalues and eigenfunctions, and applying Sturm-Liouville theory to establish orthogonality and properties of eigenfunctions.
3. **Address Non-Homogeneous Problems**: Apply methods of eigenfunction expansion to non-homogeneous Sturm-Liouville boundary value problems, and utilize the method of separation of variables to solve Laplace, wave, and diffusion equations.
4. **Utilize Green's Functions:** Construct and apply Green's functions for non-homogeneous boundary value problems, understanding their properties and the procedure for their construction, including the treatment of inhomogeneous boundary conditions.
5. **Apply Advanced Techniques of Dirac delta function and Green's function:** Employ advanced mathematical techniques such as the Dirac delta function and bilinear formulas for Green's functions, demonstrating proficiency in solving complex boundary value problems in various contexts.

Unit - 1

Classification of linear partial differential equation of second order, Canonical forms, Cauchy's problem of first order partial differential equation.

Unit - 2

Linear homogeneous boundary value problem, Eigen values and eigen functions, Sturm-Liouville boundary value problems, orthogonality of eigen functions, Lagrange's identity, properties of eigen functions, important theorems of sturm Liouville system, Periodic functions.

Unit - 3

Non-homogeneous boundary value problems, Non-homogeneous Sturm-Liouville boundary value problems (method of eigen function expansion). Method of separation of variables, Laplace, wave and diffusion equations.

Unit - 4

Green's Functions: Non-homogeneous Sturm-Liouville boundary value problem (method of Green's function), Procedure of constructing the Green's function and solution of boundary value problem, properties of Green's function, Inhomogeneous boundary conditions, Dirac delta function, Bilinear formula for Green's function, Modified Green's function.

Reference Books:

1. J.L.Bansal and H.S.Dhami, Differential Equations Vol-II, JPH, 2004.

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2. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
3. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
4. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.
5. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
6. Frank Ayres, Theory and Problems of Differential equations, TMH, 1990.
7. D.A. Murray, Introductory Course on Differential Equations, Orient Longman,1902.
8. A.R.Forsyth, A Treatise on Differential Equations, Macmillan & Co. Ltd., London, 1956.

Paper – 4 : MAT 804 : Riemannian Geometry and Tensor Analysis
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 804 : Riemannian Geometry and Tensor Analysis	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 804	Riemannian Geometry and Tensor Analysis					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of differential geometry, focusing on the study of geodesics, tensor analysis, and Riemannian geometry. Students will explore the mathematical foundations of geodesics on surfaces, the properties of tensors, and the curvature of Riemannian spaces. The course aims to equip students with the analytical skills necessary to apply these concepts in advanced theoretical and applied contexts, such as general relativity and differential geometry.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the

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question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Analyze Geodesics:** Derive and solve the differential equations of geodesics, including those on surfaces of revolution, and understand concepts such as geodesic curvature and torsion, as well as the Gauss-Bonnet theorem.
2. **Understand Tensors and their peroperties:** Define and classify different types of tensors, including contravariant, covariant, and symmetric tensors, and apply the quotient law and relative tensor concepts in Riemannian spaces.
3. **Utilize Christoffel Symbols:** Calculate and apply Christoffel symbols, understand their properties, and perform covariant differentiation of tensors, including the study of intrinsic derivatives and geodesic coordinates.
4. **Explore Riemannian Curvature:** Analyze the Riemann-Christoffel tensor and covariant curvature tensor, understanding their properties and significance in the context of Einstein spaces and Bianchi's identity.
5. **Apply Theoretical Concepts of differential geometry:** Discuss and apply concepts such as the Einstein tensor, flat spaces, isotropic points, and Schur's theorem, demonstrating the ability to work with advanced topics in differential geometry and their implications in theoretical physics.

Unit - 1

Geodesics, Differential equation of a geodesic, Single differential equation of a geodesic, Geodesic on a surface of revolution, Geodesic curvature and torsion, Gauss-Bonnet Theorem.

Unit - 2

Tensor Analysis– Kronecker delta. Contravariant and Covariant tensors, Symmetric tensors, Quotient law of tensors, Relative tensor. Riemannian space. Metric tensor, Indicator, Permutation symbols and Permutation tensors.

Unit - 3

Christoffel symbols and their properties, Covariant differentiation of tensors. Ricci's theorem, Intrinsic derivative, Geodesics, Differential equation of geodesic, Geodesic coordinates, Field of parallel vectors.

Unit - 4

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Reimann-Christoffel tensor and its properties. Covariant curvature tensor, Einstein space. Bianchi's identity. Einstein tensor, Flat space, Isotropic point, Schur's theorem.

Reference Books:

1. R.J.T. Bell, Elementary Treatise on Co-ordinate geometry of three dimensions, Macmillan India Ltd., 1994.
2. Mittal and Agarwal, Differential Geometry, Krishna publication, 2014.
3. Barry Spain, Tensor Calculus, Radha Publ. House Calcutta,1988.
4. J.A. Thorpe, Introduction to Differential Geometry, Springer-Verlog , 2013.
5. T.J. Willmore - An Introduction to Differential Geometry. Oxford University Press.1972.
6. Weatherbum, Reimanian Geometry and Tensor Clculus, Cambridge Univ. Press, 2008.
7. Thorpe, Elementary Topics in Differential Geometry, Springer Verlag, N.Y. (1985).
8. R.S. Millman and G.D. Parker, Elements of Differential Geometry, Prentice Hall, 1977.

Paper – 5 : MAT 805: Hydrodynamics
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 805 : Hydrodynamics	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 805	Hydrodynamics					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of fluid dynamics, focusing on the kinematics and dynamics of ideal fluids. Students will explore the fundamental principles governing fluid motion, including Lagrange's and Euler's methods, the equations governing fluid flow, and the characteristics of vortices. This course aims to equip students with the theoretical and practical knowledge necessary for analyzing fluid behavior in various physical contexts.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Analyze Fluid Kinematics:** Describe the kinematics of ideal fluids using Lagrange's and Euler's methods, and derive the equations of continuity in Cartesian, cylindrical, and spherical coordinates.
2. **Understand Fluid Dynamics:** Apply Euler's hydrodynamic equations and Bernoulli's theorem to solve problems related to fluid motion, and comprehend the Helmholtz equations and Cauchy's integral in fluid dynamics.
3. **Examine Motion Due to Impulsive Forces:** Analyze fluid motion due to impulsive forces, particularly in two dimensions, utilizing concepts such as the stream function and complex potential to study sources, sinks, and doublets.
4. **Explore Vortex Motion:** Define and analyze vortex motion, including rectilinear vortices and properties of vortex tubes, and apply theoretical concepts to understand the behavior of vortex pairs and doublets in various configurations.
5. **Apply Fluid Dynamics Concepts**: Demonstrate proficiency in applying fluid dynamics principles to analyze and solve complex problems involving vortices, streamlines, and fluid motion around obstacles, enhancing understanding of ideal fluid behavior in real-world scenarios.

Unit - 1

Kinematics of ideal fluid. Lagrange's and Euler's methods. Equation of continuity in Cartesian, cylindrical and spherical polar coordinates. Boundary surface. Stream-lines, path-lines and streak lines, velocity potential, irrotational motion.

Unit - 2

Euler's hydrodynamic equations, Bernoulli's theorem. Helmholtz equations. Cauchy's integral.

Unit – 3

Motion due to impulsive forces. Motion in two-dimensions, Stream function, Complex potential. Sources, Sinks, Doublets, Images in two-dimensions.

Unit – 4

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Vortex motion definition, rectilinear vortices, centre of vortices, properties of vortex tube, two vortex filaments, vortex pair, vortex doublet, vortex inside and outside circular cylinder, four vortices, motion of vortex situated at the origin and stream lines.

Reference Books:

1. M.D. Raisinghania, Hydrodynamics, S. Chand & Co. Ltd., N.D. 1995.
2. M. Ray and G.C. Chadda, A Text Book on Hydrodynamics, Students' Friends & Co., Agra, 1985.
3. N. C. Rana and P.S. Joag, Classical Mechanics, Tata McGraw-Hill, 1991.
4. H. Goldstein, Classical Mechanics, Narosa, 1990.
5. J. L. Synge and B. A. Griffith, Principles of Mechanics, McGraw-Hill, 1991.
6. L. N. Hand and J. D. Finch, Analytical Mechanics, Cambridge University Press, 1998.

Paper-6 : MAT 806 : Special Functions- II
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 806 : Special Functions- II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
I	MAT 806	Special Functions- II				6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures
Prerequisites		Mathematics course at UG Level.				

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Objectives of the Course:	The objective of this course is to provide students with a thorough understanding of special functions, focusing on Bessel functions, Hermite polynomials, Laguerre polynomials, Jacobi polynomials, and Chebyshev polynomials. Students will explore their definitions, properties, applications, and the role these functions play in solving differential equations and in various fields of applied mathematics and engineering.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Bessel Functions:** Define and analyze Bessel functions Jn(x), including their properties, applications, and solutions to Bessel's differential equation.
2. **Explore Orthogonal Polynomials:** Identify and apply Hermite polynomials Hn(x), Laguerre polynomials, and associated Laguerre polynomials, understanding their significance in probability theory and quantum mechanics.
3. **Analyze Jacobi Polynomials:** Define Jacobi polynomials, explore their special cases, and apply Bateman's generating function and Rodrigue's formula to derive properties such as orthogonality and recurrence relations.
4. **Work with Chebyshev Polynomials:** Define Chebyshev polynomials Tn(x) and Un(x), derive solutions to Chebyshev's equation, and utilize their properties in generating functions, expansions, and orthogonality relations.
5. **Apply Special Functions:** Demonstrate the ability to apply special functions to solve problems in differential equations and other applied mathematics contexts, showcasing how these functions are used in real-world applications.

Unit - 1

Bessel functions $J_n(x)$.

Unit - 2

Hermite polynomials $H_n(x)$, Laguerre and Associated Laguerre polynomials.

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Unit - 3

Jacobi Polynomial: Definition and its special cases, Bateman's generating function, Rodrigue's formula, orthogonality, recurrence relations, expansion in series of polynomials.

Unit - 4

Chebyshev polynomials $T_n(x)$ and $U_n(x)$: Definition, Solutions of Chebyshev's equation, expansions, Generating functions, Recurrence relations, Orthogonality.

Reference Books:

1. J.L.Bansal and H.S.Dhami, Differential Equations Vol-II, JPH, 2004.
2. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
3. J.N.Sharma and R.K.Gupta, Differential Equations with Special Functions, Krishna Prakashan , 1991.
4. Earl D. Rainville, Special Functions, Macmillan Company, New York, 1960.
5. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
6. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.

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M.A./M.Sc. Mathematics

Semester Scheme (Semester III and IV)

Semester - III

Note:
Continuous assessment (intenal) will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate Maximum marks in continuous assessment of each paper is 100.

Paper- 1 : MAT 901 : Functional Analysis- I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 901 : Functional Analysis- I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 901	Functional Analysis- I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a solid foundation in the theory of metric spaces and normed linear spaces. Students will explore key concepts such as convergence, completeness, compactness, and continuity, as well as the applications of various theorems in functional analysis. By the end of the course, students will be equipped to analyze and apply these concepts in advanced mathematical contexts.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Analyze Metric Spaces:** Define and identify subspaces of metric spaces, product spaces, and continuous mappings, and demonstrate an understanding of sequences, including convergent and Cauchy sequences in metric spaces.
2. **Understand Completeness:** Distinguish between complete and incomplete metric spaces, providing examples of each, and apply the Banach contraction theorem in various contexts.
3. **Explore Compactness and Connectedness:** Apply Baire's category theorem and Ascoli-Arzelà theorem, and understand the properties of compact sets, compact spaces, and connected metric spaces, including the concept of separability.
4. **Work with Normed Linear Spaces:** Define normed linear spaces and quotient spaces, and demonstrate an understanding of Banach spaces and bounded linear transformations, including their properties and examples.
5. **Employ Advanced Theorems:** Apply theorems related to equivalent norms, compactness in finite-dimensional normed linear spaces, and understand key results such as Riesz Lemma, the Open Mapping theorem, the Closed Graph theorem, and the Uniform Boundedness theorem in the context of functional analysis.

Unit 1: Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space, Convergent, Cauchy sequence. Complete metric space, Examples of Complete & Incomplete metric spaces.

Unit – 2

Banach contraction theorem and applications. Baire's category theorem, Ascoli-Arzela theorem, compact sets, compact spaces and connected metric spaces. Separable metric space with examples.

Unit - 3

Normed linear spaces. Quotient space of normed linear spaces and its completeness. Banach spaces and examples. Bounded linear transformations. Normed linear space of bounded linear transformations.

Unit – 4

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Equivalent norms. Basic properties of finite dimensional normed linear spaces and compactness. Reisz Lemma. Multilinear mapping. Open mapping theorem. Closed graph theorem. Uniform boundness theorem.

Reference Books:

1. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley and Sons., 1978.
2. A. E. Taylor, Introduction to Functional Analysis, John Wiley, 1958.
3. A. Bowers and N. Kalton, An Introductory Course in Functional Analysis, Springer Verlog, 2014.
4. W. Rudin, Functional Analysis, McGraw-Hill, 1973.

Paper-2 : MAT 902 : Viscous Fluid Dynamics-I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 902 : Viscous Fluid Dynamics-I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 902	Viscous Fluid Dynamics-I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of fluid mechanics, focusing on the principles of viscosity, stress, and strain, as well as the mathematical formulation of fluid motion. Students will explore the Navier-Stokes equations, dimensional analysis, and the significance of various non-dimensional parameters. The course aims to equip students with both theoretical knowledge and practical skills to analyze and solve problems related to fluid flow in various contexts.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Fluid Properties:** Define and analyze key concepts such as viscosity, stress, rate of strain, and thermal conductivity, and apply Stoke's law of friction and the generalized law of heat conduction in fluid mechanics.
2. **Apply Navier-Stokes Equations:** Derive and utilize the Navier-Stokes equations of motion, understanding their significance in describing fluid behavior under various conditions.
3. **Conduct Dimensional Analysis:** Perform dimensional analysis and apply the Buckingham theorem to derive non-dimensional parameters, recognizing their physical importance in fluid dynamics, including Reynolds number, Froude number, and others.
4. **Solve Fluid Flow Problems:** Analyze exact solutions of the Navier-Stokes equations for various flow scenarios, including plane Couette flow, plane Poiseuille flow, and Hagen-Poiseuille flow, and understand velocity distributions in tubes of uniform cross-sections.
5. **Examine Complex Flows:** Investigate flow between concentric rotating cylinders, stagnation point flows (Hiemenz and Homann flows), and flow due to a rotating disc, applying theoretical principles to practical fluid mechanics problems.

Unit – 1

Viscosity , Analysis of stress and rate of strain, Stoke's law of friction, Thermal conductivity and generalized law of heat conduction, Equations of state and continuity , Navier- Stokes equations of motion.

Unit – 2

Vorticity and circulation, Dynamical similarity, Inspection and dimensional analysis, Buckingham theorem and its application, Non-dimensional parameters and their physical importance : Reynolds number, Froude number, Mach number, Prandtl number, Eckart number, Grashoff number, Brinkmann number, Non – dimensional coefficients : Lift and drag coefficients, Skin friction , Nusselt number, Recovery factor.

Unit – 3

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Exact solutions of Navier – Stokes equations, Velocity distribution for plane couette flow, Plane Poiseuille flow, Generalized plane Couette flow, Hagen- Poiseuille flow, Flow in tubes of uniform cross-sections.

Unit – 4

Flow between two concentric rotating cylinders. Stagnation point flows : Hiemenz flow, Homann flow. Flow due to a rotating disc.

Reference Books:

1. J.L. Bansal, Viscous Fluid dynamics, JPH, Jaipur , 2008.
2. M.D.Raisinghania, Fluid Dynamics, S.Chand, 2003.
3. F. Chorlton, A Text Book of Fluid Dynamics, CBC, 1985.
4. S. W. Yuan, Foundations of Fluid Mechanics, Prentice-Hall, 1976.
5. S. I. Pai, Viscous Flow Theory I- Laminar Flow, D. Van Nostrand Co., Ing., Princeton, New Jersey, N.Y., Landon, Toronto, 1956.
6. F.M.White, Viscous Fluid Flow, McGraw-Hill, N.Y., 1974.

Paper – 3 : MAT 903 : Integral Transforms

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT 903 : Integral Transforms	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT 903	Integral Transforms					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide a comprehensive understanding of advanced integral transforms and their applications in solving differential equations and analyzing functions. The course covers Fourier, Mellin, Laplace, and Hankel transforms, focusing on their definitions, properties, and theorems. Students will learn how to apply these					

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	transforms to solve problems involving derivatives, integrals, and convolutions, and gain insight into their practical uses in various fields of mathematics and engineering. By the end of the course, students will have developed the skills needed to utilize these integral transforms for both theoretical analysis and practical problem-solving.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Apply Fourier Transforms:** Understand and apply the definitions and properties of Fourier sine, cosine, and complex transforms. Use the convolution theorem to solve problems, and apply inversion theorems and Fourier transforms of derivatives to analyze functions.
2. **Utilize Mellin Transforms:** Define and use Mellin transforms, understand their elementary properties, and apply them to derivatives and integrals. Implement the inversion theorem and convolution theorem to solve various problems involving Mellin transforms.
3. **Work with Laplace Transforms:** Define and manipulate Laplace transforms, including their properties and rules. Solve problems involving derivatives and integrals using Laplace transforms, and apply the properties of inverse Laplace transforms and the convolution theorem effectively.
4. **Implement Hankel Transforms:** Understand and use the complex inversion formula and the infinite Hankel transform. Apply the definition, properties, and inversion theorem of Hankel transforms, and utilize Parseval's Theorem in the context of Hankel transforms.

Unit – 1

Fourier transform – Defiition and properties of Fourier sine, cosine and complex transforms. Convolution theorem. Inversion theorems. Fourier transform of derivatives.

Unit – 2

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Mellin transform– Definition and elementary properties. Mellin transforms of derivatives and integrals. Inversion theorem. Convolution theorem.

Unit - 3

Laplace transform– Definition and its properties. Rules of manipulation. Laplace transform of derivatives and integrals. Properties of inverse Laplace transform. Convolution theorem.

Unit – 4

Complex inversion formula. Infinite Hankel transform– Definition and elementary properties. Hankel transform of derivatives. Inversion theorem. Parseval Theorem.

Reference Books:

1. Lokenath Debnath and Dambaru Bhatta, Integral Transforms and their Applications, Taylor and Francis Group, 2014.
2. Abdul J. Jerry, Introduction to Integral Equations with applications, Marcel Dekkar Inc. NY, 1999.
3. L.G.Chambers, Integral Equations: A short Course, Int. Text Book Company Ltd. 1976.
4. Murry R. Spiegal, Laplace Transform (SCHAUM Outline Series), McGraw-Hill, 1965.

Optional Papers: (ECC)

Paper – 4 : MAT A01 : Continuum Mechanics – I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	Paper – 3 : MAT A01 : Continuum Mechanics – I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT A01	Continuum Mechanics – I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of tensor analysis and its applications in continuum mechanics. Students will explore Cartesian tensors, their transformation					

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	laws, and the mathematical tools necessary for analyzing stress, strain, and fluid motion. By the end of the course, students will be equipped to apply these concepts to complex problems in solid and fluid mechanics.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Tensor Notation:** Define and manipulate Cartesian tensors using index notation, and apply transformation laws for addition, subtraction, and multiplication of tensors in various contexts.
2. **Apply Vector Calculus Theorems:** Utilize the gradient, divergence, and curl of scalar and vector functions, and apply Stokes, Gauss, and Green's theorems to solve problems in vector calculus and physics.
3. **Analyze Stress and Equilibrium:** Classify continuous media, distinguish between body forces and surface forces, and derive the components of the stress tensor along with the equations of equilibrium, including principal stresses and stress invariants.
4. **Describe Deformation and Flow:** Differentiate between Lagrangian and Eulerian descriptions of motion, analyze velocity, acceleration, and strain tensors, and derive the continuity equation in the context of fluid mechanics.
5. **Interpret Strain and Rotation:** Explain the geometrical meaning of linear strain tensor components, analyze principal axes and properties of strain tensors, and evaluate the rate of strain tensors and vorticity in fluid motion, providing insights into the behavior of deformable bodies.

Unit 1:

Cartesian Tensors, Index notation and transformation laws of Cartesian tensors. Addition, Subtraction and Multiplication of cartesian tensors, Gradient of a scalar function, Divergence of a vector function and Curl of a vector function using the index notation. ε-δ identity. Conservative vector field and concept of a scalar potential function. Stokes, Gauss and Green's theorems.

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Unit 2:

Continuum approach, Classification of continuous media, Body forces and surface forces. Components of stress tensor, Force and Moment equations of equilibrium. Transformation law of stress tensor. Stress quadric. Principal stress and principal axes. Stress invariants and stress deviator. Maximum shearing stress.

Unit 3:

Lagrangian and Eulerian description of deformation of flow. Comoving derivative, Velocity and Acceleration. Continuity equation. Strain tensors. Linear rotation tensor and rotation vector, Analysis of relative displacements.

Unit – 4

Geometrical meaning of the components of the linear strain tensor, Properties of linear strain tensors. Principal axes, Theory of linear strain. Linear strain components. Rate of strain tensors. The vorticity tensor. Rate of rotation vector and vorticity, Properties of the rate of strain tensor, Rate of cubical dilation.

Reference Books:

1. W. Prager, Introduction to Mechanics of Continua, Lexinton Mass, Ginn, 1961.
2. A.C. Eringen, Mechanics of Continua, Wiley, 1967.
3. T.J. Chung, Continuum Mechanics, Prentice- Hall, 1988.

Paper – 5 : MAT B01 : Boundary Layer Theory- I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT B01 : Boundary Layer Theory- I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT B01	Boundary Layer Theory- I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			

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Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		This course aims to provide a comprehensive understanding of boundary layer theory and its applications in fluid mechanics. Students will learn the derivation of boundary layer equations for two-dimensional and three-dimensional flows, analyze characteristic parameters, and explore various exact and approximate solutions. Emphasis will be placed on practical applications such as flow past different geometries and boundary layer behavior in complex scenarios, including jets and rotating systems. By the end of the course, students will develop the ability to model and analyze boundary layer phenomena in both academic and industrial contexts.				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Derive and Apply Boundary Layer Equations:** Derive the boundary layer equations for two-dimensional flows and apply them to practical problems, including flow along flat plates and wedges.
2. **Analyze Boundary Layer Solutions:** Understand and apply exact and similarity solutions to steady-state boundary layer equations, including the Blasius-Topfer and Gortler new series methods.
3. **Model Complex Flows:** Analyze and solve boundary layer problems for various flow configurations such as flow past a symmetrically placed cylinder, jets, and flows along convergent channels.
4. **Employ Transformations and Techniques:** Use Prandtl-Mises transformation and Mangler's transformation to simplify and solve complex boundary layer problems.

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5. **Understand Three-Dimensional Flows:** Analyze three-dimensional boundary layer flows, including those on bodies of revolution, yawed cylinders, and rotating discs, and understand the growth and characteristics of these layers in different contexts.

Unit 1

Derivation of boundary layer equations for two-dimensional flow. Boundary layer along a flat plate (Blasius-Topfer solution). Characteristic boundary layer parameters. Similar solutions.

Unit - 2

Exact solution of the steady state boundary layer equations in two-dimensional flow. Flow past a wedge. Flow along the wall of a convergent channel. Boundary layer separation.

Unit-3

Flow past a symmetrically placed cylinder (Blasius series solution). Gortler new series method. Plane free jet, Circular jet, Plane wall jet. Prandtl-Mises transformation and its application of plane free jet.

Unit - 4

Axially symmetrical boundary layers on bodies at rest. Boundary layers on a body of revolution. Mangler's transformation. Three-dimensional boundary layers – Boundary layer flow on yawed cylinder. Growth of three-dimensional boundary layer on a rotating disc impulsively set in motion.

Reference Books:

1. J.L. Bansal, Viscous Fluid dynamics, JPH, Jaipur , 2008.
2. M.D.Raisinghania, Fluid Dynamics, S.Chand, 2003.
3. F. Chorlton, A Text Book of Fluid Dynamics, CBC, 1985.
4. S. W. Yuan, Foundations of Fluid Mechanics, Prentice-Hall, 1976.
5. S. I. Pai, Viscous Flow Theory I- Laminar Flow, D. Van Nostrand Co., Ing., Princeton, New Jersey, N.Y., Landon, Toronto, 1956.
6. F.M.White, Viscous Fluid Flow, McGraw-Hill, N.Y., 1974.

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Paper-6: MAT C01 : Mathematical Programming -I
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT C01 : Mathematical Programming -I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT C01	Mathematical Programming -I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide a thorough understanding of various advanced optimization techniques and their applications in solving complex decision-making problems. The course covers foundational topics in linear programming, integer programming, goal programming, separable programming, and dynamic programming. Students will learn both theoretical concepts and practical algorithms for solving optimization problems, including methods for handling bounded and integer variables, achieving multiple goals, and solving problems with non-linear and fractional components. The course aims to equip students with the skills necessary to apply these methods to real-world scenarios and advanced problem-solving situations. .					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain

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four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Apply Advanced Linear Programming Techniques:** Utilize separating and supporting hyperplane theorems and apply the revised simplex method to solve linear programming problems, including those with bounded variables.
2. **Solve Integer Programming Problems:** Implement Gomory's algorithm for all and mixed integer programming problems, and apply the Branch and Bound algorithm to find optimal solutions in integer programming.
3. **Employ Goal Programming Methods:** Use graphical and simplex methods for solving goal programming problems (GPP) to achieve multiple objectives simultaneously.
4. **Address Non-Linear and Separable Programming:** Apply piece-wise linear approximations to non-linear functions, reduce separable programming problems to linear programming problems, and use appropriate algorithms for separable and fractional programming.
5. **Implement Dynamic Programming technique:** Understand and apply Bellman's principle of optimality, solve dynamic programming problems with finite stages, and use dynamic programming techniques to address linear programming problems.

Unit – 1

Separating and supporting hyperplane theorems. Revised simplex method to solve Linear Programming problems, Bounded variable problems.

Unit – 2

Integer programming: Gomory's algorithm for all and mixed integer programming problems, Branch and Bound algorithm; Goal programming: Graphical goal attainment method, Simplex method for GPP.

Unit – 3

Separable programming: Piece-wise Linear approximations to non-linear functions, Reduction to separable programming problem to l.p.p., separable programming algorithm, fractional programming: computational procedure.

Unit - 4

Dynamic programming: Introduction, Bellman principle of optimality, solution of problems with finite number stages, solution of l.p.p. by dynamic programming.

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Reference Books:

1. Kanti Swaroop, P.K.Gupta and Manmohan, Operation Research, Sultan Chand & Sons., N.Delhi, 2007.
2. S.D.Sharma, Operations Research, Kedar Nath Ram Nath and co. Meerut, 2005.
3. F. S. Hillier and G. J. Lieberman, Introduction to Operations Research Concepts and Cases (9th Edition), Tata McGraw Hill, 2010.
4. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
5. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.

Paper – 7: MAT D01 : Combinatorics and Graph Theory- I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT D01 : Combinatorics and Graph Theory- I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT D01	Combinatorics and Graph Theory- I					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to develop a foundational understanding of combinatorial mathematics, discrete numeric functions, and graph theory. Students will explore various combinatorial techniques, including counting principles and generating functions, and will delve into the fundamentals of graph theory, including the study of different types of graphs, paths, and circuits. The course also covers advanced topics such as the Traveling Salesman Problem and operations on trees. By the end of the course, students will be equipped with the theoretical knowledge and practical skills necessary for solving complex combinatorial and graph-based problems.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Apply Combinatorial Techniques:** Utilize combinatorial methods to count sets, multisets, and objects, apply binomial and multinomial coefficients, and solve problems involving unordered and ordered selections with and without repetitions. Demonstrate proficiency in using the Pigeonhole Principle and the Inclusion-Exclusion Principle.
2. **Utilize Discrete Numeric Functions:** Understand and apply discrete numeric functions to solve combinatorial problems. Use generating functions and power series to model and solve recursions, including both homogeneous and non-homogeneous linear recursions.
3. **Analyze Graphs and Graph Properties:** Comprehend and apply basic graph terminology, and identify and work with simple graphs, multi-graphs, and weighted graphs. Analyze paths, circuits, and connectedness, and solve problems related to shortest paths, Eulerian and Hamiltonian paths and circuits.
4. **Solve Graph-Based Problems:** Address complex problems such as the Traveling Salesman Problem and perform operations on graphs. Understand and apply concepts related to trees, including rooted trees, spanning trees, and minimum spanning trees.

Unit-1

Introduction to diagraphs, Orientation of a graph, Underlying graph, Parallel edges, Source and Sink, Types of diagraphs, Accessibility, Arborescence, Spanning Arborescence, Euler digraphs, Handshaking dilemma, Incidence matrix of a diagraph, Circuit matrix of a diagraph.

Unit-2

Degree sequences, Graphic sequence, Havel Hakimi Theorem. Matrix representation of graphs except adjacency and incidence matrix.

Unit-3

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Planer graphs Kurotowski's graphs, Maximal planar graphs, Outer planer graphs, Maximal outer planar graph, Minimally non-outer planar graphs, Thickness and Crossing number of bipartite and complete bipartite graph, Euler's formula, Kuratowski's theorem.

Unit-4

Isomorphism, Homorphism. Graph theory in Network analysis Network flows, Transport networks, Max-flow min-cut-theorem

Reference Books:

1. N. Deo, Graph Theory with Applications to Computer Science, Prentice-Hall of India, 1979.
2. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, 1986.
3. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1995.
4. S. Wiitala, Discrete Mathematics: A Unified Approach, McGraw-Hill Book Co., 1987.
5. Ian Anderson, A First course in Combinatorial Mathematics, Springer, 1989.

Paper – 8 : MAT F01 : Relativistic Mechanics

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT F01 : Relativistic Mechanics	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
I	MAT F01	Relativistic Mechanics			6
Level of Course	Type of the Course	Credit Distribution	Offered to	Course Delivery	

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		Theory	Practical	Total	NC Student	Method
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		The objective of this course is to provide a thorough understanding of the principles and mathematical framework of special relativity. Students will explore the foundational concepts such as the relativity of space and time, Lorentz transformations, and relativistic effects. The course covers the theoretical underpinnings of relativistic mechanics, including time dilation, Lorentz contraction, and the relationship between mass and energy. Additionally, students will delve into the geometrical interpretation of relativity through Minkowski space and understand the principles of equivalence and general covariance. By the end of the course, students will gain a solid grasp of both the conceptual and mathematical aspects of special relativity and their implications for modern physics.				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand and Apply Relativity Principles:** Explain the principle of relativity and its postulates, derive the Lorentz transformation equations, and apply them to problems involving velocity composition, time dilation, and length contraction.
2. **Analyze Relativistic Effects:** Describe and apply concepts of simultaneity, relativistic velocity transformations, and Lorentz contraction. Understand and solve problems related to particle acceleration and relativistic aberration, and relate these concepts to Newtonian theory.
3. **Utilize Relativistic Mechanics:** Analyze the variation of mass with velocity, and understand the equivalence of mass and energy. Use transformation formulae for

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relativistic mass, momentum, and energy, and solve problems involving the conservation of these quantities. Apply the principles of relativistic Lagrangian and Hamiltonian mechanics.

4. **Interpret Minkowski Space and Relativistic Geometry:** Understand and apply concepts of Minkowski space, including space-like, time-like, and light-like intervals. Utilize the concepts of the null cone, proper time, and world lines. Discuss the principles of equivalence and general covariance within the context of relativity.

Unit – 1

Relative Character of space and time, Principle of Relativity and its postulates, Derivation of special Lorentz transformation equations, Composition of Parallel velocities, Lorentz-Fitzgerald contraction formula, Time dilation.

Unit – 2

Simultaneity, Relativistic transformation formulae for velocity, Lorentz contraction factor, Particle acceleration, Velocity of light as fundamental velocity, Relativistic aberration and its deduction to Newtonian theory.

Unit - 3

Variation of mass with velocity, Equivalence of mass and energy, Transformation formulae for mass, Momentum and energy, Problems on conservation of mass, Momentum and energy, Relativistic Lagrangian and Hamiltonian.

Unit - 4

Minkowski space, Space-like, Time-like and Light-like intervals, Null cone, Relativity and Causality, Proper time, World line of a particle. Principles of Equivalence and General Covariance.

Reference Books:

1. J.V. Narlikar, Lectures on General Relativity and Cosmology, Macmillan Co. Ltd. India, N.Delhi, 1978.
2. C. Moller, The Theory of Relativity, Oxford Clarendon Press, 1952.
3. P.G. Bergmann, Introduction to the Theory of Relativity, Prentice Hall of India, 1969.
4. J.L. Anderson, Principles of Relativity Physics, Academic Press, 1967.
5. W. Rindler, Essential Relativity, Van Nostrand Reinhold Company, 1969.
6. V. A. Ugarov, Special Theory of Relativity, Mir Publishers, 1979.

Paper – 9 : MAT G01: Industrial Mathematics- I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks

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Theory	**MAT G01: Industrial Mathematics- I** **Mechanics**	**3 Hrs**	**100**	

Semester	**Code of the Course**	**Title of the Course/Paper**				**NHEQF Level**	**Credits**
I	**MAT G01**	**Industrial Mathematics- I**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of various mathematical techniques and computational methods used in solving partial differential equations (PDEs), linear programming (LP) problems, and assignment and transportation problems. The course covers finite difference methods for PDEs, operational techniques in LP, including the Simplex method and its variations, and explores assignment models and transportation problems in optimization. By integrating theoretical knowledge with practical applications, particularly in fluid mechanics and industrial contexts, students will gain the skills necessary to address complex problems in operations research and applied mathematics.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Objective

The objective of this course is to provide students with a thorough understanding of various mathematical techniques and computational methods used in solving partial differential equations (PDEs), linear programming (LP) problems, and assignment and transportation problems. The course covers finite difference methods for PDEs, operational techniques in LP, including the Simplex method and its variations, and explores assignment models and transportation problems in optimization. By integrating theoretical knowledge with practical applications, particularly in fluid mechanics and industrial contexts, students will gain the skills necessary to address complex problems in operations research and applied mathematics.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Solve Partial Differential Equations (PDEs):** Apply techniques for solving PDEs, including finite difference methods. Analyze and solve industry-related problems, particularly in fluid mechanics, using these methods.
2. **Apply Operational Techniques in Linear Programming:** Utilize linear programming techniques to solve optimization problems. Implement computational procedures for the Simplex method, including the Two-Phase Simplex method and Big-M method, to find optimal solutions.
3. **Utilize Advanced Linear Programming Methods:** Employ the Revised Simplex method and understand the concept of duality in linear programming. Analyze the relationship between duality and the Simplex method to solve complex LP problems.
4. **Formulate and Solve Assignment and Transportation Problems:** Develop mathematical formulations for assignment and transportation problems. Apply the Hungarian method to solve assignment problems, and address transportation models including finding initial basic feasible solutions and handling degeneracy and unbalanced problems.

Unit -1

Partial differential equations and techniques of solution. Finite difference methods for solving PDE. Application to problems of industry with special reference to Fluid Mechanics.

Unit -2

Operational Techniques.Linear Programming problems. Computational procedure of Simplex method, Two-phase Simplex method, Big-M-method.

Unit - 3

Revised Simplex method, Duality in linear programming, Duality and Simplex method.

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Unit - 4

Assignment models. Mathematical formulation, Hungarian method. Travelling Salesman problem. Transportation models. Mathematical formulation. Initial basic feasible solution. Degeneracy and unbalanced transportation problems.

Reference Books:

1. Kanti Swaroop, P.K.Gupta and Manmohan, Operation Research, Sultan Chand & Sons., N.Delhi, 2007.
2. S.D.Sharma, Operations Research, Kedar Nath Ram Nath and co. Meerut, 2005.
3. H.A.Taha, Operations Research: An Introduction; MacMillan Publishing Company, New York, 1982.
4. F.S. Hillier and G.J. Leiberman, Introduction to Operations Research; Holden Day, 1962.
5. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.

Paper – 10: MAT H01: Magnetohydrodynamics - I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT H01: Magnetohydrodynamics - I**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	**MAT H01**	**Magnetohydrodynamics - I**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide an in-depth understanding of magnetohydrodynamics (MHD) and its applications in fluid mechanics and electromagnetic theory. Students will explore Maxwell's equations in the context of fluid motion, the fundamental principles of MHD, and various MHD approximations and boundary conditions. The course also emphasizes the use of dimensional analysis to interpret key dimensionless					

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	numbers in fluid dynamics and MHD. Practical applications of MHD will be studied through analysis of different flow scenarios, including those in channels, pipes, and rotating systems. By the end of the course, students will be equipped with both theoretical knowledge and practical skills to analyze and solve complex MHD problems.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Objective

The objective of this course is to provide an in-depth understanding of magnetohydrodynamics (MHD) and its applications in fluid mechanics and electromagnetic theory. Students will explore Maxwell's equations in the context of fluid motion, the fundamental principles of MHD, and various MHD approximations and boundary conditions. The course also emphasizes the use of dimensional analysis to interpret key dimensionless numbers in fluid dynamics and MHD. Practical applications of MHD will be studied through analysis of different flow scenarios, including those in channels, pipes, and rotating systems. By the end of the course, students will be equipped with both theoretical knowledge and practical skills to analyze and solve complex MHD problems.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Maxwell's Equations and MHD Fundamentals:** Comprehend Maxwell's electromagnetic field equations and the constitutive equations for fluid motion, including the Stokes hypothesis. Analyze the Maxwell stress tensor and fundamental equations of magnetohydrodynamics.
2. **Apply MHD Approximations and Boundary Conditions:** Use MHD approximations to solve problems involving magnetic field equations and frozen-in fluid effects. Understand and apply boundary conditions specific to MHD, and analyze Alfven transverse waves.
3. **Utilize Dimensional Analysis in MHD:** Perform inspection and dimensional analysis using π-products to determine dimensionless numbers such as Reynolds number, Mach

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number, Prandtl number, Magnetic Reynolds number, Magnetic pressure number, Hartmann number, Magnetic parameter, Magnetic Prandtl number, and Nusselt number.

4. **Analyze MHD Flow Scenarios:** Solve practical problems involving MHD flow in various geometries including Hartmann plane Poiseuille flow, plane Couette flow with temperature distribution, MHD flow in rectangular cross-section tubes, pipes, annular channels, and between rotating coaxial cylinders.

Unit -1

Maxwell electromagnetic field equations. Constitutive equations of fluid motion, Stokes hypothesis. Maxwell stress tensor. Fundamental equations of Magnetofluid-dynamics.

Unit - 2

Magnetofluiddynamic approximations. Magnetic field equation, Frozen in fluid, Alfven transverse waves. MHD boundary conditions.

Unit - 3

Inspection and Dimensional analysis, π-products. Reynolds number, Mach number, Prandtl number, Magnetic Reynolds number, Magnetic pressure number, Hartmann number, Magnetic parameter, Magnetic Prandtl number and Nusselt number.

Unit - 4

Hartmann plane Poiseuille flow and plane Couette flow including temperature distribution. MHD flow in a tube of rectangular cross-section. MHD pipe flow. MHD flow in annular channel. MHD flow between two rotating coaxial cylinders.

Reference Books:

1. J.L.Bansal, Magnetofluiddynamics of Viscous Fluids, JPH, Jaipur, 1994.
2. K.R. Cramer and S.I.Pai, Magnetofluiddynamics for Enginners and Applied Physicists, McGraw-Hill, N.Y., 1973.
3. P.A. Davidson, An Introduction to Magnetohydrodynamics, Cambridge Univ. Press, U.K., 2001.
4. J.A.Shercliff, A Textbook of Magnetohydrodynamics, Pergamon Press., 1965.
5. K.R. Cramer and S.I. Pai, Magnetofluid Dynamics for Engineers and Applied Physicists, McGraw- Hill Book Co., 1973.

Paper – 11 : MAT I01 : Numerical Analysis – I

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT I01 : Numerical Analysis – I	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper	NHEQF	Credits

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						Level	
I	**MAT I01**	**Numerical Analysis – I**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide a comprehensive understanding of numerical methods for solving algebraic and differential equations. The course covers iterative methods, polynomial equations, systems of simultaneous linear equations, and eigenvalue problems. Students will explore various techniques for accelerating convergence, solving polynomial equations, and handling systems of linear equations using direct and iterative methods. Additionally, the course will delve into eigenvalue problems, including methods for finding eigenvalues and eigenvectors. By the end of the course, students will have acquired the skills necessary to apply these numerical techniques effectively in practical and theoretical problems.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Apply Iterative Methods:** Understand and implement iterative methods, including the theory of iteration, acceleration of convergence, Chebyshev method, Muler's method, and methods for finding multiple and complex roots.
2. **Utilize Polynomial Equation Techniques:** Solve polynomial equations using various methods, including synthetic division, the Birge-Vieta method, Bairstow's method, and

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Graeffe's root squaring method. Understand the real and complex roots of polynomials and apply these methods to find polynomial solutions.

3. **Solve Systems of Simultaneous Linear Equations:** Use direct methods such as determinants, Gauss-Jordan elimination, and LU-Factorization techniques (Doolittle's, Crout's, and Cholesky's methods) to solve systems of simultaneous linear equations. Apply partition methods and relaxation techniques for iterative solutions.
4. **Analyze Eigenvalue Problems:** Understand and apply methods for finding eigenvalues and eigenvectors, including the Power method, Jacobi method, Givens' method, and Rutishauser method. Analyze complex eigenvalues and apply these methods to solve eigenvalue problems.

Unit – 1

Iterative methods – Theory of iteration method, Acceleration of the convergence, Chebyshev method, Muler's method, Methods for multiple and complex roots.

Unit - 2

Newton-Raphson method for simultaneous equations, Convergence of iteration process in the case of several unknowns. Solution of polynomial equations – Polynomial equation, Real and complex roots, Synthetic division, the Birge-Vieta, Bairstow and Graeffe's root squaring method.

Unit - 3

System of simultaneous Equations (Linear)- Direct method, Method of determinant, Gauss-Jordan, LU-Factorizations-Doolitte's, Crout's and Cholesky's. Partition method. Relaxation methods.

Unit - 4

Eigen value problems– Basic properties of eigen values and eigen vector, Power methods, Method for finding all eigen values of a matrix. Jacobi, Givens' and Rutishauser method. Complex eigen values.

Reference Books:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, PHI, 1979.
2. V.Rajaraman, Computer Oriented Numerical Methods, PHI, 1993.
3. M.K.Jain, S.R.K. Eyenger and R.K. Jain, Numerical Methods for Mathematics and Applied Physicists, Wiley-Eastern Pub., N.Delhi, 2005.
4. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
5. C. F. Gerald and P. O. Wheatley, App;ied Numerical Analysis, Pearson Education, India,7th edition, 2008.
6. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.
7. S. D. Conte, C de Boor, Elementary Numerical Analysis, McGraw-Hill, 1980.
8. C.E. Froberg, Introduction to Numerical Analysis, (Second Edition), Addition-Wesley, 1979.

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Paper – 12: MAT J01: Computer Applications- Theory
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT J01: Computer Applications- Theory	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT J01	Computer Applications- Theory					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide a foundational understanding of computer systems, including hardware, software, and operating systems, and to develop practical skills in programming and problem-solving using popular computational tools. Students will learn about computer organization, input-output devices, and memory systems, as well as gain proficiency in using system and application software, including MS Word and MS Excel. The course emphasizes hands-on experience with programming languages and computational tools such as MATLAB, Mathematica, or Maple, focusing on variables, matrix operations, and algorithmic problem-solving. By the end of the course, students will be equipped to use computational tools effectively for a variety of tasks and problems.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand Computer Systems:** Explain the basic components of computer systems, including hardware (input-output devices, memory systems) and software (operating systems). Demonstrate knowledge of computer organization and the interaction between hardware and software.
2. **Use System and Application Software:** Navigate and utilize system software and application software effectively. Manage files and folders, configure printers and modems, and use accessories in Windows. Demonstrate proficiency in MS Word and MS Excel, including basic operations and file management.
3. **Perform Computational Programming:** Write and execute programs using MATLAB, Mathematica, or Maple. Understand and apply basic programming concepts such as variables, vector and matrix computation, built-in functions, and plotting. Create and manage M-files for computational tasks.
4. **Implement Advanced Programming Techniques:** Develop more advanced programming skills using MATLAB, Mathematica, or Maple, including creating and using functions, implementing loops, conditional execution, and performing matrix multiplication.

Unit – 1

Introduction to computers, Computer organization, Input-output devices, Memory system. Hardware and software. Operating system.

Unit – 2

Computer languages, System software and application software. Windows: Graphical user interface, control panel and all features there in files and folders management. Using Accessories, Getting help, copying, moving and sharing information between programs. Setting up printer and fonts. Configuring modem. Introduction to MS Word and Ms-Excel. Algorithms and flow charts. Programming languages and problem solving on computers.

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Unit 3: Programming using Matlab/Mathematica/Maple – Variables, Vector and Matrix Computation, Built-in-functions, Plotting, output, M-files.

Unit 4: Programming using Matlab/Mathematica/Maple – Functions, Loops, Conditional Execution, Matrix Multiplication.

Reference Books:

1. Y. Kanetkar, Let Us C, BPB Publications, 2008.
2. C. Ghezzi and M. Jazayeri, Programming Languages Concepts, John Wiley, 1977.
3. M. Marcotty & H.F. Ledgard, Programming Language Landscape, Galgotia Publication, 1981.
4. B.S. Gottfried, Schaum's Outline of Theory and Problems of Programming with C, McGraw-Hill, 1996.
5. Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, A Guide to MATLAB, Cambidge Univ. Press, 2001.
6. Duane hanselman and Bruce Littlefield, Mastering Matlab-7, Pearson Education 2005.
7. William J. Palm III, Introduction to Matlab-7 for Engineers, McGraw Hill, 2005.
8. Mureşan, Marian, Introduction to Mathematica® with Applications, Springer, 2017.
9. José Guillermo Sánchez León, Mathematica Beyond Mathematics: The Wolfram Language in the Real World, Chapman and Hall/CRC, 2017.

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Semester – IV

Note:
Continuous assessment (intenal) will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate Maximum marks in continuous assessment of each paper is 100.

Paper -1 : MAT X01 : Functional Analysis II and Advanced Calculus

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT X01 : Functional Analysis II and Advanced Calculus	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT X01	Functional Analysis II and Advanced Calculus					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide a comprehensive understanding of functional analysis, focusing on linear functionals, normed spaces, and inner product spaces, with particular emphasis on Hilbert spaces. The course covers fundamental theorems such as Hahn-Banach and Riesz Representation Theorem, explores the properties and structures of Hilbert spaces, and examines various operators and their spectral properties. By the end of the course, students will develop a deep understanding of functional analysis concepts and their applications in advanced mathematical contexts.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type

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questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. **Understand and Apply Functional Analysis Theorems:** Explain the concepts of continuous linear functionals, the Hahn-Banach theorem and its consequences, and the embeddings and reflexivity of normed spaces. Provide examples of dual spaces and understand their significance in functional analysis.
2. **Analyze Hilbert Spaces:** Describe the properties of Hilbert spaces, including the Cauchy-Schwartz inequality, orthogonality, and functionals. Apply the Pythagorean theorem and the projection theorem in Hilbert spaces. Understand and identify separable Hilbert spaces and their examples.
3. **Utilize Orthonormal Sets and Bases:** Work with orthonormal sets and apply Bessel's inequality. Use the Gram-Schmidt orthogonalization process to find orthonormal bases. Understand complete orthonormal sets, Parseval's identity, and the structure of Hilbert spaces. Apply the Riesz Representation Theorem and understand the reflexivity of Hilbert spaces.
4. **Analyze Operators on Hilbert Spaces:** Determine the adjoint of an operator on a Hilbert space. Analyze and classify operators as self-adjoint, positive, normal, and unitary, and understand their properties. Work with orthogonal projections, eigenvalues, eigenvectors, and the spectrum of operators. Apply the spectral theorem to operators in Hilbert s

Unit – 1

Continuous linear functionals. Hahn-Banach theorem and its consequences. Embedding and Reflexivity of normed spaces. Dual spaces with examples. Inner product spaces.

Unit – 2

Hilbert space and its properties. Cauchy-Schwartz inequality, Orthogonality and Functionals in Hilbert Spaces. Phythagorean theorem, Projection theorem, Separable Hilbert spaces and Examples.

Unit - 3

Orthonormal sets, Bessel's inequality, Existence of orthonormal bases by Gram-schimidt orthogonalization process. Complete orthonormal sets, Parseval's identity, Structure of a Hilbert space, Riesz representation theorem, Reflexivity of Hilbert spaces.

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Unit – 4

Adjoint of an operator on a Hilbert space. Self-adjoint, Positive, Normal and Unitary operators and their properties.Projection on a Hilbert space. Invariance. Reducibility. Orthogonal projections. Eigen values and eigen vectors of an operator. Spectrum of an operator Spectral theorem.

Reference Books:

1. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley and Sons., 1978.
2. A. E. Taylor, Introduction to Functional Analysis, John Wiley, 1958.
3. A. Bowers and N. Kalton, An Introductory Course in Functional Analysis, Springer Verlog, 2014.
4. W. Rudin, Functional Analysis, McGraw-Hill, 1973.

Paper – 2: MAT X02 : Viscous Fluid Dynamics – II

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT X02 : Viscous Fluid Dynamics – II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT X02	Viscous Fluid Dynamics – II					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of fluid dynamics involving unsteady flows, energy equations, and boundary layer theory. The course aims to develop the ability to analyze complex fluid flow scenarios, such as flow due to					

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	moving walls, oscillations, and suction/injection processes. Additionally, it covers temperature distribution in different geometries, the effects of variable viscosity in Couette flow, and the principles of very slow motion in fluids. Students will learn to derive and solve equations related to velocity and thermal boundary layers, preparing them for advanced studies and applications in fluid mechanics.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and analyze unsteady flow phenomena,** including those caused by moving and oscillating walls, and comprehend the implications of suction and injection through porous walls.

   Derive and solve the energy equation for temperature distribution in various configurations, such as parallel plates, pipes, and concentric rotating cylinders.
2. **Apply the theory of variable viscosity to analyze plane Couette** flow and understand the principles of transpiration cooling.
3. **Explain and apply the concepts of Stokes' and Oseen's** flows in the context of very slow motion around a sphere.
4. **Derive and understand velocity and thermal boundary layer equations** in two-dimensional flows, and apply solutions to specific cases like the boundary layer on a flat plate and thermal boundary layers where the Prandtl number equals one.
5. **Integrate the theoretical knowledge of fluid dynamics** with practical applications in engineering and research scenarios, preparing for advanced topics in fluid mechanics.

Unit – 1

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Concept of unsteady flow, Flow due to plane wall suddenly set in the motion (Stokes' first problem), Flow due to an oscillating plane wall (Stokes' second problem), Starting flow in plane Couette motion, Suction/injection through porous wall.

Unit - 2

Equation of energy, Temperature distribution : Between parallel plates, in a pipe, between two concentric rotating cylinders.

Unit - 3

Variable viscosity plane Couette flow, temperature distribution of plane Couette flow with transpiration cooling.Theory of very slow motion: Stokes' and Oseen's flows past a sphere.

Unit – 4

Concept of boundary layer , Derivation of velocity and thermal boundary equations in two-dimensional flow. Boundary layer on flat plate (Balsius-Topfer solution), Simple solution of thermal boundary layer equation for Pr = 1.

Reference Books:

1. J.L. Bansal, Viscous Fluid dynamics, JPH, Jaipur , 2008.
2. M.D.Raisinghania, Fluid Dynamics, S.Chand, 2003.
3. F. Chorlton, A Text Book of Fluid Dynamics, CBC, 1985.
4. S. W. Yuan, Foundations of Fluid Mechanics, Prentice-Hall, 1976.
5. S. I. Pai, Viscous Flow Theory I- Laminar Flow, D. Van Nostrand Co., Ing., Princeton, New Jersey, N.Y., Landon, Toronto, 1956.
6. F.M.White, Viscous Fluid Flow, McGraw-Hill, N.Y., 1974.

Paper – 3: MAT X03 : Integral Equations

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT X03 : Integral Equations	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT X03	Integral Equations					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	

Prerequisites	Mathematics course at UG Level.
Objectives of the Course:	The objective of this course is to provide students with a solid foundation in the theory and application of linear integral equations. The course aims to develop students' ability to solve various types of integral equations, including Fredholm and Volterra equations, using different mathematical techniques. Topics covered include the conversion of differential equations to integral equations, eigenvalues and eigenfunctions, resolvent kernels, symmetric kernels, and classical Fredholm theory. The course prepares students for advanced study in mathematics and engineering by equipping them with the skills needed to analyze and solve integral equations that arise in various scientific and engineering contexts.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand the definition and classification of linear** integral equations and convert initial and boundary value problems into integral equations. Analyze and compute eigenvalues and eigenfunctions for these equations.
2. **Solve homogeneous and general Fredholm integral equations** of the second kind with separable kernels, applying methods suitable for these types of problems.
3. **Apply methods of successive substitutions and successive approximations** to solve Fredholm and Volterra integral equations of the second kind, and understand the concept of the resolvent kernel, including conditions for uniform convergence and the uniqueness of series solutions.
4. **Analyze integral equations with symmetric kernels using** the orthogonal system of functions and fundamental properties of eigenvalues and eigenfunctions. Apply the Hilbert-Schmidt theorem to solve Fredholm integral equations of the second kind.

5. **Solve Volterra integral equations of the second kind with convolution**-type kernels using Laplace transforms, and solve singular integral equations using Fourier transforms.
6. **Understand and apply classical Fredholm theory**, including Fredholm theorems, to solve Fredholm integral equations of the second kind using Fredholm's first theorem.
7. **Integrate knowledge of integral equations to solve complex mathematical** problems and apply these techniques to practical problems in physics, engineering, and applied mathematics.
8. **Demonstrate proficiency in theoretical and practical aspects** of solving integral equations, contributing to advanced research and professional practice in mathematical and engineering disciplines.

Unit – 1

Linear integral equations– Definition and classification. Conversion of initial and boundary value problems to an integral equation. Eigen values and Eigen functions. Solution of homogeneous and general Fredholm integral equations of second kind with separable kernels.

Unit - 2

Solution of Fredholm and Volterra integral equations of second kind by methods of successive substitutions and successive approximations. Resolvent kernel and its results. Conditions of uniform convergence and uniqueness of series solution.

Unit – 3

Integral equations with symmetric kernels– Orthogonal system of functions. Fundamental properties of eigen values and eigen functions for symmetric kernels. Expansion in eigen functions and bilinear form. Hilbert-Schmidt theorem. Solution of Fredholm integral equations of second kind by using Hilbert-Schmidt theorem.

Unit - 4

Solution of Volterra integral equations of second kind with convolution type kernels by Laplace transform. Solution of singular integral equations by Fourier transform.

Classical Fredholm theory– Fredholm theorems. Solution of Fredholm integral equation of second kind by using Fredholm first theorem.

Reference Books:

1. Shanti Swarup, Integral Equations, Krishna Publications, Meerut.
2. M.D.Raisinghania, Integral Equations and Boundary Value Problems, S.Chand, 2010.
3. Abdul J. Jerry, Introduction to Integral Equations with applications, Marcel Dekkar Inc. NY, 1999.
4. L.G.Chambers, Integral Equations: A short Course, Int. Text Book Company Ltd. 1976.

Optional Paper (ECC)

Paper – 4 : MAT A02 : Continuum Mechanics – II

(Teaching 6 hours per week)

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Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT A02 : Continuum Mechanics – II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT A02	Continuum Mechanics – II					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of fundamental principles in fluid mechanics and thermodynamics, as well as their applications in elasticity and fluid dynamics. The course focuses on the conservation laws, equations of motion, thermodynamic principles, and elasticity theories. It aims to equip students with the knowledge to analyze fluid flow problems, apply thermodynamic laws, and understand the behavior of materials under stress. By the end of the course, students will be prepared to approach advanced topics in mechanical and civil engineering fields with a solid theoretical foundation.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

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1. **Understand and apply the law of conservation of mass** and the Eulerian continuity equation, as well as utilize the Reynolds transport theorem and momentum integral theorem in various engineering applications.
2. **Comprehend the kinetic equation of state** and the first and second laws of thermodynamics, including their applications to both linear elasticity and fluid mechanics. Students will learn to apply the generalized Hooke's law for isotropic homogeneous solids.
3. **Analyze and solve problems related to linear elasticity**, including understanding and applying compatibility equations (Beltrami-Michell equations), strain energy functions, and the uniqueness theorem. Students will also be familiar with the principles of superposition and the relationship between pressure and density in fluid dynamics.
4. **Apply fundamental fluid dynamics principles**, including the kinetic equation of state, equations of motion, vorticity-stream surfaces for inviscid flow, and Bernoulli's equations. Students will also learn to identify and utilize similarity parameters of fluid flow.
5. **Understand irrotational flow and velocity potential concepts** and their applications in fluid dynamics, enabling them to analyze and solve complex fluid flow problems.
6. **Integrate the knowledge of thermodynamics and fluid dynamics** to solve practical engineering problems, preparing them for more advanced studies and professional applications in fields such as mechanical, civil, and aerospace engineering.

Unit – 1

Law of conservation of mass and Eulerian continuity equation. Reynolds transport theorem. Momentum integral theorem and equation of motion.

Unit – 2

Kinetic equation of state. First and the second law of thermodynamics and dissipation function. Applications (Linear elasticity and Fluids) – Assumptions and basic equations. Generalized Hook's law for an isotropic homogeneous solid.

Unit – 3

Compatibility equations (Beltrami-Michell equations). Classification of types of problems in linear elasticity. Principle of superposition, Strain energy function, Uniqueness theorem, p-ρ relationship and work kinetic energy equation, Irrotational flow and Velocity potential.

Unit – 4

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Kinetic equation of state and first law of Thermodynamics. Equation of continuity. Equations of motion. Vorticity-stream surfaces for inviscid flow, Bernoullis equations. Irrotational flow and velocity potential. Similarity parameters of fluid flow.

Reference Books:

4. W. Prager, Introduction to Mechanics of Continua, Lexinton Mass, Ginn, 1961.
5. A.C. Eringen, Mechanics of Continua, Wiley, 1967.
6. T.J. Chung, Continuum Mechanics, Prentice- Hall, 1988.

Paper – 5 : MAT B02 : Boundary Layer Theory – II
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT B02 : Boundary Layer Theory – II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT B02	Boundary Layer Theory – II					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with an in-depth understanding of unsteady boundary layer theory, thermal boundary layers, and convective heat transfer. The course aims to equip students with the skills to analyze and solve complex fluid flow problems involving boundary layers, using both exact and approximate methods. It covers the growth of boundary layers under various conditions, methods for solving boundary layer equations, and the thermal effects in convective flows. By integrating theoretical concepts with practical applications, students will be prepared for advanced studies and research in fluid dynamics and heat transfer.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Analyze unsteady boundary layers using methods** of successive approximations, understanding boundary layer growth after impulsive and accelerated starts, and for periodic flows driven by pulsatile pressure gradients.
2. **Apply approximate methods to solve boundary layer equations**, including the Karman momentum integral equation, the Karman-Pohlhausen method, the Waltz-Thwaites method, and the energy integral equation, to solve complex fluid flow problems.
3. **Derive and understand the two-dimensional thermal boundary layer equation** for flow over a plane wall, and analyze forced convection in a laminar boundary layer on a flat plate, utilizing Crocco's integrals and Reynolds analogy for heat and momentum transfer.
4. **Analyze temperature distribution in different jet flows**, including plane free jets, circular jets, and plane wall jets, and understand the principles of free convection from heated vertical plates. Apply thermal-energy integral equations and approximate solutions, such as the Pohlhausen method, to problems of free convection.
5. **Integrate knowledge of boundary layer theory and thermal analysis to address** complex fluid dynamics and heat transfer problems in engineering, preparing for further study or professional work in fields such as aerospace, mechanical, and chemical engineering.
6. **Demonstrate proficiency in using theoretical models** and numerical methods to solve practical problems in unsteady and thermal boundary layers, contributing to the development of innovative solutions in fluid mechanics and heat transfer applications.

Unit-1

Unsteady boundary layers – Method of successive approximations, Boundary layer growth after impulsive start of motion and in accelerated motion, Boundary layer for periodic flow (Pulsatile pressure gradient).

Unit - 2

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Approximate methods for the solution of the boundary layer equations. Karman momentum integral equation. Karman-Pohlhausen method and its application. Waltz-Thwaites method. Energy integral equation.

Unit - 3

Derivation of two-dimensional thermal boundary layer equation for flow over a plane wall. Forced convection in a laminar boundary layer on a flat plate, Crocco's first and second integrals. Reynolds analogy.

Unit - 4

Temprature distribution in the spread of a jet – (i) Plane free jet, (ii) Circular jet (iii) Plane wall jet. Free convection from a heated vertical plate. Thermal-energy integral equation. Approximate solution of the Pohlhausan's problem of free convection from a heated vertical plate.

Reference Books:

1. J.L. Bansal, Viscous Fluid dynamics, JPH, Jaipur , 2008.
2. M.D.Raisinghania, Fluid Dynamics, S.Chand, 2003.
3. F. Chorlton, A Text Book of Fluid Dynamics, CBC, 1985.
4. S. W. Yuan, Foundations of Fluid Mechanics, Prentice-Hall, 1976.
5. S. I. Pai, Viscous Flow Theory I- Laminar Flow, D. Van Nostrand Co., Ing., Princeton, New Jersey, N.Y., Landon, Toronto, 1956.
6. F.M.White, Viscous Fluid Flow, McGraw-Hill, N.Y., 1974.

Paper – 6 : MAT C02 : Mathematical Programming - II

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT C02 : Mathematical Programming - II**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	**MAT C02**	**Mathematical Programming - II**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					

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Objectives of the Course:	The objective of this course is to provide students with a comprehensive understanding of nonlinear programming and optimization techniques. The course focuses on the theoretical foundations and practical applications of various optimization methods, including convex functions, quadratic programming, and geometric programming. Students will learn to formulate and solve constrained optimization problems, apply the Kuhn-Tucker conditions, and understand duality in quadratic programming. The course aims to equip students with the skills needed to tackle complex optimization problems in engineering, economics, and other fields.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and apply the concepts of convex functions and quadratic forms** to solve constrained problems of maxima and minima using the Lagrangian method.
2. **Formulate and solve nonlinear programming problems** using graphical methods and understand the fundamental ingredients of nonlinear optimization.
3. **Apply the Kuhn-Tucker necessary and sufficient conditions** for optimality and analyze saddle points and saddle-point theorems in the context of nonlinear programming.
4. **Solve quadratic programming problems using the Kuhn-Tucker** conditions and Wolfe method, and understand the concept of duality in quadratic programming.
5. **Apply Beale's method to solve quadratic programming problems** (QPP) and understand the formulation and solution of geometric programming problems using geometric-arithmetic inequalities and necessary conditions of optimality.
6. **Integrate the knowledge of optimization techniques to address** complex real-world problems, preparing for advanced studies or professional applications in areas such as operations research, finance, engineering, and data science.

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7. **Demonstrate proficiency in theoretical and practical optimization** techniques, contributing to innovative solutions in various fields that require optimal decision-making and resource allocation.

Unit – 1

Convex function, Quadratic forms, constrained problem of maxima and minima, Lagrangian method, Non-linear programming: Formulation and Graphical method.

Unit – 2

Non-linear programming and its fundamental ingradients, Khun-Tucker necessary and sufficient conditions; Saddle point, Saddle-point theorems.

Unit – 3

Quadratic Programming: Kuhn-Tueker conditions, Wolfe method, Duality in Quadratic Programming.

Unit - 4

Beals method to solve QPP, Geometric Programming: Formulation, geometric arithmetic inequality, necessary conditions of optimality.

Reference Books:

1. Kanti Swaroop, P.K.Gupta and Manmohan, Operation Research, Sultan Chand & Sons., N.Delhi, 2007.
2. S.D.Sharma, Operations Research, Kedar Nath Ram Nath and co. Meerut, 2005.
3. F. S. Hillier and G. J. Lieberman, Introduction to Operations Research Concepts and Cases (9th Edition), Tata McGraw Hill, 2010.
4. Hamdy A. Taha, Operations Research, An Introduction (9th edition), Prentice-Hall, 2010.
5. G. Hadley, Linear Programming, Narosa Publishing House, New Delhi, 2002.

Paper – 7 : MAT D02: Graph Theory – II

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT D02: Graph Theory – II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
I	MAT D02	Graph Theory – II		6

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Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of advanced graph theory concepts and their applications. The course covers various topics including cut sets, network flows, planarity in graphs, graph coloring, and directed graphs. Students will explore foundational theorems, such as the max-flow min-cut theorem, Euler's formula, and Cayley's theorem, as well as advanced topics like graph coloring and counting labeled trees. The course aims to develop students' abilities to analyze and solve complex problems in graph theory, which are applicable in computer science, engineering, operations research, and other related				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

fields.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and apply concepts of cut sets**, cut vertices, and network flows to analyze the connectivity and separativity of graphs, and utilize the max-flow min-cut theorem to solve flow problems in networks.
2. **Analyze and determine the planarity of graphs using** combinatorial and geometric approaches, understand Kuratowski's graphs, apply Euler's formula, and calculate the thickness and crossing number of planar graphs.
3. **Apply graph coloring techniques, including vertex coloring**, edge coloring, and map coloring, to solve problems related to chromatic numbers and chromatic polynomials, and understand the four-color and five-color theorems.

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4. **Understand the properties and applications of digraphs**, including binary relations, directed graphs, directed trees, and tournaments. Apply methods such as the Polish notation method and analyze tournaments using graph theory principles.
5. **Count labeled trees using various combinatorial methods,** including Cayley's theorem and Polya's theory, to solve problems in graph enumeration and understand the principles of counting in graph theory.
6. **Integrate knowledge of graph theory concepts to address practical** problems in various fields, preparing for advanced studies or professional applications in areas such as computer science, network design, and operations research.
7. **Demonstrate proficiency in theoretical and practical aspects** of graph theory, contributing to innovative solutions in fields that require complex network analysis, optimization, and algorithm development.

Unit-1

Cut set and Cut vertices, Cut set and bridge, fundamental cut set, Connectivity and Severability, Vector spaces of graphs.

Unit-2

Coloring: Graph Coloring, vertex coloring, Edge coloring, Properly coloring of a graph, Chromatic polynomial, Decomposition theorem, Four colour theorem, The five colour theorem.

Unit-3

Enumeration of graphs: Types of enumeration, Labeled graphs, Counting labeled tress, Rooted labled trees, Enumeration of graphs, Partitions, Generating functions, Counting unlabeled trees, Rooted unlabeled trees, Permutation, Composition of Permutation, P6lya's theorem, Burnside's lemma, P6lya's enumeration theorem.

Unit-4

Graph and Algorithms: Applications Shortest path algorithms, Dijkstra's algorithm, Algorithm for minimal spanning tree, Kruskal's algorithm, Prim's algorithm, the labeling algorithms.

Reference Books:

1. N. Deo, Graph Theory with Applications to Computer Science, Prentice-Hall of India, 1979.
2. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, 1986.
3. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1995.

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4. S. Wiitala, Discrete Mathematics: A Unified Approach, McGraw-Hill Book Co., 1987.
5. Ian Anderson, A First course in Combinatorial Mathematics, Springer, 1989.

Paper – 8 : MAT F02 : General Relativity & Cosmology
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT F02 : General Relativity & Cosmology	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT F02	General Relativity & Cosmology					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a deep understanding of the fundamental concepts and mathematical frameworks of General Relativity. The course covers the theoretical underpinnings of Einstein's field equations, the Schwarzschild metric, and the relationship between gravity and spacetime. Students will explore key topics such as Mach's principle, the nature of singularities, relativistic orbits, tests of General Relativity, and cosmological models. By the end of the course, students will be equipped with the knowledge and skills necessary to analyze complex problems in gravitational physics and cosmology.					

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus

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(all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and apply Mach's principle and the Newtonian approximation** of the equation of motion. Derive and analyze Einstein's field equations for both matter and empty space, and understand their reduction to Poisson's equation. Explain the resolution of the clock paradox within the framework of General Relativity.
2. **Analyze the Schwarzschild exterior metric and its isotropic form**, including the identification and implications of singularities. Derive key relationships such as GM=c2mGM = c^2mGM=c2m and calculate the mass of the sun in gravitational units. Formulate and solve the relativistic differential equations governing the orbits of planets.
3. **Describe and analyze the three crucial tests of General Relativity** and understand their significance. Explore the analogues of Kepler's laws in the context of General Relativity, and calculate the trace of the Einstein tensor and the energy-momentum tensor for a perfect fluid. Understand the Schwarzschild interior metric and the corresponding boundary conditions.
4. **Demonstrate the Lorentz invariance of Maxwell's equations in empty** space and calculate the Lorentz force on a charged particle. Derive the energy-momentum tensor for electromagnetic fields and understand its role in Einstein's field equations with a cosmological term. Analyze static cosmological models, including the Einstein and de-Sitter models, and understand their physical and geometrical properties. Explore non-static forms of de-Sitter line-elements and their relation to redshift, Einstein spaces, Hubble's law, and Weyl's postulate.
5. **Integrate knowledge of General Relativity and cosmology** to solve complex theoretical and practical problems in gravitational physics, providing a solid foundation for advanced studies or research in these fields.
6. **Demonstrate proficiency in theoretical physics by applying** advanced mathematical techniques to analyze and solve problems related to the curvature of spacetime, the behavior of objects in strong gravitational fields, and the dynamics of the universe.

Unit - 1

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Mach's principle, Newtonian approximation of equation of motion, Einstein's field equation for matter and empty space, Reduction of Einstein's field equation to Poisson's equation, Removal of clock paradox in General Relativity.

Unit - 2

Schwarzschild exterior metric, its isotropic form, Singularity and singularities in Schwarzschild exterior metric, Derivation of the formula $GM = c^2m$, Mass of sun in gravitational unit, Relativistic differential equation for the orbit of the planet.

Unit – 3

Three crucial tests in General Relativity and their detailed descriptions, Analogues of Kepler's laws in General Relativity, Trace of Einstein tensor, Energy-momentum tensor and its expression for perfect fluid, Schwarzschild interior metric and boundary condition.

Unit – 4

Lorentz invariance of Maxwell's equations in empty space, Lorentz force on charged particle, Energy-momentum tensor for electro-magnetic field. Einstein's field equation with cosmological term, Static cosmological models (Einstein & de-Sitter models) with physical and geometrical properties, Non-static form of de-Sitter line-element and Red shift in this metric, Einstein space, Hubble's law, Weyl's postulate.

Reference Books:

1. J.V. Narlikar, Lectures on General Relativity and Cosmology, Macmillan Co. Ltd. India, N.Delhi, 1978.
2. C. Moller, The Theory of Relativity, Oxford Clarendon Press, 1952.
3. P.G. Bergmann, Introduction to the Theory of Relativity, Prentice Hall of India, 1969.
4. J.L. Anderson, Principles of Relativity Physics, Academic Press, 1967.
5. W. Rindler, Essential Relativity, Van Nostrand Reinhold Company, 1969.
6. V. A. Ugarov, Special Theory of Relativity, Mir Publishers, 1979.

Paper – 9 : MAT G02 : Industrial Mathematics – II

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT G02 : Industrial Mathematics – II**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
I	**MAT G02**	**Industrial Mathematics – II**		**6**

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Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**
Prerequisites		Mathematics course at UG Level.				
Objectives of the Course:		The objective of this course is to introduce students to the fundamental concepts and mathematical models of inventory management, replacement, and reliability theory. The course covers various Economic Order Quantity (EOQ) models, including those with constraints and shortages, as well as replacement strategies for items that deteriorate or fail completely. Additionally, the course provides an in-depth understanding of reliability theory, including the analysis of system reliability, aging, and failure rates. Students will learn to apply these models to optimize inventory management, maintenance strategies, and reliability of systems in various practical contexts.				

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Objective

The objective of this course is to introduce students to the fundamental concepts and mathematical models of inventory management, replacement, and reliability theory. The course covers various Economic Order Quantity (EOQ) models, including those with constraints and shortages, as well as replacement strategies for items that deteriorate or fail completely. Additionally, the course provides an in-depth understanding of reliability theory, including the analysis of system reliability, aging, and failure rates. Students will learn to apply these models to optimize inventory management, maintenance strategies, and reliability of systems in various practical contexts.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and apply inventory management models**, specifically Economic Order Quantity (EOQ) models, with and without shortages. Analyze these models to determine optimal inventory levels and reorder points.
2. **Develop and apply EOQ models with constraints**, understanding how to incorporate real-world limitations such as budget, space, and supplier constraints into inventory management decisions.
3. **Analyze replacement and reliability models**, including strategies for replacing items that deteriorate over time or fail completely. Determine optimal replacement schedules to minimize costs and maximize operational efficiency.
4. **Apply reliability theory to assess system reliability**, including the study of coherent structures and the reliability of systems composed of independent components. Calculate bounds on system reliability and understand the shapes of reliability functions.
5. **Understand concepts related to the aging and failure rates** of systems, including parametric families of life distributions with monotone failure rates. Apply these concepts to predict system performance and lifespan.
6. **Integrate knowledge of inventory, replacement, and reliability** models to optimize decision-making in various industrial and engineering contexts, preparing for advanced study or professional applications in operations management, logistics, and reliability engineering.
7. **Demonstrate proficiency in mathematical modeling** and analysis by effectively applying inventory, replacement, and reliability theories to solve complex, real-world problems in management and engineering.

Unit - 1

Inventory Models. EOQ models with and without shortages.

Unit - 2

EOQ models with constraints.

Unit - 3

Replacement and Reliability models. Replacement of items that deteriorate, Replacement of items that fail completely.

Unit - 4

Reliability Theory – Coherent structure, Reliability of systems of independent components, Bounds on system reliability, Shapes of the system reliability function, Motion of aging, Parametric families of life distribute with Monotone failure rate.

Reference Books:

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1. Kanti Swaroop, P.K.Gupta and Manmohan, Operation Research, Sultan Chand & Sons., N.Delhi, 2007.
2. S.D.Sharma, Operations Research, Kedar Nath Ram Nath and co. Meerut, 2005.
3. H.A.Taha, Operations Research: An Introduction; MacMillan Publishing Company, New York, 1982.
4. F.S. Hillier and G.J. Leiberman, Introduction to Operations Research; Holden Day, 1962.
5. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.

Paper – 10 : MAT H02: Magnetohydrodynamics - II
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	MAT H02: Magnetohydrodynamics - II	3 Hrs	100	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	MAT H02	Magnetohydrodynamics - II					6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
Advance	Major	6	0	6	Yes	Lecture, Ninety lectures	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a comprehensive understanding of Magnetohydrodynamics (MHD) and its applications in fluid dynamics. The course covers various types of MHD flows, including stagnation point flows, boundary layer flows, jet flows, and shock waves. It focuses on the mathematical modeling, analysis, and numerical techniques used to solve MHD problems, as well as the physical interpretations of these solutions. By the end of the course, students will be able to analyze and solve complex MHD flow problems and understand the behavior of conducting fluids in magnetic fields, preparing them for advanced studies and research in fluid dynamics and engineering.					

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Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and analyze MHD flows near stagnation points and different** types of MHD flows such as Rayleigh's flow, Stokes' flow past a sphere, and Oseen's flow past a sphere. Apply mathematical techniques to solve these flows and interpret the physical phenomena associated with them.
2. **Solve MHD boundary layer flow problems past flat** plates in both aligned and transverse magnetic fields. Utilize Wilson's numerical solution technique and modified Rossow's method to analyze these flows, understanding the effects of magnetic fields on boundary layer behavior.
3. **Analyze MHD plane free jet flows and MHD waves** using the theory of characteristics. Understand and derive equations of characteristics and characteristic surfaces, and solve MHD characteristic equations to analyze wave propagation in conducting fluids.
4. **Understand and analyze MHD shock waves**, including the derivation and interpretation of Friedriches diagrams, dispersion relations, and the generalized Hugoniot condition. Classify MHD shock waves, evaluate their compressive nature, and assess their stability under different conditions.
5. **Apply theoretical and numerical methods to solve MHD flow problems**, integrating knowledge of fluid dynamics and electromagnetism to address complex real-world scenarios involving conducting fluids and magnetic fields.
6. **Demonstrate proficiency in MHD theory and application**, preparing for advanced research or professional practice in fields such as aerospace engineering, astrophysics, and industrial applications involving magnetic fields and conducting fluids.

Unit - 1

MHD flow near a stagnation point. MHD Reyleigh's flow. MHD Stoke's flow past a sphere, MHD Oseen's flow past a sphere.

Unit - 2

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MHD boundary layer flow past a flat plate in an aligned magnetic flow. Wilson's numerical solution technique. MHD boundary layer flow past a flat plate in a transverse magnetic field. modified Rossow's method of solution.

Unit - 3

MHD plane free jet flow. Wave and theory of characteristics, Equation of the characteristics, Characteristic surfaces, MHD characteristic equations. MHD waves.

Unit - 4

Friedriches diagrams. Dispersion relation. MHD shock waves. Generalized Hugoniot condition. Compressive nature of MHD shocks. MHD shock wave classification. MHD shock stability.

Reference Books:

1. J.L.Bansal, Magnetofluiddynamics of Viscous Fluids, JPH, Jaipur, 1994.
2. K.R. Cramer and S.I.Pai, Magnetofluiddynamics for Enginners and Applied Physicists, McGraw-Hill, N.Y., 1973.
3. P.A. Davidson, An Introduction to Magnetohydrodynamics, Cambridge Univ. Press, U.K., 2001.
4. J.A.Shercliff, A Textbook of Magnetohydrodynamics, Pergamon Press., 1965.
5. K.R. Cramer and S.I. Pai, Magnetofluid Dynamics for Engineers and Applied Physicists, McGraw- Hill Book Co., 1973.

Paper 11 : MAT I02 : Numerical Analysis – II

(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks	Minimum Passing Marks
Theory	**MAT I02 : Numerical Analysis – II**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	**MAT I02**	**Numerical Analysis – II**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to provide students with a thorough understanding of numerical methods for curve fitting, function					

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	approximation, and solving ordinary differential equations (ODEs). The course covers various techniques for approximating functions, including least squares, polynomial fitting, Taylor series, and Chebyshev polynomials. Additionally, students will learn numerical methods for solving ODEs, including Taylor series, Picard, and Runge-Kutta methods, and explore stability analysis and boundary value problems. Finite difference methods for solving linear boundary value problems are also introduced. By the end of the course, students will have the skills to apply these numerical techniques to solve complex mathematical problems encountered in engineering and applied sciences.

Note: There shall be five questions in all. Candidates are required to attempt all five questions. This paper is divided into four units. There shall be two parts in question paper. Part 'A' of the question paper shall contain first question with 10 subparts consisting of very short answer type questions based on knowledge, understanding and applications of the topics covering the syllabus (all four units). Each question of the subpart will carry 2 marks. Part 'B' of the paper shall contain four questions. One question will be set from each unit. Each question will have three parts. Candidates are required to attempt all four units by taking any two parts from each question of the unit. All questions carry equal marks.

Course Outcomes

By the end of this course, students will be able to:

1. **Understand and apply curve fitting and function approximation techniques**, including least square error criterion, linear regression, polynomial fitting, and approximation of functions using Taylor series and Chebyshev polynomials. Analyze the accuracy and efficiency of different approximation methods.
2. **Solve ordinary differential equations (ODEs) numerically using** various methods such as Taylor series, Picard method, Runge-Kutta methods up to fourth order, and multistep methods, including predictor-corrector strategies.
3. **Perform stability analysis for numerical methods used in solving ODEs**, both single and multistep methods. Apply this understanding to ensure the reliability and accuracy of numerical solutions.
4. **Analyze and solve boundary value problems (BVPs) for ordinary differential equations** using methods such as the shooting method, and understand their application in various scientific and engineering problems.
5. **Implement finite difference methods to develop difference schemes for solving** linear boundary value problems, and apply these schemes to practical problems.

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6. **Integrate knowledge of numerical methods to solve complex problems,** enabling advanced study or professional application in fields such as engineering, physics, and computational mathematics.
7. **Demonstrate proficiency in applying numerical techniques** for solving mathematical problems, contributing to innovative solutions in computational analysis and modeling in scientific and engineering contexts.

Unit – 1

Curve Fitting and Function Approximations – Least square error criterion. Linear regression. Polynomial fitting and other curve fittings, Approximation of functions by Taylor series and Chebyshev polynomials.

Unit – 2

Numerical solution of Ordinary differential Equations – Taylor series Mathod, Picard method, Runge-Kutta methods upto fourth order, Multistep method (Predictor-corrector strategies).

Unit - 3

Stability analysis – Single and Multistep methods.BVP's of ordinary differential Equations – Boundary value problems (BVP's), Shooting methods.

Unit - 4

Finite difference methods. Difference schemes for linear boundary value problems of the type $y'' = f(x, y), y'' = f(x, y, y')$ and $y^{iv} = f(x, y)$.

Reference Books:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, PHI, 1979.
2. V.Rajaraman, Computer Oriented Numerical Methods, PHI, 1993.
3. M.K.Jain, S.R.K. Eyenger and R.K. Jain, Numerical Methods for Mathematics and Applied Physicists, Wiley-Eastern Pub., N.Delhi, 2005.
4. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
5. C. F. Gerald and P. O. Wheatley, App;ied Numerical Analysis, Pearson Education, India,7th edition, 2008.
6. C.F. Gerald, P.O. Wheatley, Applied Numerical Analysis, Addison-Wesley, 1998.
7. S. D. Conte, C de Boor, Elementary Numerical Analysis, McGraw-Hill, 1980.
8. C.E. Froberg, Introduction to Numerical Analysis, (Second Edition), Addition-Wesley, 1979.

Paper – 12: MAT J 11: Computer Applications- Practical
(Teaching 6 hours per week)

Type	Paper code and Nomenclature	Duration of	Maximum Marks	Minimum Passing

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		Examination		Marks
Theory	**MAT J 11: Computer Applications- Practical**	**3 Hrs**	**100**	

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	**MAT J 11**	**Computer Applications- Practical**					**6**
Level of Course	**Type of the Course**	**Credit Distribution**			**Offered to NC Student**	**Course Delivery Method**	
		Theory	**Practical**	**Total**			
Advance	**Major**	**6**	**0**	**6**	**Yes**	**Lecture, Ninety lectures**	
Prerequisites		Mathematics course at UG Level.					
Objectives of the Course:		The objective of this course is to introduce students to various numerical methods for solving mathematical problems and to develop proficiency in using computational tools such as MATLAB, Mathematica, and Maple. The course covers the numerical solution of systems of linear equations, computation of eigenvalues and eigenvectors, least squares approximation, numerical integration, and the numerical solution of differential equations. It also includes graphical representation of data and solutions in two and three dimensions. By the end of the course, students will be able to apply these numerical techniques to solve complex mathematical problems and utilize software tools to perform advanced computations and visualizations.					

Note: There shall be five practicals with internal choice and candidates are required to attempt all give practicals.

Course Outcomes

By the end of this course, students will be able to:

1. **Solve systems of linear equations using numerical methods such** as Gauss elimination and Gauss-Seidel methods. Analyze the efficiency and accuracy of these methods in various applications.

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2. **Compute eigenvalues and eigenvectors using the power method** and inverse power method, and apply these techniques to problems in linear algebra and other areas requiring eigenvalue analysis.
3. **Perform least squares approximation to fit data to straight lines**, parabolas, and cubic equations, enabling accurate modeling of data and trends in scientific and engineering contexts.
4. **Apply numerical integration techniques,** including the trapezoidal and Simpson's methods, to approximate the definite integrals of functions, and perform double integration for more complex problems.
5. **Find roots of polynomials and create two-dimensional** and three-dimensional plots to visually represent mathematical functions and data, enhancing understanding of the underlying concepts.
6. **Solve initial value problems numerically using methods such as** Euler's method and the fourth-order Runge-Kutta method, and apply these techniques to practical problems involving differential equations.
7. **Utilize computational tools such as MATLAB**, Mathematica, and Maple to solve boundary value problems, perform numerical integrations, and create visualizations, effectively leveraging technology for advanced mathematical computations.
8. **Integrate numerical methods and computational tools** to solve complex problems across various disciplines, preparing for advanced study or professional work in fields such as engineering, physics, and applied mathematics.
9. **Demonstrate proficiency in the application of numerical methods** and software tools for solving mathematical problems, contributing to innovative solutions in research and industry.

Exercises shall be assigned on the topics covered in units 1 to 4 of MAT J01.

Solution of system of linear equations – Gauss elimination, Gauss-Seidel, Eigenvalues and Eigenvectors – Power method and inverse power method. Least Squares Approximation – Fitting of straight line, parabola and cubic equation. Numerical integration – Trapezoidal and Simpson's methods, Differential equations and graphics: Double integration, Roots of polynomial, two and three dimensional plots, Numerical solution of Initial value problems – Euler's method, Fourth order Runge-Kutta method, solution of Boundary value problems by using inbuilt functions of MATLAB/Mathematica/Maple.

Distribution of Marks:

Five Practicals – 15 Marks each	= 75 Marks
Practical Record	= 10 Marks
Viva-Voce	= 15 Marks
Total Marks	= 100 Marks

Note:

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1. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University through BOS and internal examiner will be appointed by the Head of the Department/Principal of the College.
2. Each candidate has to prepare his/her practical record.

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GLOBAL P.G. COLLEGE
(Affiliated to University of Rajasthan)
Nehru Colony, Lalsot, District - Dausa (Rajasthan) 303503

Programme Syllabus of

Master of Science (Physics)

Duration – 2 Years

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Vision of the College

Global PG College focuses on encouraging curiosity, science, art, and core values like fairness, justice, and caring for the environment. The college prepares students to become leaders, helping them solve problems, face new challenges, and make a positive difference in the world.

Mission of the College

Global PG College is focused on building a community that core values diversity, great education, new ideas, and helping others. It is committed to preparing students to succeed in a fast-changing world by giving them the knowledge, skills, and chances they need.

Programme Educational Outcomes (PEOs)

PEO1: Students will learn core and modern areas of Physics, including classical mechanics, quantum mechanics, statistical mechanics, nuclear physics, condensed matter, and computational physics.

PEO2: Students will learn strong analytical and laboratory skills to solve complex physics problems and conduct scientific research.

PEO3: Students will learn to think critically, be creative, and develop innovative solutions for both theoretical and experimental problems in physics.

PEO4: Students will learn to collaborate across disciplines to conduct research, solve scientific problems, and contribute innovative ideas.

PEO5: Students will learn to apply Physics concepts to real-life and community issues, like farming, renewable energy, the environment, and rural technology.

Program Outcomes (POs) and program Specific Outcomes (PSOs):

PO1: Students will learn both basic and advanced concepts of physics, demonstrating a clear understanding of the theory.

PO2: Students will use experiments to conduct research and analyze data accurately.

PO3: Students will apply their physics knowledge in areas such as agriculture, renewable energy, environmental science, and rural technology.

PO4: Students will be prepared for lifelong learning, advance studies, and career in teaching research or industry needs.

PO5: Students will learn to plan, carry out, and report small scientific projects on their own or in teams.

PSO1: Students will learn and apply the fundamental concepts of both classical and modern physics.

PSO2: Students will carefully conduct physics experiments, ensuring accuracy in every step, and will learn to interpret and understand the results correctly.

PSO3: Students will adhere to ethical standards, follow lab safety rules, and uphold social responsibility in all their studies and research activities.

PSO4: Students will pursue higher studies, develop new skills, and advance professionally in physics or related fields.

PSO5: Students will use Physics knowledge in useful work like electronics, materials, and energy systems.

राजस्थान विश्वविद्यालय
University of Rajasthan
ISO 9001:2015,14001:2015, 21001:2018 Certified University

Vision Statement of the University

धर्मो विश्वस्य जगतः प्रतिष्ठा (महानारायण उपनिषद)
धर्म ही समस्त संसार की प्रतिष्ठा का मूल है।
Dharma is the root of the prestige of the whole world

Foster an academic environment through intellectual discourse by creating centres of academic excellence to create and disseminate knowledge, facilitated by a transparent system of governance by adopting ethical practices and societal engagement.

Mission Statement of the University

Encourage quality teaching and research across disciplines using both established pedagogy and innovative practice, inside and outside the classroom.

Provide an enabling environment for academic debate and discourses.

Encourage value-based and ethical work culture by adopting efficient and democratic governance practices.

Nurture the students to grow as learned, ethical and conscientious citizens, thereby contributing to a knowledge based society.

University of RajasthanJaipur

SYLLABUS

M.Sc. Physics

(Semester Scheme)

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I/II Semester Examination 2024-25III/IVSemesterExamination2023-24

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M.Sc. Physics

SyllabusSemesterScheme202

4-25

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2. **SchemeofExamination**
3. **SemesterStructure**
4. **Course Details**

1. Eligibility:

A candidate who has secured more than 55% or CGPA of 3.5 in the UGC Seven Pointscale [45% or CGPA 2.5 in the UGC Seven Point Scale for SC/ST/Non-creamy layerOBC]orequivalentintheBachelordegreeinScienceorEngineeringorTechnology shall be eligible for admission to First Semester of a Master of Science course. Theadmission shall be based on Entrance Examination as per syllabus to be notified byURATPGbasedonB.Sc.PhysicsSyllabusofUniversityof Rajasthan. The M.Sc.Physics course in affiliated college will also be based on this syllabus and SemesterSystem,ChoiceBasedCreditSystemandGradeSystemasperOrd.199F.

2. SchemeofExamination

(1) Each theory paper EoSE shall carry 100 marks. The EoSE will be of 3 hoursduration. Part 'A' of theory paper shall contain 10 Short Answer Questions of 20marks based on knowledge, understanding and application of the topics/textscoveredinthesyllabus.Eachquestionwillcarryonemarkforcorrectanswer.

(2) Part "B" of paper will consist of Four questions with internal choice (except incases where a different scheme is specifically specified in the syllabus) of 20markeach.Thelimitofanswerwillbefivepages.

(3) Each Laboratory EoSE will be of four/six hours duration and involve

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laboratoryexperiments/exercisesandviva-voceexaminationwithweightageinratio of75:25.

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3. Course Structure

Thedetailsofthecourseswithcode,titleandthecreditsassignareasgivenbelow:AbbreviationsUsed:

CourseCategory:

CCC:CompulsoryCoreCourseECC
: Elective Core CourseOEC: Open
Elective
CourseSC:SupportiveCourse
SSC:SelfStudyCourseSE
M:Seminar
PRJ:ProjectWork
RP:ResearchPublication

ContactHours

L:Lecture
T:Tutorial
P:PracticalorOtherS:S
elfStudy

ThemediumofinstructionandexaminationshallbeEnglishonly.

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FirstSemester

S. No.	Subject Code	CourseTitle	Course Category	Credit	ContactHours PerWeek			EoSE Duration(Hrs.)	
					L	T	P	Thy	P
1.	PHY701	ClassicalMechanics	CCC	4	4	0	0	3	0
2.	PHY702	QuantumMechanics	CCC	4	4	0	0	3	0
3.	PHY704	ClassicalElectrodynamics-I	CCC	4	4	0	0	3	0
4.		TheoryElective–1	ECC	4	4	0	0	3	0
5.		TheoryElective–2	ECC	4	4	0	0	3	0
6.		TheoryElective–3	ECC	4	4	0	0	3	0
7.	PHY711	General Physics Lab(SixExperiments)	CCC	6	0	0	9	0	6
8.		ElectiveLaboratoryWork	ECC	6	0	0	9	0	6

Departments will offer a minimum of three and maximum five theory elective courses forthesemesterbasedonoptionssubmittedbystudentsandavailabilityofFacultytoteachthecourse.

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SecondSemester

S. No.	Subject Code	CourseTitle	Course Category	Credit	ContactHours PerWeek			EoSE Duration(Hrs.)	
					L	T	P	Thy	P
1.	PHY802	Atomicandmolecular Physics	CCC	4	4	0	0	3	0
2.	PHY804	ClassicalElectrodynamics–II	CCC	4	4	0	0	3	0
3.	PHY805	MathematicalMethodsinPhysics	CCC	4	4	0	0	3	0
4.		TheoryElective–1	ECC	4	4	0	0	3	0
5.		TheoryElective–2	ECC	4	4	0	0	3	0
6.		TheoryElective–3	ECC	4	4	0	0	3	0
7.	PHY811	General Physics Lab(SixExperiments)	CCC	6	0	0	9	0	6
8.		ElectiveLaboratoryWork	ECC	6	0	0	9	0	6

Departments will offer a minimum of three and maximum five theory elective courses forthesemesterbasedonoptionssubmittedbystudentsandavailabilityofFacultytoteachthecourse.

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ThirdSemester

S. No.	Subject Code	CourseTitle	CourseCategory	Credit	ContactHours PerWeek			EoSE Duration(Hrs.)	
					L	T	P	Thy	P
1.	PHY901	Advance QuantumMechanics	CCC	4	4	0	0	3	0
2.	PHY902	Statistical and Solid StatePhysics	CCC	4	4	0	0	3	0
3.	PHY903	NuclearPhysics–I	CCC	4	4	0	0	3	0
4.		Elective–1	ECC	4	4	0	0	3	0
5.		Elective–2	ECC	4	4	0	0	3	0
6.		Elective–3	ECC	4	4	0	0	3	0
7.	PHY911	Advanced Physics Lab(SixExperiments)	CCC	6	0	0	9	0	6
8.		ElectiveLaboratoryWork	ECC	6	0	0	9	0	6

Departments will offer a minimum of three and maximum five theory elective courses forthesemesterbasedonoptionssubmittedbystudentsandavailabilityofFacultytoteachthecourse.

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FourthSemester

S. No.	Subject Code	CourseTitle	CourseCategory	Credit	ContactHours PerWeek			EoSE Duration(Hrs.)	
					L	T	P	Thy	P
1.	PHYX 01	IntroductiontoQuantumFieldTheory	CCC	4	4	0	0	3	0
2.	PHYX 02	SolidStatePhysics	CCC	4	4	0	0	3	0
3.	PHYX 03	NuclearPhysics–II	CCC	4	4	0	0	3	0
4.		Elective–1	ECC	4	4	0	0	3	0
5.		Elective–2	ECC	4	4	0	0	3	0
6.		Elective–3	ECC	4	4	0	0	3	0
7.	PHYX 11	Advanced Physics Lab(SixExperiments)	CCC	6	0	0	9	0	6
8.		ElectiveLaboratoryWork	ECC	6	0	0	9	0	6

TheoryElectiveCoursesSp
ecializationCourses

A. CMP:CondensedMatterPhysics
B. HEP:HighEnergyPhysics
C. EC:ElectronicCommunications
D. ES:EnergyStudies
E. PP:PlasmaPhysics
F. ON:AdvancePhysicsOpenElectives
G. GN:GENERALTP:ThermalPhysics
H. TP:ThermalPhysics
I. CP:ComputationalPhysics
J. RP:ReactorPhysics
K. LP:LaserPhysics

Electctive Course Code	Specialization	PaperTitle	Prerequisite	Semester Inwhich course will beavailable
PHYH01	GEN	Electronics	-	I
PHYH02	GEN	ProgramminginC	-	I
PHYH04	GEN	Numericalmethods	-	II/III/IV
PHYB01	CMP	CondensedMatterPhysics-I	-	I/II/III

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PHYB02	CMP	CondensedMatterPhysics–II	-	II/III/IV
PHYC01	HEP	HighEnergyPhysics–I	-	I/II/III
PHYC02	HEP	HighEnergyPhysics–II	-	II/III/IV
PHYC03	HEP	HighEnergyPhysics–III	PHYC02	II/III/IV
PHYD11	EC	ElectronicsandCommunications -I	-	I/II/III
PHYD12	EC	ElectronicsandCommunications -II	-	II/III/IV
PHYE01	ES	EnergyStudies–I		I/II/III
PHYE02	ES	EnergyStudies–II		II/III/IV
PHYF01	PP	PlasmaPhysics–I		I/II/III
PHYF02	PP	PlasmaPhysics–II		II/III/IV
PHYG01	NT	Nanotechnology–I		I/II/III
PHYG02	NT	Nanotechnology–II		II/III/IV
PHYI01	EP	ThermalPhysics–I		I/II/III
PHYI02	EP	ThermalPhysics–II		II/III/IV
PHYK01	RP	ReactorPhysics–I		I/II/III
PHYK02	RP	ReactorPhysics–II		II/III/IV
PHYM01	LP	Laser–I		I/II/III

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PHYM02	LP	Laser–II		II/III/IV
PHY A01	AP	ATMOSPHERIC PHYSICS		III/IV

ElectiveCoreCoursesLabWorkwillbebasedonLabWorkofabovepaperswhereverapplicable.Themedium ofinstructionandexaminationshallbeEnglishonly.

4. CourseDetails

PG-PHY-701-Classical Mechanics

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I	**PG-PHY-701**	**Classical Mechanics**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	This course is an introduction to concepts of classical mechanics. It is a compulsory and core paper for M.Sc. Physics. It is meant to introduce the basic concepts classical mechanics, i.e., Constraints, D'Alembert's Principle, Method of Lagrange's Multipliers, Hamilton's principle,Noether's TheoremHamilton's canonical Equations, Canonical transformation,Hamilton-Jacobi Equation, Action angle variables, The Kepler's problem, a theory of small oscillations and Euler's theorem.		

Unit-I

Constraints, holonomic and non-holonomic constraints, D'Alembert's Principle and Lagrange's Equation, velocity dependent potentials, applications of Lagrangian formulation, Hamilton's Principle, Calculus of variations, Derivation of Lagrange's Equation from Hamilton's principle, Extension of Hamilton's principle for non-conservative and non-holonomic systems, Method of Lagrange's Multipliers, Conservation theorems and symmetry properties, Noether's Theorem, Conservation of energy, linear momentum and angular momentum as a consequence of homogeneity of time and space and isotropy of space.

Unit-II

Generalized momentum, Legendre transformation and the Hamilton's Equations of Motion, applications of Hamiltonian formulation, cyclic coordinates, Routh's procedure, Derivation of

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Hamilton's canonical Equations from Hamilton's variational Principle. Hamiltonian Formulation of Relativistic Mechanics. The principle of least Action.

Unit-III

Canonical transformation, integral invariance of Poincare, Lagrange's and Poisson brackets as canonical invariants, Equation of motion in Poisson bracket formulation. Infinitesimal contact transformation and generators of symmetry, Liouville's Theorem, Hamilton-Jacobi Equation and its application.

Unit-IV

Action angle variables, The Kepler's problem in action angle variables, theory of small oscillations in Lagrangian formulation, normal coordinates and its applications, orthogonal transformation, Euler's theorem. Eigen values of the Inertia tensor, Euler equations, force free motion of a rigid body.

Reference Books:

(1) Classical Mechanics, H. Goldstein, Poole and Safco, Narosa Publication.

(2) Mechanics, L.D. Landau and E.M. Lifshitz.

(3) Classical Mechanics, A.K. Raychaudhuri.

(4) Classical Mechanics, N.C. Rana and P.S. Joag.

(5) Classical Dynamics, J. B. Marion.

(6) Classical Mechanics of particles and rigid bodies, K.C. Gupta, (John Wiley).

(7) Theoretical Mechanics, Murray Spiegel.

(8) Classical Mechanics, J.C. Upadhyaya, Himalaya Publishing House Pvt. Ltd.

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PG -PHY- 702-Quantum Mechanics

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
I	PG-PHY-702	Quantum Mechanics		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Quantum Mechanics of Under Graduate level.			
Objectives of the Course	Course Objectives: 1. Student should have a sound understanding of key concepts in quantum mechanics, and be able to apply this understanding to analyze, and make both qualitative and quantitative understanding of the problems.			

UNIT – I:Formalism and Angular Momentum algebra

Formalism: Hilbert Space, Observables: Hermitian Operators, Determinate States; Eigenfunctions of a Hermitian Operator: Discrete Spectra, Continuous Spectra; Generalized Statistical Interpretation, The Uncertainty Principle: Proof of the Generalized Uncertainty Principle, The Minimum-Uncertainty Wave Packet, The Energy-Time Uncertainty Principle; Vectors and Operators: Bases in Hilbert Space, Dirac Notation, Changing Bases in Dirac Notation.

Angular Momentum: Eigenvalues, Eigenfunctions; Spin, Spin ½, Electron in a Magnetic Field, Addition of Angular Momenta; Electromagnetic Interactions: Minimal Coupling, The Aharonov–Bohm Effect.

UNIT – II: Identical Particles and Symmetries & Conservation Laws

Identical Particles: Two-Particle Systems: Bosons and Fermions, Exchange Forces, Spin, Generalized Symmetrization Principle; Atoms: Helium, The Periodic Table; Solids: The Free Electron Gas, Band Structure.

Symmetries & Conservation Laws: Introduction of Symmetries & Conservation Laws: Transformations in Space; The Translation Operator: How Operators Transform, Translational Symmetry; Conservation Laws,

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Parity: Parity in One Dimension, Parity in Three Dimensions, Parity Selection Rules ; Rotational Symmetry: Rotations About the *z* Axis, Rotations in Three Dimensions; Degeneracy, Rotational Selection Rules: Selection Rules for Scalar Operators, Selection Rules for Vector Operators; Translations in Time: The Heisenberg Picture, Time-Translation Invariance.

UNIT – III: Time-Independent Perturbation Theory

Nondegenerate Perturbation Theory: General Formulation, First-Order Theory, Second-Order Energies; Degenerate Perturbation Theory: Two-Fold Degeneracy, "Good" States, Higher-Order Degeneracy; The Fine Structure of Hydrogen: The Relativistic Correction, Spin-Orbit Coupling; The Zeeman Effect: Weak-Field Zeeman Effect, Strong-Field Zeeman Effect, Intermediate-Field Zeeman Effect; Hyperfine Splitting in Hydrogen.

UNIT – IV:Quantum Dynamics and Afterword

Quantum Dynamics: Two-Level Systems: The Perturbed System, Time-Dependent Perturbation Theory, Sinusoidal Perturbations; Emission and Absorption of Radiation: Electromagnetic Waves, Absorption, Stimulated Emission, and Spontaneous Emission, Incoherent Perturbations; Spontaneous Emission: Einstein's *A* and *B* Coefficients, The Lifetime of an Excited State, Selection Rules; Fermi's Golden Rule, The Adiabatic Approximation: Adiabatic Processes, The Adiabatic Theorem.

Afterword: The EPR Paradox, Bell's Theorem, Mixed States and the Density Matrix: Pure States, Mixed States, Subsystems; The No-Clone Theorem, Schrödinger's Cat.

- To get a better grip on the concepts of Quantum Mechanics, students are suggested to refer solved and unsolved problems of text book.

Suggested Textbook:

1. Griffiths, D. J., & Schroeter, D. F. (2018). *Introduction to Quantum Mechanics* (3rd ed.). Cambridge: Cambridge University Press.

Suggested Reference Books:

1) R. Shankar (1994). Principles of Quantum Mechanics (2nd ed.)
2) Belsley, M. (2012). Lectures on Quantum Mechanics, 2nd edn, by Ashok Das
3) N. Zettili (2022) Quantum Mechanics: Concepts and Applications, 3rd Edition
4) F. Laloë, B. Diu, C. Cohen-Tannoudji (2019) Quantum Mechanics, Volume 1: Basic Concepts, Tools, and Applications, 2nd Edition

Suggested online links:

1) https://nptel.ac.in/courses/115106066
2) https://archive.nptel.ac.in/courses/122/106/122106034/
3) https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/

Course learning outcomes:

The student will be able to learn after completion of the course:

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1. Understand the foundational principles and mathematical framework of quantum mechanics.
2. Apply advanced mathematical techniques to solve quantum mechanical problems.
3. Analyze the time evolution and dynamics of quantum systems using the Schrödinger equation.
4. Utilize quantum operators to compute expectation values and probabilities in quantum systems.
5. Identify symmetries and relate them to conservation laws in quantum mechanics.
6. Evaluate and apply quantum mechanical models to physical systems.
7. Develop critical analysis, problem-solving, and communication skills in quantum mechanics.

PG-PHY 704-ClassicalElectrodynamics-1

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
I	704-PHY-PG	**Classical Electrodynamics-1**		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent, Nanotechnology-I course of Post Graduate level Semester II.			
Objectives of the Course	• To enable the students to learn about the behavior of electric and magnetic fields in different media. • To provide the understanding of maxwell's unification idea of electric and magnetic fields. • Learning the covariant formulation of electrodynamics.			

Unit I

Electrostatics

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Gauss's Law, Electrostatic scalar potential, Poisson and Laplace equation, Green's Theorem, Uniqueness of the solution with the Dirichlet or Neumann boundary conditions, Formal Solution of electrostatic Boundary value problem with Green's function, Electrostatic potential energy and energy density.

Method of images, Point charge in the presence of a grounded conducting sphere, Point charge in the presence of a charged insulated conducting sphere, Point charge near a conducting sphere at a fixed potential, Conducting sphere in a uniform electric filed by method of images, Green function for the sphere, General solution for the potential. Conducting sphere with hemisphere at a different potentials. (15 Hrs)

Unit II

Multipole Expansion, Approximate Potentials at Large Distances, Monopole and Dipole Terms, Electric Field of a Dipole. Multipole expansion of the energy of a charge distribution in an external field.

Polarization, Dielectrics, Induced Dipoles, Alignment of Polar Molecules, Field of a Polarized Object, Bound Charges, The Field inside a Dielectric, Electric Displacement Gauss's Law in the Presence of Dielectrics, Boundary value problem with dielectrics, Molar polarizability and electric susceptibility. Energy in Dielectric Systems, Forces on Dielectrics. (15 Hrs)

Unit III

Magnetostatics: Introduction and definition, Biot and Savart law, the differential equations of magnetostatics and Ampere's law, Vector potential and magnetic induction for a current loop, Magnetic fields of a localized current distribution, Magnetic moment, Force and torque on and energy of a localized current distribution in an external induction, Macroscopic equations, Boundary conditions on B and H, Methods of solving boundary value problems in magnetostatics, Uniformly magnetized sphere, a magnetized sphere in an external field, permanent magnets, magnetic shielding, spherical shell of permeable material in a uniform field. (15 Hrs)

Unit IV

Time-varying fields, Maxwell's equations, Conservation laws: Energy in a magnetic field, Vector and Scalar potentials, Gauge transformation, Lorentz gauge, Coulomb gauge, Derivation of the equations of Macroscopic Electromagnetism, Poynting's theorem and conservation of energy and momentum for a system of charged particles and EM fields, Conservation laws for macroscopic media, Electromagnetic field tensor, Transformation of four potentials and four currents. (15 Hrs)

Textbook:

J.D. Jackson: Classical Electrodynamics

Reference books:

1. David J. Griffiths, *Introduction to electrodynamics*, 3rd ed. Prentice-Hall, Inc.

2. Panofsky & Phillip: Classical electrodynamics and magnetism

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3. Landau & Lifshitz: Classical Theory of Electrodynamics

4. Landau & Lifshitz: Electrodynamics of continuous media

Course learning outcomes:

Students will have achieved the ability to:

- Describe the nature of the electric and magnetic fields and their propagation through different media and interfaces.
- Describe Maxwell equations and their physical consequences
- Synthesize specific electrodynamic phenomena into precise mathematical language
- Describe physical phenomena in the language of fields
- Formulate the covariant form of electrodynamics.

PG-PHY-802-Atomic and Molecular Physics

Semester	**Code of the course**	**Title of the course/paper**	**NHEQF Level**	**Credits**
II	**PG-PHY-802**	Atomic and Molecular Physics		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	The course aims to develop the advance and strong understanding of atomic and molecular spectroscopy in terms of governing principles, laws, theoretical knowledge, experimental techniques, and impact of external parameters like perturbation, electric field and magnetic field on the energy levels of atomic and molecular spectra. The identification of atoms, molecule, determination of atomic and molecular structures, bond energy, bond length, moment of inertia, isotope determination, etc. The selection, utility and limitation of basic and advance spectroscopy instrumentations are presented in course. The basic concept of atomic trap and cooling are elaborated by the use of LASER and magnetic field.			

Unit-I

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Gross structure of energy spectrum of the hydrogen atom, first order perturbationtheory for non-degenerate and degenerate states, relativistic correction, inclusion of spin orbit interaction to energy levels of an atom, calculation polarizeabilityof an hydrogen atom in ground state, energy correction of an isotropic harmonic oscillator;first order and second order linear Stark effect for hydrogen atomenergy levels, Zeeman effect, weak magnetic field, strong magnetic field effect, hyperfine structure a Lamb shift (only qualitative description) **(15 Lectures)**

Unit-II

Identical particles and exchange symmetry, Pauli's exclusion principle, many particle wave functions, spectroscopy terms for atoms, the helium atom, variation method and its use in calculation of ground state energy of Hydrogen atom, Heitler London method for hydrogen molecule; WKB method: validity of WKB approximation, application for one-dimensional problem, connection formulae, application to bound states (Bohr-Sommerfeld quantization condition) andbarrier penetration, Qualitative description on central field approximation and Hartree's Method of self consisted field.

Unit-III

General features of the spectra of one and two electron system-singlet, doublet and triplet characters of emission spectra, general features of alkali spectra, rotational and vibration band spectrum of a molecule, P,Q, R branches, Raman spectra:classical and quantum approach, rotational spectra in linear molecules, vibrational Raman spectra, rotational fine structure, application of Raman spectra to determination of molecular symmetry and structure determination by comparing with Infra-red spectra, general features of electronic spectra of diatomic molecule, Born Oppenheimer Approximation, progression, Frank Condon principle. **(15 Lectures)**

Unit-IV

The scattering force, slowing an atomic beam, chirp cooling, optical molasses technique, Doppler cooling limit, magneto-optical trap, introduction to dipole force, theory of the dipole force, optical lattice, Sisyphus cooling techniques-description and its limit, atomic fountain, magnetic trap (only qualitative description) for confining low temperature atoms produced by laser cooling, the atomic laser.

Techniques and instrumentation: Working principle, limitations and applications of - Photoelectron spectroscopy-UPES, XPES, spin resonance spectroscopy, NMR spectroscopy, XPS: EXAFS and SEXAFS; Mossbauer spectroscopy. **(15 Lectures)**

Suggested Books and references:

1. Atomic spectra and atomic structure, G. Herzberg, 1944, Dover Publication, New York.
2. Introduction to Atomic spectra, HE White, 1934, McGraw Hill Book Company, New York and London.
3. Quantum mechanics (Theory and application), A.K. Ghatak & S. Loknathan, 1984, 3rd edition, Macmillan India LTD.

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4. Fundamentals of Molecular Spectroscopy, CN Banwell, EM McCash, 4th edition, 1994, McGraw-Hill Education.
5. Physics of Atoms and Molecules, BH Bransden and CJ Joachain, 2nd edition, 2019, Pearson Education ltd.
6. Atomic Physics, C.J. Foot, 2006, Oxford University Press, Inc. New York.
7. Atomic & molecular spectra: LASER, Raj Kumar, KNRM Publication, Meerut

Suggested E-resources:

Online lecture notes and course materials:

- Selected videosmay be assessed fromNPTEL: NOC: Atomic and Molecular Physics, Co-ordinators: Prof. Amal Kumar Das. e.g*www.digimat.in/nptel/courses/video/115105100/L01.html*,here last L01 represents the lecture number lecture number 01. http://www.digimat.in/downloads/html-browser/physics.pdf page number 93-94 by clicking the provided link.
- Selected Lecture notes may be assessed from the NPTL website http://www.digimat.in/downloads/pdf-browser/physics.pdf, page number 93-94 by clicking the provided link.
- Selected handwritten notes may be assessed from http://sites.iiserpune.ac.in/~bhasbapat/phy420.html

Course Learning Outcomes:

By the end of the course, the student should be able to –

1. Understand and origin of atomic and molecular spectra, the types of spectrum, ideal spectrum and spectral width,
2. Understand the basic concepts and analysis of mono-valent and di-valent atomic spectra,
3. Analysis of hydrogen spectra, hydrogen-like spectra, helium spectra and calculate the series limits,
4. Isotopic shift and role of nuclear mass on spectra, calculation of isotopic shift, determination of the mass of the unknown nucleus,
5. Understand the concept of external effect (especially magnetic field) on energy levels of hydrogen and hydrogen-like atoms.
6. Understanding X-ray, generation and its governing principles and application to determine the atomic number in a given specimen,
7. Understanding the molecular formation and its features, electronic states and its quantum numbers representation,
8. Understanding about the rotational and vibrational energy levels of di and tri atomic molecules, calculation of bond length, force constant and anharmonicity, isotopic shift, determination of isotopes,
9. Conceptual understanding and Familiarization of instrumentation related to emission and absorption spectroscopy, the various spectroscopy components and its limitations, the applicability of instruments,
10. Introductory understanding of advanced instruments and use of LASER in spectroscopy.

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By the end of the course, the student will have developed a strong understanding of atomic and molecular spectroscopy which includes the governing principles and laws, various experimental techniques and its analytical approaches, limitations, and application for day to day investigation and elementary research .The student will also get flavour of wide scope of spectroscopy in fundamental research,in health science, in forensic science, in food science, in paint and drug industries.

PHY 804: Classical Electrodynamics-II

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
II	804-PHY-PG	**Electrodynamics-II**		4

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Level of Course	Type of Course	Delivery of the Course
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent, Nanotechnology-I course of Post Graduate level Semester II.	
Objectives of the Course	• To provide the understanding of Maxwell's unification idea of electric and magnetic fields. • To apprise the students regarding the concepts of electrodynamics and Maxwell equations and use them various situations • Learning the covariant formulation of electrodynamics. • To provides the basic understanding of plasma physics and their occurrence in nature.	

Unit-I

Plane Electromagnetic waves: Plane waves in a non-conducting medium. Frequency dispersion characteristics of dielectrics. Waves in conducting medium, plasma waves in conducting dissipative medium. Superposition of waves and group velocity, Casualty connection between D and E, Kramers-Kroning relation. (15 Hrs.)

Unit-II

Megnetohydrodynamics and Plasma Physics: Introduction and definitions, MHD equations. Magnetic diffusion. Viscosity and pressure. Pinch effect. Instabilities in pinched plasma column. Magnetohydrodynamics waves, Plasma oscillations. Short wavelength limit of plasma oscillation and Debye shielding distance. Hydromagnetic waves, Plasma confinement. (15 Hrs.)

Unit-III

Radiation by moving charges: Lienard-Wiechert Potential for a point charge. Total power radiated by an accelerated charge: Larmour's formula and its relativistic generalization. Angular distribution of radiation emitted by an accelerated charge. Radiation emitted by a charge in arbitrary extremely relativistic motion, Thomson scattering and radiation, coherent and incoherent scattering, Cherenkov radiation. (15 Hrs.)

Unit-IV

Radiation damping, self fields of a particle, scattering, and absorption of radiation by a bound system: Introductory considerations, Radiative reaction force from conservation of energy, Abraham Lorentz evaluation of the self-force, difficulties with Abraham Lorentz model, Intro-differential equation of motion

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including radiation damping, Line Breadth and level shift of an oscillator, scattering and absorption of radiation by an oscillator. (15 Hrs.)

Reference Books:

1. Classical Electrodynamics: J. D. Jackson
2. Introduction to Electrodynamics: D. J. Griffiths
3. Introduction to Plasma Physics and Controlled Fusion: F. F. Chen
4. Classical Theory of Field: Landan and Lifshitz
5. Foundations of Electromagnetic Theory: J. R. Reitz, F. J. Milford and R. W. Christy

Course learning outcomes:

Students will have achieved the ability to:

- Use Maxwell equations in analysing the electromagnetic field due to time varying charge and current distribution.
- Describe the nature of electromagnetic wave and its propagation through different media and interfaces.
- Explain charged particle dynamics and radiation from localized time varying electromagnetic sources.
- Describe electromagnetic phenomena with the aid of potentials,
- Demonstrate understanding how electric potential and fields transform,
- Solve problems applying potential formalism and understand that the results are independent of the approaches one used,
- Relate electrodynamics with relativity.

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PHY-805 :Mathematical Methods in Physics

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II	**PG-PHY-805**	**Mathematical Methods in Physics**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	The objective of this course is to equip students with some of the Mathematical methods that are widely used in Physics. The course aims to develop deep understanding of tensors, tensor algebra, group theory and their application in physics and equip students with techniques of Fourier and Laplace transforms for solving differential equations and analyzing physical phenomena.			

UNIT-I

Tensors: Tensors notations, order and rank of a tensor, Tensors of rank-1 and rank-2, covariant and contravariant tensors and their transformation, higher order tensors and their transformation. Fundamental operations with tensors: addition, subtraction, outer/direct product, contraction, inner/scalar product, quotient rule. Symmetric tensor, isotropic tensors, Kronecker delta tensor. Metric tensor: infinitesimal displacement and metric tensor, properties of metric tensor, rank of metric tensor, conjugate of metric tensor, raising and lowering of a tensor index using metric tensor, metric tensor for Euclidean space and 4D Minkowski space. Associated tensors. Covariant and contravariant basis vectors. Jacobian of transformation, Jacobian determinant, relative tensor. Pseudotensors: proper and improper rotation, polar vectors, axial vectors. Examples of pseudovectors, Levi-civita Symbol. Covariant derivatives of a vector: Christoffel symbols of first and second kinds and their transformation, Christoffel symbols in terms of metric tensor, Christoffel symbols for Cartesian, cylindrical and spherical polar coordinate systems. Covariant derivatives of metric tensor: Ricci's Theorem. Tensor derivative operators: Gradient, divergence, curl, Laplacian. Some applications of tensors: Expressing Maxwell equation, Klein Gordon and Dirac Equation in Lorentz covariant form.

[15 Lectures]

UNIT-II

Group of Transformation: Example: symmetry transformation of square. Multiplication table, rearrangement theorem. Generators of a finite group. Conjugate elements and classes. Cyclic groups, subgroups and cosets. Normal subgroup and factor groups. Direct product of groups. Isomorphism and Homomorphism. Representation of group, faithful and unfaithful representation, Representation theorem of finite groups, reducible and irreducible representation. Introduction to continuous groups: Lie groups, rotation and unitary groups. Generators of continuous groups, Rotation group SO(2) and SO(3). Unitary

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group SU(2) and SU(3), Physical applications of SU(2) and SU(3).

[15 lectures]

UNIT-III

Fourier Transforms: Fourier series: Dirichlet conditions, complex Fourier series, Sturm-Liouville theory, development of the Fourier integral from the Fourier series. Fourier and inverse Fourier transform. Simple applications: finite wave train, wave train with Gaussian amplitude, plane wave. Fourier integral theorem, integral representation of Dirac-delta function. Properties of Fourier transforms: linearity, change of scale, translation of scale, complex conjugation of Fourier transform, Fourier Transform of derivatives, derivatives of Fourier transform. Convolution theorem, Parseval relation, examples. Intensity in terms of spectral density for quasi monochromic EM Waves. Application of Fourier transform: Solution of Partial Differential Equations using Fourier transform method: wave equation, diffusion equation; momentum representation of vectors and operators, momentum representation of Schrodinger equation. Application of Fourier transform to diffraction theory: diffraction pattern of rectangular aperture, and circular aperture.

[15 lectures]

UNIT-IV

Laplace Transforms: Definition and conditions for existence of Laplace transform. Laplace transform of elementary functions. Properties of Laplace transforms, Laplace transform of derivatives (of continuous and discontinuous functions) and integrals, derivatives and integral of Laplace transform. Initial value theorem and final value theorem. Inverse Laplace Transform: using partial fractions, Bromwich integral. Convolution theorem for Laplace transforms. Application of Laplace transform in solving linear, differential equations with constant coefficient, linear differential equations with variable coefficient, linear partial differential equations, linear differential equations involving impulsive functions.

[15 lectures]

Course Learning Outcomes: On completing this course students should be able to use tensor algebra and calculus to solve physical problems, analyze physical systems by identifying symmetries and apply group theory. Students will be equipped with the widely used tools of Fourier transform and Laplace transforms techniques to solve differential equations and analyzing various physical problems.

Suggested Textbooks and References

- A Student's Guide to Vectors and Tensors, Daniel A. Fleisch, Daniel A. Fleisch (Cambridge University Press)
- Vector Analysis (Schaum's Outline)- Murray Spiegel, Seymour Lipschutz, Dennis Spellman (McGraw Hill Education)
- Elements of Group Theory for Physicists- A. W. Joshi (New Age International)
- Mathematical Methods for Physicists- Arfken and Weber (Elsivier Academic Press)

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- Mathematical Method for Physics and Engineering- Riley, Hobson, Bence (Cambridge University Press)

PG-PHY-901 - Advance Quantum Mechanics

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
III	**PG-901**	**Advance Quantum Mechanics**		**4**
Level of Course	Type of Course	Delivery of the Course		
Introductory	Major/Minor	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent.			
Objectives of the Course	Course Objectives: To enhance knowledge of advanced quantum mechanics for solving relevant physical problems.Further study how to deal with some related problems in quantum mechanics on the basis of relativistic quantum mechanics, Approximation methods, Scattering theory, relativistic quantum mechanics and so on.			

Unit – I

Scattering (non-relativistic): Differential and total scattering cross section, transformation from CM frame to Lab frame, solution of scattering problem by the method of partial wave analysis, expansion of a plane wave into a spherical wave and scattering amplitude, the optical theorem, Applications: scattering from a delta potential, square well potential and the hard sphere scattering of identical particles, energy dependence a resonance scattering. Breit-Wigner formula, quasi-stationary states.

The Lippman-Schwinger equation and the Green's functions approach for scattering problem,Born approximation and its validity for scattering problem, Coulomb scattering problem under first Born approximation in elastic scattering.

Unit – II

Relativistic Formulation ad Dirac Equation: Attempt for relativistic formulation ofquantum theory, The Klein-Gordon equation, Probability density and probabilitycurrent density, solution

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free particle K.G. equation in momentum representation, interpretation of negative probability density and negative energy solutions, Dirac equation for a free particle, properties of Dirac matrices and algebra of gamma matrices, non-relativistic correspondence of the Pauli equation (inclusive of electromagnetic interaction), Solution of the free particle Dirac equation, orthogonality and completeness relations for Dirac spinors, interpretation of negative energy solution and hole theory.

Unit - III

Symmetries of Dirac Equation: Lorentz covariance of Dirac equation, proof of covariance and derivation of Lorentz boost and rotation matrices for Dirac spinors, Projection operators involving four momentum and spin, Parity (P), charge conjugation (CC), time reversal (T) and CPT operators for Dirac spinors, Bilinear covariant and their transformations, behaviour under Lorentz transformation, P,C,T and CPT, expectation values of coordinate and velocity involving only positive energy solutions and the associated problems, inclusion of negative energy solution, Zitterbewegung, Klein paradox.

Unit – IV

The Quantum Theory of Radiation: Classical radiation field, transversality condition, Fourier decomposition and radiation oscillators, quantization of radiation oscillators: Creation, annihilation and number operators, Fermion operators, Quantized radiation field: photon as quantum mechanical excitations of the radiation field, fluctuations and the uncertainty relations, validity of the classical description, matrix element for emission and absorption, spontaneous emission in the dipole approximation. Rayleigh scattering, Thomson scattering and the Raman Effect, Radiation damping and Resonance fluorescence.

Suggested Reference Books:

1. Ashok Das and A.C. Melissinos: Quantum mechanics A Modern Approach (Garden and Breach Science Publishers).
2. Eugen Merzbacher: Quantum Mechanics, Second Edition (John Wiley and Sons).
3. Bjorken and Drell: Relativistic Quantum Mechanics (McGraw Hill).
4. J.J. Sakurai: Advanced Quantum Mechanics (John Wiley)

Course learning outcomes:

Students will have achieved the ability to:

1. Understand the basics & applications of Scattering.
2. Explanation of the non- relativistic & relativistic quantum mechanical equations, namely, Klein-Gordon equation and Dirac equation.
3. Lorentz covariance of Dirac equationand spinors withquantitative description.
4. Explanation of classical and quantum radiation fields with oscillators, Fourier decomposition for radiation oscillators, different operators for quantized radiation field.
5. Develop understanding about various scattering using the Feynman graphs for different interactions.

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PHY-PG-902: Statistical and Solid State Physics

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
III	**PG-PHY-902**	**Statistical and Solid-State Physics**		**4**
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	It is expected from the students that they have done a basic course in thermodynamics, statistical physics, quantum physics and basic solid-state physics at the undergraduate level.			
Objectives of the course	This course is designed to equip students with a comprehensive understanding of the fundamental theories and the practical aspects of statistical and solid-state physics.			

Unit: I: Basic Principles, Canonical and Grand Canonical ensembles:

Concept of statistical distribution, phase space, density of states , Liouville's theorem, systems and ensemble, entropy in statistical mechanics, connection between thermodynamic and statistical quantities, microcanonical ensemble, equation of state, specific heat and entropy of a perfect gas using microcanonical ensemble.

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Canonical ensemble, thermodynamic functions for the canonical ensemble, calculation of means values, energy fluctuation in a gas, grand canonical ensemble, thermodynamic functions for the grand canonical ensemble, density fluctuations.

(15 Lecture + 5 Tutorials = 20 Hours)

Unit: II: Partition function and statistics:

Partition functions and properties, partition function for an ideal gas and calculation of thermodynamic quantities, Gibbs Paradox, validity of classical approximation, determination of translational, rotational and vibration contributions to the partition function of an ideal diatomic gas, specific heat of a diatomic gas, ortho and para hydrogen.

Identical particles and symmetry requirement, difficulties with Maxwell- Boltzmann statistics, quantum distribution functions, Bose-Einstein and Fermi-Dirac statistics and Planck's formula, Bose-Einstein condensation, liquid He^4 as a Boson system, quantization of harmonic oscillator and creation and annihilation of phonon operators, quantization of fermion operators.

(15 Lecture + 5 Tutorials = 20 Hours)

Unit: III Theory of Metals:

Fermi Dirac distribution function, density of states, temperature dependence of Fermi energy, specific heat, use of fermi Dirac statistics in the calculation of thermal conductivity and electrical conduction. Wiedemann Franz ratio, susceptibility, width of conduction band. Drude theory of light absorption in metals.

(15 Lecture + 5 Tutorials = 20 Hours)

Unit: IV : Band Theory:

Bloch theorem, Kronig Penny model, effective mass of electrons, Wigner-Seitz approximation, NFE model, tight binding method and calculation of density of states for a band in simple cubic lattice, pseudopotential method.

(15 Lecture + 5 Tutorial = 20 hours)

Learning Outcomes:

The subject of statistical mechanics covered in the first two units has a deep intellectual appeal to natural scientists generally. The completion of this course will give exposure to ideas of classical and quantum statistics to post-graduate students. The course will enhance the basic probability concepts, macro and microscopic states of systems, types of ensembles, different equilibrium

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situations and distribution functions. In the other two units, students will learn to apply Fermi-Dirac statistics to analyze electrical and optical properties of conductors. Students will grasp band theory fundamentals and methods for calculating electronic properties, including band structures and density of states, using models like Pseudopotential method, Kronig-Penney, and tight binding.

PG-PHY-903-Nuclear Physics-I

Semester	**Code of the course**	**Title of the course/paper**	**NHEQF Level**	**Credits**
III	**PG-PHY-903**	**Nuclear Physics-I**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	It is expected from the students that they should have done a basic course of Atomic Physics, Quantum Physics and basic Nuclear Physics at undergraduate level.			
Objectives of the course	The aim and objective of the course on Nuclear Physics is to familiarize the students of M.Sc class to the basic aspects of Nuclear Physics like nuclear force and its properties, deuteron problem in central and non-central potential, nucleon scattering at low energy. It will also give deep insight about Interaction of nuclear radiation (Gamma-ray, charged particles, neutron) with matter and their applications, and basic knowledge of nuclear instrumentation.			

Unit: I Two Nucleon system and Nuclear forces:

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General nature of the force between nucleons, saturation of nuclear forces, charge independence and spin dependence, General forms of nucleon interaction, Central, non-central and velocity dependent potential, Analysis of ground state($^3S_1$) of deuteron using a square well potential, range-depth relationship, excited states of deuteron, Discussion on the ground state of deuteron under non-central force, calculation of the electric quadrupole and magnetic dipole moments and the D-state admixture.

(15 Lecture + 5 tutorial = 20 hours)

Unit: II Nucleon-Nucleon Scattering and Potentials:

Partial wave analysis of the neutron-proton scattering at low energy assuming central potential with square well shape, concept of the scattering length, coherent scattering of neutrons by protons in (ortho and para) , hydrogen molecule ; conclusions of these analyses regarding scattering lengths range and depth of the potential ; the effective range theory (in neutron- proton scattering) and the shape independence of nuclear potential : A qualitative discussion of proton –proton scattering at low energy ; General features of two-body scattering at high energy , effect of exchange forces. Phenomenological Hamada –Johnson a hard core potential, a Reid hard core and soft core potentials; Main features of the One Boson Exchange Potentials (OBEP) no derivation.

(15 Lecture + 5 Tutorials = 20 Hours)

Unit: III Interaction of radiation and charged particle with matter :

Law of absorption and attenuation coefficient (Linear attenuation and mass attenuation coefficient) photo electric effect, Compton scattering, pair –production; energy, target and projectile dependence of all three processes. Energy loss of charged particles due to ionization, Bremstrahlung; Bragg Curve, Energy straggling, Range of charge particles; Range-energy curve, Range straggling, Stopping time. Interaction of Neutrons with matter: Neutron Sources, types of neutron, neutron interaction, neutron cross section

(15 Lecture + 5 Tutorials = 20 Hours)

Unit: IV : Nuclear Techniques:

Nuclear radiation detection system: Gamma ray spectrometer using NaI scintillation detector, High Purity Germanium detector (HPGe); Cerenkov counter

General characteristic of Detector: Modes of detector operation, Energy Resolution, Fano factor, response function, response time, detector Efficiency, Dead time

Electronic circuits for nuclear detector: Pre-amplifier, amplifier, Discriminators, Analog to Digital Convertor (ADC), Single channel analyzer and Multi-Channel Analyzer, Pulse height spectrum analysis

Counting Statistics: Characterization of data, Statistical Models; the binomial, Poisson and Gaussian distribution and application of statistical models, Error propagation **(15 Lecture + 5 tutorial = 20 hours)**

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Reference Books:

1. R.R. ROY and B.P. Nigam: Nuclear Physics (Willy and Easter-1979)
2. S.B.PATEL: Nuclear Physics An Introduction (New age International Publisher-1991)
3. William R. Leo: Techniques for nuclear and particle physics experiments-Springer (1992)
4. Glenn F. Knoll: Radiation Detection and Measurement-Wiley (2010)
5. R.D. EVANS: The Atomic Nucleus(Krieser Publishing Company- 1982)
6. W.E. BURCHAM: Elements of Nuclear Physics(ELBS LONGMAN-1988)
7. K.S. Krane: Introductory Nuclear Physics(Wiley-2008)
8. B.L.Cohen: Concept of Nuclear Physics(Tata Mc Graw Hills 1988)
9. I.Kaplan :Nuclear Physics(Addison Wesley-1963)
10. R.M. SINGRU: Introductory Experimental Nuclear Physics (Wiley Eastern, 1972)

Learning Outcomes: By the end of the course, students should be able to-

- It will develop theoretical understanding about nature of forces existing between nucleons in the nucleus and its properties, calculation of the electric quadrupole and magnetic dipole moments for deuteron in ground and excited state.
- Comparison between theoretical and experimental results of two nucleon scattering cross section both at low energy and high energy.
- Fundamental understanding about nuclear radiation interaction with matter and different interaction processes for specific radiation.
- Basic knowledge about nuclear radiation detection system, detection processing by electronic circuits and counting statistics.

PHY X01: INTRODUCTORY QUANTUM FIELD THEORY

Semester	**Code of the course**	**Title of the course/paper**	**NHEQF Level**	**Credits**
IV	**PG-PHY-X01**	**INTRODUCTORY QUANTUM FIELD THEORY**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the	The objective of this course is to equip students with a foundational understanding			

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course	of the principles and techniques of QFT, enabling them to describe and quantize fields, derive and apply key equations, and compute physical quantities for fundamental processes. The course aims to develop proficiency in using Feynman diagrams and rules to analyze and predict outcomes in quantum electrodynamics and related fields.

UNIT I

The need of QFT, Scalar and Vector fields, Classical Lagrangian field theory, Euler Lagrange's equation, Noether's theorem and conservation law, Quantized field theory, second quantization of the free scalar field: real and complex scalar field, the meson propagator.

[15 Hours]

UNIT II

The occupation number representation for fermions, second quantization of the Dirac field, the fermion propagator, the em interaction and gauge invariance, covariant quantization of the free electromagnetic field, the photon propagator.

[15 Hours]

UNIT III

Interaction picture and time evolution operator, S-matrix, the S-matrix expansion, Wick's theorem, Graphical representation of Wick's theorem, Feynman diagrams in configuration space and the momentum space, basic QED processes, Feynman rules of QED.

[15 Hours]

UNIT IV

Cross section, lowest order cross section calculation of QED processes : Bhabha scattering, Moller scattering and Compton scattering, $e^+e^- \rightarrow \mu^+\mu^-$.

[15 Hours]

Course outcomes:

Upon completion of the course, students will be able to:

- CO1: Describe scalar and vector fields and their roles in classical and quantum theories and can apply classical Lagrangian field theory and derive Euler-Lagrange equations for fields.
- CO2 : Understand about the Quantization of fields and can quantize free scalar fields, Dirac fields and electromagentic field.
- CO3: Understand about the S-matrix formalism, Wick's theorem and graphical representation of Wick's theprem.

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- CO4: Interpret and draw Feynman diagrams in both configuration and momentum space.
- CO5: Apply the S-matrix formalism to basic QED processes and calculate lowest-order cross sections for processes like Bhabha scattering, Moller scattering, Compton scattering, $e^+e^- \rightarrow \mu^+\mu^-$.

Suggested books and references:

1. Quantum Field Theory, by F. Mandl & G. Shaw (Wiley, 2010).
2. Relativistic Quantum Mechanics, by J.D. Bjorken& S. Drell (McGraw Hill Book Co.).
3. Advanced Quantum Mechanics, by J.J. Sakurai (Addison Wesley, 1967).
4. Elements of Advanced Quantum Theory, by J.M. Ziman. (Cambridge University Press).
5. A First Book of Quantum Field Theory, by A. Lahiri and P.B. Pal (CRC Press, 2005).
6. An Introduction to Quantum Field theory, by Michael E. Peskin & Daneil V. Schoreder (CRC Press, 2018).

PG-PHY-X02-Solid state physics

Semester	Code of the	Title of the Course /	NHEQF Level	Credits

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	Course	Paper		
IV	**PHY X02**	**Solid state physics**		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and solid state physics courses of Undergraduate level Hons. or equivalent, course of Post Graduate level Semester II.			
Objectives of the Course	• To understand the fundamentals of intriguing phenomena such as lattice vibration in solids, Hall effect, photoconductivity, photoluminescence, magnetism and superconductivity. • To develop scientific and positive attitudes in students related to materials science which is a part of solid-state physics • To able the students for solve problems related to solid-state physics			

Unit I

Lattice Dynamics and Optical Properties of Solids: Interatomic forces and lattice dynamics and simple metals, ionic, covalent and quasi crystals. Optical phonons, elastic constants and properties. Inelastic neutron scattering, Mossbauer effect, Debye-Waller factor, Anharmonicity, thermal expansion and thermal conductivity. Interaction of electrons and phonons with photons. Direct and indirect transitions Absorption in insulators, Polaritons, Types of Polaritons, one-phonon absorption, optical properties of metals, skin effect and anomalous skin effect.

Unit II

Semiconductors: Law of mass action, calculation of impurity conductivity, ellipsoidal energy surfaces in Si and Ge, Hall effect, recombination mechanism, optical transitions and Shockley-Read theory, excitons, photoconductivity, photoluminescence. Point, line, planar and bulk defects, colour centres, F, M, V, R colour centres.

Unit III

Magnetism: Langevin diamagnetism. Paramagnetism, Curie-Langevin and Curie-Weiss theories. Susceptibility of rare earth and transition metals. Ferromagnetism. Domain theory. super paramagnetism (introduction), Weiss molecular field and exchange, spin waves, dispersion relation and experimental determination by inelastic neutron scattering, heat capacity. Nuclear Magnetic resonance: Conditions of resonance. Bloch equations. NMR experiment and characteristics of an absorption line.

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Unit IV

Superconductivity:

(a) Experimental Results: Meissner effect, heat capacity, microwave and infrared properties, isotope effect, flux quantization, ultrasonic attenuation, density of states, DC and AC Josephson Effects, High temperature superconductor, Applications of Superconductors.

(b) Cooper pairs and derivation of BCS Hamiltonian, results of BCS Theory (no derivation).

Course Learning Outcomes:

At the end of this course, the students will be able to

- Explain the theories and phenomena of solid state physics.
- Understand the phenomenon of lattice dynamics
- Advanced understanding of semiconducting materials and electrical and optical properties in semiconductors
- Illustrate some exciting phenomena such as Meissner effect, Isotope effect, London's equations, BCS theory, and Josephson effect of superconductors

Textbook:

Introduction to Solid State Physics: Charles Kittel (John Wiley & Sons, Inc; 8th Edition)

References Books:

1. Solid State Physics by G. Grosso and G. Pastori Parravicini (Academic Press, 2012)

2. Elementary Solid-State Physics by M Ali Omar (Pearson Education, Inc., 2006)

3. Band Theory and Electronic Properties of solids by John Singleton (Oxford Master Series in Physics)

4. Magnetism in Condensed Matter by Stephen Blundell (Oxford Master Series in Physics)

5. Solid State Physics: A J Dekker (MacMilla India Ltd.)

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PG-PHY-X03-Nuclear Physics-II

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
IV	**PG-PHY-X03**	**Nuclear Physics-II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Nuclear physics and Quantum mechanics courses at UG/PG level			
Objectives of the course	This course aims to provide an in-depth understanding of nuclear physics, focusing on the fundamental models and processes that govern the behavior and interactions of atomic nuclei. By exploring the nuclear shell model, collective model, nuclear gamma and beta decay, and nuclear reactions, students will develop a comprehensive knowledge of the structure, dynamics, and transformations within atomic nuclei. The course will equip students with both theoretical insights and practical skills necessary to analyze nuclear phenomena and apply this knowledge to research and technological applications.			

Unit -I

Nuclear Shell Model: Single particle and collective motions in nuclei-Assumptions and justification of the shell model, average shell potential, spin orbit coupling; single particle wave functions and level sequence; magic numbers; shell model predictions for ground state parity; angular momentum, magnetic dipole and electric quadrupole moments; and their comparison with experimental data; configuration mixing; single particle transition probability according to shell model; selection rules; approximate estimates for the transition probability and Weisskopf units; Nuclear isomerism.

Unit – II

Collective Nuclear Models: Collective variable to describe the cooperative modes of nuclear motion; Parameterization of nuclear surface; A brief description of the collective model Hamiltonian (in the quadratic approximation); Vibrational modes of a spherical nucleus, Collective modes of a deformed even-even nucleus and moments of inertia. Collective spectra and electromagnetic transition in even nuclei and comparison with experimental data. Nilsson model for the single particle states in deformed nuclei.

Unit-III

Nuclear Gamma and Beta decay: Electric and magnetic multipole moments and gamma decay probabilities in nuclear system (no derivations) Reduced transition probability, Selection rules; Internal conversion and zero-zero transition. General characteristics of weak interaction; nuclear beta decay and lepton capture; electron energy spectrum and Fermi-Kurie plot; Fermi theory of beta decay (parity conserved selection rules Fermi and Gamow-Teller) for allowed transitions; ft-values; General interaction hamiltonian for beta decay with parity conserving and non conserving terms; Forbidden transitions; Experimental verification of parity violation; The V-A interaction and experimental verification.

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Unit-IV

Nuclear Reactions: Theories of Nuclear Reactions; Partial wave analysis of reaction Cross section; Compound nucleus formation and breakup; Resonance scattering and reaction-Breit-Wigner dispersion formula for s-wave (l=0), continuum cross section; Statistical theory of nuclear reactions, evaporation probability and cross section for specific reactions; The optical model, Stripping and pick-up reactions and their simple theoretical description (Butler theory) using plane wave Born approximation (PWBA) Shortcomings of PWBA Nuclear structure studies with deuteron stripping (d, p) reactions.

Reference Books:

1. M.A. Preston and R.K Bhaduri: Structure of Nucleus, Addison Wesley, 1975.
1. R.R. Roy and B.P. Nigam: Nuclear Physics, Wiley-Eastern, 1979.
2. L.R.B. Elton: Introductory Nuclear Theory, ELeBS Pub. London, 1959.
3. B.K. Agrawal: Nuclear Physics, Lokbharti Publication, Allahabad 1989.
4. M.K. Pal: Nuclear Structure, Affiliated East-West Press, 1982.
5. J.B. Blatt and V.F. Weisskopf: Theoretical Nuclear Physics.
6. H. Enge: Introduction to Nuclear Physics, Addison, Wesley, 1970.
7. B.L. Cohen: Concept of Nuclear Physics, Tata McGraw Hill, 1988.
8. W.F. Burchema: Element of Nuclear Physics, ELBS, Longman, 1988.
9. R.D. Evans: The Atomic Nucleus, McGraw Hill, 1955.
10. E. Segre: Nuclei and Particles, Benjamin, 1977.
11. I. Kaplan: Nuclear Physics, Addison Wesley, 1963.
12. W.M. Gibson: The Physics of Nuclear Reactions, Pergamon Press, 1980.
13. G. de Benedetti: Nuclear Interactions, Wiley, 1955.

Suggested E-resources:

Course learning outcomes:

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By the end of the course, student should be able to:

- Describe the assumptions and justifications for the nuclear shell model.
- Determine the sequence of energy levels and the significance of magic numbers in nuclear structure.
- Use the shell model to predict ground state parity, angular momentum, magnetic dipole, and electric quadrupole moments.
- Describe collective variables used to explain cooperative modes of nuclear motion.
- Explain vibrational modes of a spherical nucleus and collective modes of a deformed even-even nucleus.
- Describe the Nilsson model for single particle states in deformed nuclei and compare theoretical predictions with experimental data.
- Explain electric and magnetic multipole moments and gamma decay probabilities.
- Discuss the general characteristics of weak interaction and mechanisms of nuclear beta decay and lepton capture.
- Utilize Fermi theory for beta decay, considering parity-conserved selection rules.
- Describe forbidden transitions and the experimental verification of parity violation.
- Explain various theories of nuclear reactions, including partial wave analysis of reaction cross sections.
- Apply the Breit-Wigner dispersion formula for resonance scattering and reactions.
- Explain the statistical theory of nuclear reactions and calculate evaporation probabilities and cross sections for specific reactions.

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PHY711/PHY811GeneralPhysicsLabExperiments

1. Studyfollowingwaveshapingcircuitsusingdiscretecomponents
    a. HighpassandLowpassfilters
    b. Clippingcircuits
    c. Clampingcircuit

2. Study various flip-flop circuits and design counters to the base 16 up and down counter and an upcountertothebase10/9/7usingflip-flops.
3. Designandstudysinglestage RC coupled transistor amplifier with lower half power frequency500Hzandgain20.
4. Studyfollowingquantitiesinrelationtothermalbiasstabilityofagiventransistoramplifiercircuits
    a. VariationofIcowithtemperature
    b. VariationofIcwithtemperature
    c. VariationofSwithtemperature
    d. Distortionofacsignalwithtemperature
5. DesignandstudyanytwoofthefollowingcircuitsusingIC555timer:
    a. Monostableoscillator(pulsewidthWas0.25ms)
    b. Astableoscillator(frequency400Hzanddutycycle75%)
    c. Rampgenerator(slope=10V/ms)
    d. Voltagecontrolledoscillator
6. DesignandstudyRCphaseshiftoscillatoroffrequency1.5kHzusingop-amp741
7. DesignandstudyWeinbridgeoscillatorfrequency2kHzusingop-amp741.
8. Studyanaloguetodigital/digitaltoanalogueconversion.
9. Designandstudyastablemultivibratoroffrequency3kHz&1kHzbothinsymmetricandasymmetricmode .
10. Studyfollowingapplicationofop-amp741:
    a. Unitygainbuffer
    b. Adder
    c. Subtractor
    d. Integrator
    e. Differentiator
    f. Comparator
11. Studyfollowingcharacteristicsofop-amp741:
    a. Invertingmodeoperation
    b. Nonconvertingmodeoperation
    c. Inputimpedance
    d. outputimpedance
    e. inputoffsetcurrent
12. Tostudythecoupledoscillator,frequencyresponsewithmassvariation.
    a. Amplituderesponsewithfrequency
    b. Phaselagbetweendrivenanddriver.

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PHY911/PHYX11AdvancedPhysicsLaboratoryWorkPA

RT-ANuclearPhysics

1. Todeterminethehalf-lifeofaradioisotopeusingGMcounter.
2. Tostudyabsorptionofparticlesanddeterminerangeusingatleasttwosources.
3. TostudythecharacteristicsofaGMcounterandtostudystatisticalnatureofradioactivedecay.
4. Tostudythespectrumofbeta-particlesusingGammarayspectrometer.
5. Tocalibrateascintillationspectrometeranddetermineenergyofg-raysfromanunknownsource.
6. (a)Tostudyvariationofenergyresolutionfora NaI(Tl)detector.
   (b)Todetermineattenuationcoefficient(u)forraysfromagivensource.
7. TostudyComptonscatteringofgammaraysandverifytheenergyshiftformula.

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PART-B:SolidStatePhysics

1. Tostudytemperaturevariationofresistivityforasemi-conductorandtoobtainbandgapusingfourprobemethod.
2. TostudyHallEffectandtodeterminehallcoefficient
3. Tostudythevariationofrigidityofagivenspecimenasafunctionofthetemperature.
4. Tostudythedynamicsofalatticeusingelectricalanalog.
5. TostudyESRanddetermineg-factorforagivenspectrum.
6. Todetermineultrasonicvelocityandtoobtaincompressibilityforagivenliquid.
7. StudythecharacteristicsofagivenKlystronandcalculatethemodenumber,E.T.S.andtransittime.
8. StudythesimulatedL.C.RTransmissionline(audiofrequency)andtofindoutthevalueforaZ$_0$experimentallyfromthegraph.
9. StudytheradiationpatternofagivenPyramidalhornbyplottingitonaPolargraphpaper.Findthehalfpowerbeamwidthandcalculateitsgain.
10. Findthedielectricconstantofa given solid (Teflon) for three different lengths by using slottedsection.
11. Findthedielectricconstantofagivenliquid(organic)usingslottedsectionofX-band.
12. VerificationofBragg'slawusingmicrowaves.

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TheoryElectiveCourses

PHY H01:ELECTRONICS

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I	PG-PHY-H01	ELECTRONICS		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	The course aims to provide students with theoretical knowledge in operational amplifiers, active filters, oscillators, digital concepts, logic circuits, flip-flops, counters, and digital signal processing. Emphasizing design, analysis, and troubleshooting, it prepares students for practical applications and advanced research in modern electronics and digital signal processing.			

Unit 1: Operational Amplifiers and Circuits

Introduction to Operational Amplifiers: Op-Amp Input Modes and Parameters, Negative Feedback, Op-Amps with Negative Feedback, Effects of Negative Feedback on Op-Amp Impedances, Bias Current and Offset Voltage Compensation, Open-Loop Response, Closed-Loop Response.

Basic Op-Amp Circuits: Comparators, Summing Amplifiers, Integrators and Differentiators, Special-Purpose Op-Amp Circuits, Instrumentation Amplifiers, Isolation Amplifiers, Operational Transconductance Amplifiers (OTAs), Log and Antilog Amplifiers, Converters and Other Op-Amp Circuits.

Unit 2: Active Filters and Oscillators

Active Filters: Basic Filter Responses, Filter Response Characteristics, Active Low-Pass Filters, Active High-Pass Filters, Active Band-Pass Filters, Active Band-Stop Filters, Filter Response Measurements.

Oscillators: The Oscillator, Feedback Oscillator Principles, Oscillators with RC Feedback Circuits, Oscillators with LC Feedback Circuits, Relaxation Oscillators, Multivibrators- Monostable, Astable and Bistable.

Unit 3: Digital Concepts and Logic Circuits

Digital Concepts: Digital and Analog Quantities, Binary Digits, Logic Levels, and Digital Waveforms, Basic Logic Operations, Overview of Basic Logic Functions, Fixed-Function Integrated Circuits.

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Combinational Logic Analysis: Basic Combinational Logic Circuits, Implementing Combinational Logic, The Universal Property of NAND and NOR Gates, Combinational Logic Using NAND and NOR Gates, Logic Circuit Operation with Pulse Waveform Inputs, Combinational Logic with VHDL.

Functions of Combinational Logic: Basic Adders, Parallel Binary Adders, Ripple Carry versus Look-Ahead Carry Adders, Comparators, Decoders, Encoders, Code Converters, Multiplexers (Data Selectors), Demultiplexers, Parity Generators/Checkers.

Unit 4: Flip-Flops, Counters, and Digital Signal Processing

Latches, Flip-Flops, and Timers: Latches, Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristics, Flip-Flop Applications, One-Shots, The 555 Timer.

Counters: Introduction, Asynchronous Counter Operation, Synchronous Counter Operation, Up/Down Synchronous Counters, Design of Synchronous Counters, Cascaded Counters, Counter Decoding, Counter Applications, Logic Symbols with Dependency, **Introduction to Digital Signal Processing:** Digital Signal Processing Basics, Converting Analog Signals to Digital, Analog-to-Digital Conversion Methods, The Digital Signal Processor (DSP), Digital-to-Analog Conversion Methods.

Course Learning Outcomes: Upon completing this course, students will be able to design and analyze complex electronic circuits involving operational amplifiers, active filters, and oscillators. They will understand and implement digital concepts and logic circuits, including combinational logic and flip-flop applications. Additionally, they will gain proficiency in digital signal processing, encompassing both analog-to-digital and digital-to-analog conversion methods.

Text Books:

1. *Electronic Devices* by Thomas L. Floyd Published by Pearson Prentice Hall Seventh Edition (2005).
2. *Digital Fundamentals* by Thomas L. Floyd Published by Pearson Prentice Hall Ninth Edition (2006).

Reference Books:

1. *Electronic Devices and Circuit Theory* by Robert Boylested and Louis Nashdsky, PHI, New Delhi (1991).
2. *OP-AMP and Linear Integrated Circuits* by Ramakanth, A. Gayakwad, PHI, Second Edition (1991).
3. *Digital Principle and Applications* by A.P. Malvino and Donald P. Leach, Tata McGraw Hill Company, New Delhi (1993).

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4. *Integrated Electronics: Analog and Digital Circuits and Systems* by Jacob Millman and Christos C Halkias Published by McGRAW-HILL International Book Company (2017).

PG-PHY-H02-Computer Programming

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I	PG-PHY-H02	Computer Programming		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	The objective of this course is to provide understanding of the concepts of programming lanugage and equips the students with the programming skills in C. The course aims to develop problem-solving skills with the help of C programming and preparing them for advanced programming.			

UNIT - I

Basic concepts of programming languages: Programming domains, language evaluation criterion

and language categories. Describing Syntax and Semantics, Names, Variables, Data types : primitive data types, character string types, enumeration types, array types, record types, tuple types, union types, set types and pointer types, arithmetic expressions, type conversions, relational and Boolean expressions, assignment statements, mixed mode assignment, statement level control structure, compound statements, selection statement, iterative statements.**[15 Hours]**

UNIT - II

Basic concepts in C: Character set, identifiers and keywords, variables and constants, Instructions, assignment statements, comment statements, simple input and output, operators in C: arithmetic operators, Relational operators, logical operators, assignment operators, increment and decrement operators, conditional operator, bitwise operator, Boolean expressions, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, Control structures, decision control structure, loop control structure : while, do and for loop statements, case control structure.**[15 Hours]**

UNIT - III

Arrays, one and two dimesional arrays, declaration and initialization of arrays, dynamic arrays, sorting arrays, bubble sorting, insertion sorting, selection sorting, characters and strings, Functions, function

definitions, function prototypes, headers, calling functions by value and by reference, random number generation, recursion, recursion vs. Iteration.**[15 Hours]**

UNIT - IV

Pointer, pointer variable definition and initialization, pointer operators, passing arguments to function using call-by-reference with pointer arguments, bubble sort using call-by-reference, pointer expressions and pointer arithmetic, relation between pointers and arrays, array of pointers, dynamic memory allocation, Structure and Unions, C formatted input/output, file handling.**[15 Hours]**

Course learning outcomes: After completing the course, students will be able to write efficient and maintainable C programs, applying concepts of syntax, data types, control structures, arrays, functions, and pointers. They will also be proficient in handling file operations and dynamic memory allocation in C.

Suggested books and References

1. Concepts of Programming Language , Robert W. Sebesta (Pearson Education Asia).
2. How to Program C, Paul Deitel and Harvey Deitel (Pearson Education Asia).
3. Programming with C (Schaum's Outlines Series), Byron Gottfried (Tata McGraw Hill).
4. Programming in ANSI C, E Balaguruswamy (Tata McGraw Hill).

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PG-PHY-H04-Numerical Methods

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II/III/IV	**PG-PHY-H04**	**Numerical Methods**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	The course aims to provide a broad range of numerical methods for solving mathematical problems. The goal is to provide a basic understanding of the derivation, analysis, and use of these numerical methods along with the error in measurement and inherent limitations of numerical methods is also discussed. The concept of random variables, discrete and continuous distributions and probability distribution function is explained.			

Unit I: Error in Numerical Analysis

Sources of error, Round off error, Computer Arithmetic, Error Analysis, Condition and stability, Approximation, Functional and Error Analysis, the method of Undetermined Coefficients, Use of Interpolation formula, Iterated interpolation, Inverse interpolation, Hermite interpolation and Spline interpolation, Solution of Linear equations: Direct and Iterative methods, Calculation of eigen values and eigen vectors for symmetric matrices.

Unit II: Solution of Nonlinear equation

Bisection method, Newton's method, Modified Newton's method, Method of iteration, newton's method and Method of iteration for a system of casuation, Newton;s method for the case of complex roots, Integration of a function, Trapezoidal and Simpson's rules, Gaussian quadrature formula, Singular integrals, Double integration.

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Unit III: Integration of Ordinary Differential Equation

Predictor-Corrector methods, Runge-Kutta method, Simultaneous and Higher order equations, Numerical Integration and Differentiation of data, Least squares approximations, Fast Fourier Transform (FFT).

Unit IV:

Elementary Probability Theory, Random variables, Binomial, Poisson and Normal distributions

Reference Books:

1. A first course in numerical analysis by A. Ralston and P. Rabinowitz, McGraw Hill (1985)
2. Introductory Methods of Numerical Analysis by S. S. Sastry, Prentice Hall of India (1979)

Course Outcomes: After the completion of the course, the students will be able to understand the errors, source of error and its effect on any numerical computations and also analysis the efficiency of any numerical algorithms. They will learn to obtain numerical solution of nonlinear equations using iterative methods. Students get knowledge of numerical solutions for differential equations and definite integrals. They will understand the basic concepts of probability and distribution functions.

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PG-PHY-D11: Electronics and Communication-I

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	**PG-PHY-D11**	Electronics and Communication		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	The subject aims to provide the student with: 1. An understanding of microwave waveguides, passive & active devices and tubes. 2. An ability to design microwave components. 3. An ability to derive and use scattering parameters (S-parameters) to analyse the behaviour of waveguide components. 4. An understanding of Microwave Solid state devise and its applications.			

Unit- I Waveguides

Field distribution in rectangular waveguide in TE and TM modes, Phase velocity, Group velocity, Characteristics impedance, wall current, Field distribution in Circular waveguides in dominant mode, attenuation and mode excitation techniques

Unit –II Waveguides components

Cavity resonators, attenuation and their excitation techniques, Construction and working of precision attenuator, directional coupler and phase shifter.

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Scattering matrix for waveguide components, Microwave Tees and hybrid junction

Unit –III Conventional microwave sources

Limitation of conventional sources at MW frequencies, Beam focusing arrangements Construction and working of two cavity Klystron and Reflex klystron and their efficiency.

Magnetron and its operating characteristics, Hull cut-off condition, Hartee relation.

Traveling wave tubes: Construction and working and Introduction to Gyrotron

Unit- IV Solid State MW Devices

Avalanche Transit Time Devices: Read diode, Negative resistance of an avalanching p-n junction diode, Transferred Electron Devices: Gunn effect, two valley model, High field domains, Different modes for microwave generation

Parametric Devices: Varactor, Nonlinear reactance and Manley- Rowe power relations, Parametric Up-converter amplifier and its Noise properties

Reference Books:

1. Foundations for Microwave Engineering: R.E. Collins, Mc. Graw Hills
2. Solid State Electronic Devices: B. Streetman and S.K. Banerjee, PHI
3. Microwave Devices and Circuits: L.S.Y. Liao, PHI
4. Introduction to Microwave Theory: H. A. Atwater, McGraw Hill Book Company INC.

Course Outcomes

1. **Understanding of Waveguide Theory and Components**
   - Describe the field distribution in rectangular and circular waveguides in TE and TM modes.
   - Calculate phase velocity, group velocity, and characteristic impedance of waveguides.
   - Explain the concept of wall currents and their effects on waveguide performance.
   - Analyze attenuation characteristics and mode excitation techniques in waveguides.
2. **Knowledge of Waveguide Components**
   - Identify and describe the construction, operation, and applications of cavity resonators.
   - Understand the principles behind precision attenuators, directional couplers, and phase shifters.
   - Apply scattering matrix theory to analyze microwave tees and hybrid junctions.
3. **Comprehension of Conventional Microwave Sources**
   - Evaluate the limitations of conventional microwave sources at microwave frequencies.
   - Explain the construction, working principles, and efficiency of two-cavity Klystrons and Reflex Klystrons.
   - Analyze the operating characteristics, including the Hull cut-off condition and Hartree relation, of magnetrons.
   - Describe the construction, working principles, and applications of traveling wave tubes (TWT) and introduce the concept of Gyrotron.
4. **Knowledge of Solid State Microwave Devices**

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- Describe the operation and applications of Avalanche Transit Time Devices such as Read diodes.
- Explain the Gunn effect, including the two valley model and high-field domains, in Transferred Electron Devices.
- Analyze the operation of parametric devices like varactors and parametric amplifiers, including their noise properties and application in microwave systems.

5. **Application and Analysis Skills**
   - Apply theoretical knowledge to design and analyze waveguide components and microwave sources.
   - Evaluate the performance parameters and characteristics of microwave devices.
6. **Critical Thinking and Problem Solving**
   - Critically evaluate the selection and application of microwave components and devices for specific requirements.
   - Develop solutions for optimizing microwave systems based on performance requirements and constraints.
7. **Practical Skills**
   - Gain hands-on experience through laboratory work with waveguide components, microwave sources, and solid-state devices.
8. **Professional Development**
   - Communicate effectively about electronics and communication concepts, designs, and solutions.

PG-PHY – D 12: Electronics and Communication II

Semester	**Code of the course**	**Title of the course/paper**	**NHEQF Level**	**Credits**
II/III/IV	**PG-PHY-D12**	Electronics and Communication-II		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	The subject aims to make the students: o Understand the characteristics and applications of power diodes, power transistors, TRIAC, and DIAC. o Analyze the construction and operational characteristics of Silicon Controlled Rectifiers (SCR). o Analyze single-phase and three-phase half-wave and full-wave controlled rectifiers. o Analyze Faraday rotation and its implications in microwave			

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	propagation. o Perform measurements of power, frequency, attenuation, and Voltage Standing Wave Ratio (VSWR) in microwave circuits. o Understand scalar and vector potentials in antenna theory. o Analyze antenna parameters and the operation of Huygen source antennas.

Unit-I Power Electronics

Characteristic of power diodes, power transistors, TRIAC and DIAC. SCR: Construction and itscharacteristics, Construction and working of UJT, simple firing circuit using UJTs.

Controlledrectifiers: Single and Three phase half wave and full wave-controlled rectifiers.

Commutation circuits: Line commutation and Load Commutation and Forced commutation circuit. Inverters:Single phase Tapped and Bridge inverter circuits, Basic chopper circuits: First quadrant, SecondQuadrant, I, II and III, IV quadrant choppers. Principle of operation of Cycloconverter.

Unit-II MW Propagation

Microwave propagation in ferrites, Susceptibility, and Permeability Tensors, effective permeability for LCP and RCP wave propagations, Faraday rotation, Microwave devices employing Faraday rotation: Gyrator, Isolator and Circulator.

Microwave communication: LOS microwave system, derivation of communication range, OTH microwave systems, derivation of field strength of troposphere waves. Introduction to satellite and mobile communication, RADAR.

Unit-III Measurements techniques

Microwave Measurements: Power, frequency, attenuation and VSWR measurements, return loss

measurement, Concept of Smith chart and its use in impedance measurement, Microwave

antenna measurement, measurement of dielectric properties of a solid material using waveguide

method.

Measurement devices: Digital voltmeter- ramp type and integrating type, Bolometers, Power

Meter, VNA

Unit-IV Antennas

Scalar and Vector potentials, Magnetic current sheet, Helmholtz equations, Aperture Theory,

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Antenna parameters, Huygen source, Electromagnetic horn antennas. Introduction to microstrip patch antennas and array antennas

Course Outcomes

1. **Understanding of Power Semiconductor Devices and Controlled Rectifiers**
    - Explain the characteristics and applications of power diodes, transistors, SCR, TRIAC, and DIAC.
    - Analyze and design firing circuits using UJTs for controlled rectifiers.
    - Evaluate single-phase and three-phase half-wave and full-wave controlled rectifiers, including their operational characteristics and commutation techniques.
    - Design and analyze inverters and chopper circuits across all quadrants.
2. **Knowledge of Cycloconverters**
    - Understand the principle of operation of Cycloconverters and their applications in power electronics.
3. **Comprehension of Microwave Propagation**
    - Analyze microwave propagation in ferrites, including susceptibility, permeability tensors, and Faraday rotation.
    - Describe microwave devices employing Faraday rotation such as Gyrators, Isolators, and Circulators.
    - Calculate effective permeability for LCP and RCP wave propagations.
    - Derive communication range equations for LOS microwave systems and field strength equations for OTH microwave systems.
4. **Understanding of Microwave Communication Systems**
    - Explain the principles and applications of satellite communication, mobile communication, and RADAR systems.
5. **Proficiency in Microwave Measurement Techniques**
    - Perform accurate measurements of power, frequency, attenuation, and VSWR in microwave circuits.
    - Apply the Smith chart for impedance measurement and analyze return loss.

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- Conduct microwave antenna measurements and measure dielectric properties using waveguide methods.
- Utilize digital voltmeters, bolometers, power meters, and VNAs for microwave measurements.

6. **Antenna Theory and Design Skills**
   - Analyze scalar and vector potentials in antennas and solve problems using Helmholtz equations.
   - Design antennas using aperture theory and understand the parameters affecting antenna performance.
   - Describe the operation of Huygen source antennas, electromagnetic horn antennas, microstrip patch antennas, and array antennas.
7. **Application and Integration of Concepts**
   - Apply knowledge of power electronics and microwave engineering to design and optimize systems for specific applications.
   - Integrate theoretical concepts with practical skills through laboratory work and projects.
   - Solve complex problems related to microwave propagation, power electronics, and antenna design.
8. **Professional Development**
   - Communicate effectively about microwave and power electronics concepts, designs, and solutions.

Reference Books:

1. Antenna Theory and Design: C.A. Balanis, John Wiley & Sons

2. P.C. Sen “Power Electronics”, Tata Mc Graw Hill

3. Muhammad H. Rashid “ Power Electronics circuit, design and applications,”, Pearson

4. Basic Microwave Techniques and Laboratory Manual: M. L. Sisodia, G. S. Raghuvanshi.

New Age International, Jan 1, 1987

5. Microwave Principles: Herbert J. Reich, John G. Skalnik, Philip F. Ordung and Herbert

L. Krauss, East-West Press Pvt. Ltd., New Delhi

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PG-PHY-B01- Condensed Matter Physics-01

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	PG-PHY-B01	Condensed		4

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		Matter Physics-01		
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	This course intends to provide knowledge of Condensed Matter Physics. In addition, this course aims To understand crystal defects, their impact on material properties, and the physics of surfaces, interfaces, and heterostructures. Students will learn about crystal structure, point defects, dislocations, non-crystalline solids, alloys, surface characterization, electronic properties, quantum wells, and device physics.			

Unit I

Defects in Crystals (12 Hrs):

Basis and ·the Crystal Structure,Nonideal crystal structures; **Point Defects:** Lattice Vacancies, Diffusion, Color Centers; **Dislocations:** Shear Strength of Single Crystals, Dislocations, Strength of Alloys, Dislocations Densities, Dislocation Multiplications and slip, Strength of Alloys, Dislocations and crystal growth, Hardness of Materials

Unit II

Non-Crystalline Solids (9 Hrs):

Diffraction pattern, Glasses, Amorphous Ferromagnets, Amorphous, Semiconductors, Low Energy Excitations in amorphous solids, Fiber Optics.

Alloys (9 Hrs):

General Considerations, Substitution Solid Solutions-Hume-Brother Rules, Order-Disorder Transformation, Phase Diagrams, Transition Metal Alloys, Kondo Effect.

Unit III

Surface and Interface Physics (18 Hrs):

Reflection High Energy Electron, Diffraction, Surface Electron Structure: work function, Thermionic emission, Surface states, Tangential Surface transport, Magnetoresistance in a two-dimensional Channel, PN Junctions.

Unit IV

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Heterostructures (12 Hrs):

Heterojunctions, Band Engineering, Formation of quantum wells and barrier in hetero-structures, Current transport process, Measurement of Barrier height, Device structure, Ohmic contacts, Doped Heterostructures: modulation doping, construction of band diagrams, Effective-Mass Approximation, Effective-Mass theory in heterostructures, Landau Levels, Quantum Hall Effect.

Course Learning Outcomes:

The students should be able to elucidate the basic concepts of condensed matter physics such as crystal structures, Defects in crystals, non-Crystalline solids, and alloys. The content also discussed about the surface and interface physics of materials further PN junctions and heterostructures for semiconductor materials.

Textbook:

Introduction to Solid State Physics: Charles Kittel (John Wiley & Sons, Inc; 8th Edition)

Reference Books:

1. Physics of Semiconductor Devices by S. M. Sze and Kwok K. Ng (Third Edition 2007 John Wiley & Sons, Inc.)
2. The physics of Low-dimensional Semiconductors An introduction by John H. Davies (Cambridge University Press 2005)
3. Condensed Matter Physics, M. Marder(2nd Ed., John Wiley & Sons, 2010)
4. Principles of Condensed Matter Physics,P.M. Chaikin and T.C. Lubensky (Cambridge University Press, 1995)

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PG-PHY-E01-Energy Studies-I

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	PG-PHY-E01	Energy Studies-I		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	In view of increasing the demand of alternate and efficient energy generation sources, conversion and storage systems, and the course is relevant to current need of society around the world. The course has wide application from electricity and thermal energy generation through green route, to transport, safety, and storage. In summary, the course provides the overall aspect about energy generation, demand and supply gap in all sectors of energy consumption. The course also opens new area of research for sustainable and holistic development for modern society.			

Unit I: Solar Cell Basic

Solar spectrum, Atmospheric attenuation, Direct and diffuse thermal radiation, Solar radiation measurement instruments. Fundamental of photovoltaic conversion, Physics and material properties basic to photovoltaic energy conversion: optical properties of solids, direct and indirect transition semiconductors, inter-relationship between absorption coefficient and band gap, recombination of carriers. Type of recombination.

Unit II: Types and characteristics of solar cells

Working principle of a single p-n junction solar cell, transport equation and its characteristics: current density, open circuit voltage, short circuit current, efficiency and fill factor, Shockley–Queisser Limit for efficiency. Generation of solar cell, Fabrication process of monocrystalline and amorphous silicon solar cell. Elementary ideas of advanced solar cell e.g. thin film solar cells, tandem solar cell, organic solar cells, Photo-electrochemical solar cells, Perovskite solar cell, Quantum dot solar cell. Application of solar cells.

Unit III: Hydrogen Energy

Hydrogen relevance in depletion of fossil fuels and environmental considerations. Hydrogen Production: Photoelectrolysis and Photocatalytic process. Physics and material characteristics for production of solar hydrogen. Hydrogen safety aspect in storage.Fundamentals of other renewable energy systems: wind energy, biomass, hydropower and ocean thermal.

Unit IV: Hydrogen Storage systems

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Hydrogen storage as liquid and gaseous form, hydrogen storages in metals and alloys-Background, mechanism, PCT isotherms, various changes in metals and alloys on hydrogen absorption, practical aspect, hydrogen storage system design for transposition: role of surface, heat transfer, embrittlement and expansion, basic design parameters, proposed design. Safety and Utilization of Hydrogen: Various factors relevant to safety, use of hydrogen as fuel, use in Vehicular transport, Electricity generation, fuel cells.

Ref:

1. Fonash: Solar cell Devices-Physics
2. Fahrenbruch & Bube: fundamentals of solar Cell Photovoltaic solar energy
3. Chandra: Photoelectrochemical solar cells
4. Winter & Nitch (Eds): Hydrogen as an energy carrier technology system economy

Required lectures: 15 h/Unit

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PG-PHY-E02-Energy Studies-II

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II/III/IV	**PG-PHY-E02**	**Energy Studies-II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	In view of increasing the demand of alternate and efficient energy generation sources, conversion and storage systems, and the course is relevant to current need of society around the world. The course has wide application from electricity and thermal energy generation through green route, to transport, safety, and storage. In summary, the course provides the overall aspect about energy generation, demand and supply gap in all sectors of energy consumption. The course also opens new area of research for sustainable and holistic development for modern society.			

Unit I: Solar thermal collectors

Classification of Renewable energy sources. Solar radiaiton geometry, methods of solar energy utilizaiton. Classification and working of solar thermal collectors. Flat plate collector: Components, energy balance equation, thermal analysis and perfromance parameters and testing. Concentrating collectors: classificaiton, tracking requirement, breif thermal analysis and performance parameters. Applications of flat plate and concentrator collectors.

Unit II:Solar space cooling and heating

Air heating collectors, absorption and adsorption cooling. Energy requirment in buildings and designing of a passive system architecture. Thermal energy storage: Sensible heat storagematerials and thermal analysis, Latent heat storage material and process, thermochemical storage. Application of thermal storage.Economic analysis of solar thermal systems.

Unit III: Thermal and Electric Energy storage systems

Electric energy storage: basics of Battery, working mechanism, classification, need of battery, theoretical cell voltage, capacity and energy, specific energy and energy density, specific power and power density, regone plot, Electrochemical principal and reactions: thermodynamic

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background, electrode process, electrode double layer capacity and ionic adsorption, mass transport to the electrode surface, electro analytical techniques, factors affecting battery performance; Battery systems: Lead acid battery, Li –ion batteries: oxides, Air and sulfur based , Ni-Hydrogen battery, Advanced batteries for electrical and emerging application.

Unit IV: Basic of Super capacitors

Historical overview, modes of energy storage, faradic and non-faradaic processes, types of capacitors, role and properties of dielectric, energetic of electrode processes, energy factors in related to electrode process, kinetics of electrode reaction s at metals, linearization of Butler-volmer equation for near equilibrium, relation between exchange current density and over-potential, double layer effects in electrode kinetics. Device fabrication: Assembling of electrodes, role of electrolyte, reference electrode, and characterization techniques- cyclic voltammetry, CV, specific capacity, rate performance, impedance analysis.

Ref:

1. David Linden and Thomas B. Reddy, Hand Book of Batteries, 3nd edition, 2002, McGraw Hill
2. B.E. Cowney, Electrochemical supercapapcitors: scientific fundamentals and technological application, Kulwer Academics/Plenum Publishers
3. Solar Energy Thermal Process: Dluffie and Backman, Wiley & Sons. New York
4. Solar Energy Engg. :Jui Sheng Haieh, Prentic Hall, New Jersey.
5. Solar Energy: S.P. Sukhatme, J K Nayak, Tata McGraw Hill, New Delhi.

Required lectures: 15 h/Unit

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PG-PHY- G01- Nanotechnology-I

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
I/II/III	PG-PHY- G01	Nanotechnology-I		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent.			
Objectives of the Course	Course Objectives: 1. To provide basic and advanced knowledge regarding nanotechnology. 2. Apply the scientific knowledge of Physics, Mathematics, Chemistry, and Engineering for deeper understanding of the matter at nanoscale. 3. To learn about complex equipment, perform advanced analyses and communicate with precaution, precision, confidence and integrity. 4. To search Nanotechnology based solutions for the benefit of the society that are technically sound, environmentally compatible, economically viable, sustainable, and commercially worthwhile. 5. To develop comprehensive linkages with premier academic and research institutions within the country and abroad for mutual benefit.			

UNIT – I:Introduction to Nanotechnology

What is Nanotechnology? Classification of Nanostructures: 0D, 1D, 2D Structures, Quantum Confinement and Nanoscale, Effects of Nanometer Length Scale,Fraction of Surface Atoms, Surface Effects and Specific Surface Energy, Size Effects, Effect of Nanoscale on the Lattice Parameter,Relevance of Particle in a Box Problem for Nanostructures, Changes to the Density of States and System Total Energy for 0D, 1D, 2D Nanostructures.

UNIT – II:Nanomaterials: Properties and Synthesis Methodologies

Effect of Nanoscale on the Properties of the Nanomaterials: Electronic Band Structure, Electronic Conduction, Optical Properties, Mechanical Properties, Thermal Properties: Melting point and Thermal Conduction, Magnetic Properties, ChemicalReactivity.

General Methods available for the Synthesis of Nanostructures:Precipitative, Reactive, Hydrothermal/Solvothermal Methods;Suitability of Such Methods for Scaling;Potential Uses.

UNIT – III Vacuum Technology

Vacuum technology: introduction of vacuum, units and order of vacuum, measurement of vacuum,how to achieve different level of Vacuum using various vacuum pumps.

Physical and Chemical Methods of Nanostructured Materials: Thermal evaporation, Pulsed Laser Deposition (PLD), DC/RF Magnetron Sputtering, Ball Milling, Sol-Gel Process, Solvothermal Synthesis, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD)

UNIT – IV:Specific Features of Nanoscale Growth

Thermodynamics of Phase Transitions, triggering the Phase Transition, fundamentals of nucleation growth, Controlling Nucleation & Growth, Size Control of the Nanometric State, Aggregation, Stability of Colloidal, Dispersions, Spontaneous Condensation of Nanoparticles: Homogeneous Nucleation, Spinodal decomposition, Other undesirable Post-Condensation Effects.

Suggested Reference Books:

1) C. N. R. Rao, A. Mu¨ller, A. K. Cheetham, The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Volume 1, Wiley-VCH, Verlag GmbH, Germany (2004).
2) C. Bre´chignac P. Houdy M. Lahmani, Nanomaterials and Nanochemistry, Springer Berlin Heidelberg, Germany (2006).
3) Guozhong Cao, Nanostructures & Nanomaterials Synthesis, Properties G; Z: Applications, World Scientific Publishing Private, Ltd., Singapore (2004).
5) Zhong Lin Wang, Characterization of Nanophase Materials, Wiley-VCH, Verlag GmbH, Germany (2004).
6) Carl C. Koch, Nanostructured Materials: Processing, Properties and Potential Applications, Noyes Publications, William Andrew Publishing Norwich, New York, U.S.A (2002).

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7) Daniel L. Schodek, Paulo Ferreira, Michael F. Ashby, Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects (2009, Butterworth-Heinemann)

Suggested online links:

4) https://www.nsf.gov/news/classroom/nano.jsp
5) https://uwaterloo.ca/chem13-news-magazine/lessons

Course learning outcomes:

The student will be able to learn after completion of the course:

1) Students can apply engineering and physics concepts to the nano-scale and non-continuum domain.
2) Categorize and compare state-of-the-art nanofabrication methods to perform a critical analysis for the research field.
3) Principles of basic science concepts to understanding the analysis and prediction of matter at Nano scale are applicable.
4) The advanced ideas and techniques required in emergent area of nanotechnology will be beneficial for the learners.
   To develop human resource with specialization in theoretical and experimental techniques required for career in academia and Nano technology driven industry.

PG-PHY- G02- Nanotechnology-II

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
II/III/IV	G02-PHY-	Nanotechnology-II		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including diagnostic and formative assessment during lecture hours.		
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent, Nanotechnology-I course of Post Graduate level Semester II.			
Objectives of the Course	Course Objectives: 1. To provide a comprehensive understanding of the unique properties			

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	exhibited by nanoparticles and nanostructures. 2. Analyze the influence of nanoscale dimensions on material behavior and functionality. 3. Gain proficiency in advanced characterization techniques of material characterization. 4. Explore regulatory frameworks and environmental concerns associated with the production and deployment of nanomaterial-based energy technologies. 5. Explore emerging trends and innovations in nanotechnology for sustainable energy solutions.

UNIT – I: Nanoscale Properties-I

Magnetism: Magnetic Moment in Nanoparticles/Clusters, Magnetic Order, Coercivity,Magnetocrystalline Anisotropy, Thermal Activation and Superparamagnetic Effects.

Microelectronics and Optoelectronics: Quantum Confinement in Quantum Wells and Superlattice Structure, Kronig-Penney Model of a Superlattice: Zone Folding Effect

UNIT – II:Nanoscale Properties-II

Diffusion in Nanocrystalline Materials: Diffusion in Grain Boundaries of Metals and Nanocrystalline Ceramics, Correlation between Diffusion and Growth, Doping of a Nanoparticle, Introduction to Supercapacitors

Other Properties: Brief Overview of Optical Properties: Excitonic Binding and Recombination Energies, Mechanical Properties including Superplasticity Phenomena

UNIT – III Characterization Methods

X-ray Diffraction: Debye Scherrer Formula, Dislocation Density, Microstrain, Synchrotron Radiation: Principle and Applications, Dynamic Light Scattering (DLS), Electron Microscopes: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM), Scanning Tunnelling Microscope (STM), X-ray Photoelectron Spectroscopy (XPS): Working Principle, Instrumentation and Applications

UNIT – IV:Nanotechnology in Energy Conversion and Storage

Nanotechnology for Sustainable Energy: Energy Conversion Process, Indirect and Direct Energy Conversion; Materials for Light Emitting Diodes (LEDs), Batteries, Advanced Turbines, Catalytic Reactors, Capacitors and Fuel Cells.

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Energy Challenges, Development and Implementation of Renewable Energy Technologies, Nanotechnology Enabled Renewable Energy Technologies, Energy Transport, Conversion and Storage: Nano, Micro and Poly Crystalline and Amorphous Si for Solar Cells, Nano-micro Si Composite Structure, Various Techniques of Si Deposition.

Suggested Reference Books:

1) Guozhong Cao, Nanostructures & Nanomaterials Synthesis, Properties G; Z:

Applications, World Scientific Publishing Private, Ltd., Singapore (2004).

2) Mahmood Aliofkhazraei, Handbook of Nanoparticles, Springer, 2016.

3) Zhong Lin Wang, Characterization of Nanophase Materials, Wiley-VCH, Verlag GmbH, Germany (2004).

4) J. Twidell and T. Weir, Renewable Energy Resources, E & F N Spon Ltd. London, (1986).

5) Martin A Green, Solar Cells: Operating Principles, Technology and System Applications, Prentice Hall Inc, Englewood Cliffs, NJ, USA, (1981).

Course learning outcomes:

The student will be able to learn after completion of the course:

1) Students can apply engineering and physics concepts to the nano-scale and non-continuum domain.

2) Acquire a robust foundation in nanoscale science, characterization techniques, and their application in advancing energy conversion and storage technologies.

3) Integrate theoretical knowledge with practical skills, critical thinking abilities, and ethical considerations essential for future careers in nanotechnology and related fields.

4) Innovative strategies for overcoming barriers in the development and deployment of nanomaterial-based energy technologies.

5) To develop human resource with specialization in theoretical and experimental techniques required for career in academia and Nano technology driven industry.

PH- F01: Plasma Physics-I

Semester	Code of the Course	Title of the Course / Paper	NHEQF Level	Credits
I/II/III	**PHY F01**	**Plasma Physics-I**		4
Level of Course	Type of Course	Delivery of the Course		
Introductory	Elective	Lecture, Sixty Lectures (2 hrs in a week) including		

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		diagnostic and formative assessment during lecture hours.
Prerequisites	Physics and Mathematics courses of Under Graduate level Hons. or equivalent, course of Post Graduate level Semester II.	
Objectives of the Course	In this course, students will learn about plasmas, the fourth state of matter. The plasma state dominates the visible universe, and is of increasing economic importance. Plasmas behave in lots of interesting and sometimes unexpected ways. The course introduces plasma phenomena relevant to energy generation by controlled thermonuclear fusion and to astrophysics, coulomb collisions and transport processes, motion of charged particles in magnetic fields, plasma confinement schemes, MHD models, simple equilibrium and stability analysis.	

Unit-I

Occurrence of plasma in nature, definition of plasma, concept of temperature, Debye shielding and plasma parameter, Criteria for plasmas, The plasma frequency, Plasma in magnetosphere and ionosphere, Plasma production and diagnostics, Various applications of plasmas, Fusion core plasma, MHD generator, Plasma propulsion.

Unit-II

Single particle motions in uniform E and B, gravitational field, Non-uniform magnetic field, grad B and curvature drifts, invariance of magnetic moment and magnetic mirror, Non-uniform E- field, Time varying E field and B field, Adiabatic invariant.

Unit-III

Plasma Fluid equation, Equation of continuity, Fluid drifts perpendicular to B, Fluid drifts parallel to B, The Plasma approximation.

Diffusion and resistivity, Collision and diffusion parameters, Decay of plasma by diffusion, Diffusion across a magnetic field, collision in fully ionized plasmas, Diffusion in fully ionized plasmas and solution of diffusion equation, Plasma Resistivity.

Unit-IV

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Equilibrium and Stability, Hydromagnetic equilibrium, the concept of magnetic pressure, Diffusion of magnetic field into plasmas, Instability, Two stream instability, gravitational instability, Resistive drift waves. The pinch effect: equilibrium pinch, The Bennett pinch, instabilities in a pinched plasma column.

Reference Books:

1. Introduction to Plasma Physics and Controlled Fusion: F. F. Chen, Third Edition (Springer 2015)
2. Plasma physics in Theory and Applications: W. B. Kunkel (Mc Graw Hill 1966)
3. Fundamentals of Plasma Physics: J. A. Bittencourt, Fourth Edition (Pegamohs Press. 1986)
4. Plasma Physics: An Introductory Course, R.O. Dendy-Cambridge University Press, 1995.
5. Introduction to Plasma Physics: R J Goldston and P H Rutherford, Institute of Physics, 1995

Learning Outcomes:

After completing the course the student will have an overall view of charged particle dynamics in electromagnetic fields, behaviour of plasma as a fluid and basic elements of kinetic theory. The student understands the hierarchy of plasma theories from kinetic theory to magnetohydrodynamics. The student will be able to solve simple problems in single-particle motion, magnetised fluid systems in equilibrium and wave propagation in plasmas. The student is familiar with the terrestrial and space plasma applications.

Students will also have the prerequisites to enjoy Plasma Physics: Applications, which deals with plasma applications in astrophysics, industry, medicine, nuclear fusion and laser-plasma interaction.

PG-PHY-M01-LASER-I

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Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	PG-PHY-MO1	LASER-I		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Basic understanding of the under graduate level Physics courses.			
Objectives of the course	The topics cover a broad range of theoretical and practical knowledge essential for understanding and working with lasers with the following objectives: 1. **Laser fundamentals:** To understand the basic principles of laser operation, laser components and laser optics. 2. **Laser types:** To know and understand different types of lasers such as solid -state, gas and dye lasers. **Measurements and Analysis of Laser Properties:** To understand the techniques for measuring laser power, wavelength, and beam quality etc.			

Unit-1

Interaction of radiation with matter: Absorption, spontaneous and stimulated emission, Einstein's Coefficients, population inversion, metastable states, gain, absorption Coefficients, stimulated cross section, threshold condition. Two level system (Ammonia maser-Physical separation of excited species from those in ground state). Three and Four level system, Rate equations for three and four level system, threshold pump power, relative merits and de-merits of three and four level system.

Unit-2

Optical resonators: Resonator configurations, Stability of resonators, Characteristics of Gaussian beam, Transverse and longitudinal modes, mode selection techniques (at least two techniques in each case), losses in a resonator, Hardware design-laser support structure, mirror mounts, optical coating etc.

Unit-3

Gas and dye lasers: excitation in gas discharge, collisions of 1st and 2nd kind, electron impact excitation-its cross section, different types of gas lasers : He-Ne, N2, CO2, Metal vapour lasers, Excimer and chemical laser, dye laser.

Unit-4

Laser Parameters and their measurement: Near field and Far field regimes, Internal and external parameters in the near and far field, Detectors and their operational mechanism including specific properties like rise time, spectral response etc.

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References:

1. "Lasers-Fundamentals and Applications", K. Tyagarajan and A. Ghatak, 2nd Edi- tion, Springer US, 2011.

1. "Principles of lasers", O. Svelto, 4th Edition, Springer US, 2010.

2. "Laser Fundamentals", W. T. Silfvast, 2nd Edition, Cambridge University Press, 2008.

3. "Optical Electronics", A. Ghatak, K. Tyagarajan, Cambridge University Press, 1989.

5. "Handbook of Laser Technology and Applications: Principles", Volume 1, C.E. Webb and J.D.C. Jones, Institute of Physics, 2004.

6. "Handbook of Laser Technology and Applications: Laser design and laser systems", Volume 2, C.E. Webb and J.D.C. Jones, Institute of Physics, 2004.

Outcomes of the Course

Following are the expected outcomes of the course:

7. **Understanding the Laser Principles:** Ability to explain the fundamental concepts of the operation of the laser, including the stimulated emission, and optical pumping.
8. **Knowledge of the Laser components:** Expertise in understanding the functions of key laser components such as gain medium, optical resonator, and beam manipulators.
9. **Identification of Laser Types:** Knowledge of various types of laser, namely, solid-state, Gas, and Dye lasers.
10. **Measurement Techniques and Beam Analysis:** Ability to measure and analyze laser parameters such as power, wavelength, and beam quality using appropriate instruments.

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PG-PHY-MO2-LASER-II

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II/III/IV	**PG-PHY-MO2**	**LASER-II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Basic understanding of the under graduate level Physics courses.			
Objectives of the course	The objectives aim of the course are to equip students with both theoretical knowledge and practical experience, preparing them for advanced roles in laser science and engineering. Furthermore, the students will have deepen understanding of complex laser principles, including quantum mechanics of laser systems, advanced modes of operation, and ultrafast lasers and nonlinear optical processes.			

Unit-1

Optically pumped laser systems, Optical sources projection geometries, power supply Q-switches-pulse reflection mode, multiple-pulsing in slow Q-switches. Mode locking. Ruby laser, Nd: YAG laser, Nd:glass, Amplifiers for these lasers, their characteristics, Semiconductor lasers, color center laser.

Unit-2

Pulse transmission mode Q-switching, Mode locking-active and passive techniques, passive mode locking using dye cell, Distributed Feedback Lasers (and its importance for short pulse generation)

Unit-3

Non-linear Optics: interaction of radiation with matter, optical susceptibility, propagation of EM-radiation in a medium/non-linear medium, S. H. generation, T. H.generation, wave mixing optical parametric oscillation, non-linear materials.

Unit-4

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Laser applications: (i) Holography, (ii) Optical communications/optical fiber, (iii) Laser spectroscopy, (iv) Material processing welding cutting etc. (v) Medical applications, (vi) Doppler free two photon absorption, (vii) Isotope separation

References:

1. "Lasers-Fundamentals and Applications", K. Tyagarajan and A. Ghatak, 2nd Edi- tion, Springer US, 2011.
2. "Principles of lasers", O. Svelto, 4th Edition, Springer US, 2010.
3. "Laser Fundamentals", W. T. Silfvast, 2nd Edition, Cambridge University Press, 2008.
4. "Applied Nonlinear Optics", F. Zernike and J. E. Midwinter, Courier Corporation, 2006
5. "Laser Handbook", Vol. 1-4, F. T. Arechi, and E. O. S. Dobois, (North Holland), 1973.
6. "Industrial Applications of Laser", John F. Ready, Elsevier, 1997.
7. "Handbook of Laser Technology and Applications: Principles", Volume 1, C.E. Webb and J.D.C. Jones, Institute of Physics, 2004.
8. "Handbook of Laser Technology and Applications: Laser design and laser systems", Volume 2, C.E. Webb and J.D.C. Jones, Institute of Physics, 2004.

Outcomes of the Course

Following are the expected outcomes of the course:

1. Demonstrate a comprehensive understanding of advanced laser principles, including quantum mechanics of laser action, nonlinear optical processes, and laser-material interactions.
2. Explain complex concepts such as laser stability, mode-locking, and frequency doubling.
3. Apply laser technology effectively in specialized fields such as precision manufacturing, biomedical imaging/spectroscopy, telecommunications, and scientific research.
4. Develop and implement innovative solutions using advanced laser techniques, such as ultrafast laser processing or high-resolution imaging.

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PHY-C01 : High Energy Physics-I

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	**PG-PHY-C01**	**High Energy Physics-I**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	This course is designed to provide students with a thorough understanding of elementary particle physics, covering fundamental particles, forces, and interactions. Students will gain in-depth knowledge of the symmetry principles in particle physics, Quark model, decay rates, cross section and Feynman rules in QED.			

Unit-1

Bosons, Fermions, particles and antiparticles, Leptons and Quarks, Units in High Energy Physics, Fundamental forces : Electromagnetic, Weak, Strong and Gravitation, The passage of charged particle and radiation through matter, particle accelerators and detectors, Measurement techniques: tracking, calorimetry, and particle identification, Luminosity, Signal to Noise ratio.**[15 Hours]**

Unit-2

Symmetry principles and their role in physics, Conservation laws and Noether's theorem, Isospin symmetry, Isospin conservation in two-nucleon and pion-nucleon systems, Discrete symmetries: parity (P), charge conjugation (C), and time reversal (T), CPT invariance, G-parity.**[15 Hours]**

Unit-3

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Quark Model, Baryons, Mesons, Baryon wave functions, meson wave functions, color factors, prediction of masses and magnetic moment of mesons and baryons on basis of Quark Model.

[15 Hours]

Unit-4

Decay rates, Cross sections. Feynman diagrams, Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics (no derivation). Moller scattering, trace theorems and properties of gamma matrices, helicity representation at high energies, the electron propagator, the photon propagator.

[15 Hours]

Course outcomes:

- CO1 : Learn about the fundamental particles and fundamental interactions of the nature.
- CO2 : Understand the experimental concepts in about accelerators and detectors.
- CO3 : Explain the role of symmetry principles in Physics and their implications for conservation laws.
- CO4 : Learn about the Quark model of particle physics.
- CO5 : Use the quark model to predict magnetic moments and masses of mesons and baryons.
- CO6 : Apply the Feynman rules for Quantum Electrodyamics for particle interactions
- CO7 : Understand the concept of photon propagator in QED interactions

Suggest books Reference Books

1. Introduction to Elementary Particles, D. Griffiths (Wiley-VCH, 2008)
2. Quarks & Leptons, F. Halzen and A. D. Martin (John Wiley, 1984)
3. An Introductory Course of Particle Physics, Palash B. Pal (CRC Press, 2015)
4. An introduction to Particle Physics and Standard Model, Robert Mann(CRC Press, 2010)
5. Modern Particle Physics, Mark Thomson (Cambridge University Press, 2013)
6. Introduction to high energy physics, Donald Perkin (Cambridge University Press, 2000)
7. Introduction to Elementary Particle Physics, A. Bettini (Cambidge University Press, 2008)
8. Elementary Particle Physics, Y. Nagashima (Wiley-VCH, 2010)

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PHY-C02 : High Energy Physics-II

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II/III/IV	**PG-PHY-C02**	**High Energy Physics-II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics courses at UG/PG level			
Objectives of the course	This course aims to provide a comprehensive understanding of fundamental concepts and interactions in particle physics. Students will explore the structure of hadrons through form factors, electron-proton scattering, and deep inelastic scattering. They will gain insight into Quantum Chromodynamics (QCD). The course will also cover weak interactions, examining phenomena such as parity violation, beta decay, and neutrino scattering. Additionally, students will learn about gauge symmetries, including the principles of QED and QCD, and the Higgs mechanism.			

Unit 1

Structure of Hadrons: form factors, e-p scattering, inelastic e-p scattering, Bjorken scaling, Partons, gluons, deep inelastic scattering, evolution equations for parton densities.**[15 Hours]**

Unit 2

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QCD: Electron positron annihilation into hadrons, heavy quark production, three jet events, QCD corrections, Perturbative QCD, Drell-Yan process.

[15 Hours]

Unit 3

Weak Interactions: Parity violation, V-A form of weak interaction, Nuclear beta decay, muon decay, pion decay, charged current neutrino electron scattering, neutrino quark scattering, weak neutral current, the Cabibbo angle, weak mixing angles, CP invariance.

[15 Hours]

Unit 4

Gauge Symmetries: U(1) Local gauge invariance and QED, Non-abelian gauge invariance and QCD, massive gauge bosons, spontaneous breakdown of symmetry, the Higgs mechanism.

[15 Hours]

Course outcomes:

- CO1 : Gain insight into how form factors describe the distribution of charge within hadrons.
- CO2 : Understand about the electron-proton scattering and the significance of inelastic scattering processes in probing the internal structure of protons.
- CO3 : Explore the concept of scaling and its implications in deep inelastic scattering, leading to the discovery of partons.
- CO4 : Learn about the processes and significance of hadron production in electron-positron annihilation and the production of heavy quarks.
- CO5 : Study the Drell-Yan process and its significance in probing the quark structure of hadrons and the strong force.
- CO6 : Understand the phenomenon of parity violation in weak interactions and its historical and theoretical significance.
- CO7 : Understand about V-A theory of weak interaction and learn about nuclear beta decay and its role in weak interaction theory.
- CO8 : Learn trhe concept of Cabibbo angle and its role in quark mixing and weak interactions.

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- CO9 : Learn the principles of U(1) gauge invariance and its application in quantum electrodynamics (QED).
- CO10 : Study non-abelian gauge invariance and its role in quantum chromodynamics (QCD).
- CO11 : Explore the mechanisms and significance of spontaneous symmetry breaking in field theory.
- CO12 : Study the Higgs mechanism and its role in giving mass to gauge bosons and other particles in the standard model.

Suggest books Reference Books

1. Introduction to Elementary Particles, D. Griffiths (Wiley-VCH, 2008)

2. Quarks & Leptons, F. Halzen and A. D. Martin (John Wiley, 1984)

3. An Introductory Course of Particle Physics, Palash B. Pal (CRC Press, 2015)

4. An introduction to Particle Physics and Standard Model, Robert Mann(CRC Press, 2010)

5. Modern Particle Physics, Mark Thomson (Cambridge University Press, 2013)

6. Introduction to high energy physics, Donald Perkin (Cambridge University Press, 2000)

PG-PHY-B02- Condensed Matter Physics-II

Semester	**Code of the course**	**Title of the course/paper**	**NHEQF Level**	**Credits**
II/III/IV	**PG-PHY-B02**	**Condensed Matter Physics-II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	The course covers basic concepts of condensed matter physics such as Nanostructures and imaging techniques for nanostructures and their principles. This course further introduced soft condensed matter and magnetic interactions of matter. An overview is given of the variety of physical properties that different Nano and soft materials exhibit, including optical, thermal, electrical, and magnetic effects. Experimental techniques for fundamental studies of nanomaterials are introduced.			

Unit I

Nanostructures:

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Electronic Structure of lD Systems: One-Dimensional Sub bands, Spectroscopy of Van Hove Singularities, lD Metals - Coulomb Interactions and Lattice Couplings,

Electrical Transport in lD, Conductance Quantization and the Ladauer Formula, Two Barriers in Series-resonant Tunneling, Incoherent Addition and Ohm's Law, Localization, Voltage Probes and the Buttiker-Landauer Formalism

Electronic Structure of 0D Systems: Quantized Energy Levels, Semiconductor Nanocrystals, Metallic Dots, Discrete Charge States

Electrical Transport in 0D: Coulomb Oscillations,Spin, Mott Insulators, and the Kondo Effect,Cooper Pairing in Superconducting Dots

Unit II

Magnetic interactions, Order and Broken symmetry: Magnetic dipolar interaction, Exchange interaction, Broken symmetry, Models, Consequences of broken Symmetry, Phase transitions, Rigidity, Excitation.

Unit III

Soft condensed matter: Introduction to Soft Condensed Matter, Polymers, Colloids, Liquid Crystals, Amphiphiles and Self-Assembly.

Unit IV

Interaction of electrons with matter and based techniques:

Elastic interactions, Interaction cross section, Differential cross section, Interaction volume, coherent and Incoherent elastic scattering, Inelastic scattering, Secondary electrons, Auger electrons, Backscattered electrons, Transmitted electrons, Characteristic X-rays and EDX, Continuum X-rays (Bremsstrahlung), Cathodoluminescence.

Imaging Techniques for Nanostructures:

Microscopy: Optical Microscopy, Electron Microscopy, Scanning Tunneling Microscopy, Atomic Force Microscopy

Course Learning Outcomes: By the end of this course, students will gain a deep understanding of the electronic structure and transport in 1D and 0D nanostructures, including quantum effects like the Kondo

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effect and Cooper pairing. They will explore electron interactions with matter, mastering imaging techniques like electron microscopy. Additionally, students will learn about the properties and behaviors of soft condensed matter, and comprehend magnetic interactions, broken symmetry, and phase transitions in various condensed matter systems.

Textbooks:

1. Introduction to Solid State Physics by Charles Kittel (John Wiley & Sons, Inc; 8th Edition)
2. Soft Condensed Matter by Richard A.L. Jones (Oxford University Press)

Reference Books:

1. Scanning Microscopy for Nanotechnology Techniques and Applications edited by Weilie Zhou and Zhong Lin Wang (Springer, 2006)
2. Magnetism in Condensed Matter by Stephen Blundell (Oxford University Press)
3. Principles of Condensed Matter Physics by P.M. Chaikin and T.C. Lubensky (Cambridge University Press)

PHY K01: Reactor Physics – I

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
I/II/III	**PG-PHY-K01**	**Reactor Physics – I**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative assessments during lecture hours		
Pre-requisites	Physics and mathematics course at UG level			
Objectives of the course	This course aims to comprehensively understand the fundamental concepts and principles of nuclear reactions and radiation interactions with matter. Students will gain in-depth knowledge of radioactivity, the behaviour of alpha, beta, and gamma particles, neutron interactions, and the fission process. Additionally, the course will cover neutron transport behaviour, including neutron diffusion theory			

	and the slowing down of neutrons in various media. Students will be equipped with the theoretical knowledge to design and understand nuclear reactors.

Unit - I

Radioactivity, Successive Radioactive Decay, Radioactive Equilibrium, Alpha and beta and gamma decay, Selection Rules, Radioactive Series, Charged particle interaction with matter—ionization and Bremsstrahlung, Range, Straggling, Interaction of Gamma rays with the matter-photoelectric effect, Compton scattering, pair production, the relative importance of the projectile and its energy, and the target for interaction processes.

Unit - II

Interaction of neutrons with the matter – The Production of neutrons, Neutron Reactions, Reactions with Fast Neutrons, Inelastic and Elastic Scattering, Maxwell Boltzmann Distribution, Cross-sections for neutron Reactions- Cross Section determination by transmission Method and activation Method, Poly-energetic neutron systems, thermal neutron systems, Variation of cross-sections with neutron energy, The Fission Process – Mechanism, Cross-sections, Fission Rate and Reactor Power, Fission neutrons, Fission products, Amount and activities of Fission products, heat Generation after shut down.

Unit-III

Neutron Diffusion Theory- One-speed neutron Conservation, The Diffusion Equation, Solution of Diffusion Equation and boundary conditions, Diffusion Equation in Non-multiplying Medium, Diffusion of one-speed neutrons from a point source, Infinite Plane Source, A Medium of finite thickness, Diffusion in Multiplying Systems- Multiplication factors, Geometrical Buckling and spatial flux distribution, Non-leakage Probability, One Group Critical Equation for Bare Rector

Unit-IV

The Slowing down of the neutrons- Elastic Scattering, Energy change in Scattering, Average Logarithmic Energy Decrement, Lethargy Slowing down in Infinite Medium- Neutron moderation with and without absorption, Absorption in a heterogeneous system, thermalization of neutrons, Spatial Distribution of slowed-down neutrons- Fermi Age, slowing down and Migration Lengths, Critical equations based on diffusion theory, Four Factor Formula, Criticality Measurement.

Reference Books:

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1. Nuclear Reactor Engineering (Reactor Design and Basics) – Samuel Glasstone& Alexander Sessonske.
2. Introduction to Nuclear Engineering – John R. Lamarsh.
3. Fundamentals of Nuclear Reactor Physics – Elmer E. Lewis
4. Neutron Physics – K. H. Becuts, K. Wirtz.

Course Learning Outcomes:

After successful completion of this course, students will be able to:

- ❖ Understand the fundamentals of nuclear reactions and radioactivity:
- ❖ Analyze the interactions of radiation with matter:
- ❖ Understand neutron interactions with matter and the importance of cross-sections in nuclear reactions.
- ❖ Describe the fission process and its role in nuclear reactors.
- ❖ Explain the energy released during fission and its significance for reactor design.
- ❖ Understand neutron transport behaviour:
- ❖ Grasp the concept of neutron transport and its relevance to reactor physics.
- ❖ Analyze the behaviour of neutrons in multiplying systems and the slowing down process in an infinite medium.
- ❖ Apply theoretical knowledge to practical reactor design

PHY-K02: Reactor Physics – II

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credits
II/III/IV	**PG-PHY-K02**	**Reactor Physics – II**		4
Level of Course	**Type of course**	**Delivery type of the course**		
Advance	Major	Lectures, sixty lectures including diagnostic and formative		

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		assessments during lecture hours
Pre-requisites	Physics and mathematics course at UG level	
Objectives of the course	This course is designed to provide students with a thorough understanding of the principles and methods involved in nuclear reactor design, reactor kinetics, the impact of temperature on reactivity, and radiation protection and shielding. The course will cover multigroup diffusion theory, fuel depletion calculations, neutron transport equations, reactor kinetics, fission product poisoning, reactor stability analysis, and control systems. Additionally, the course covers radiation protection standards, biological effects of radiation, and radiation shielding principles to ensure safe reactor operation. By the end of the course, students will possess the knowledge required to design, analyze, and operate nuclear reactors safely and efficiently.	

Unit-I

Nuclear Design Basics – Multigroup Diffusion Theory - The Group Diffusion Equation, Strategy for solving multigroup equations, Generation of Group Constants, Many Group Calculation, Few Group Constants, Heterogeneous Systems, Space dependent Group Fluxes, Multiplication Eigen Value, Few-Group Diffusion Equation Solution, Fuel Depletion Calculations – Simplifying Fuel Depletion Calculation, Fuel Depletion Isotopic Behaviour, The Neutron Transport equation, and its approximation.

Unit - II

Reactor Kinetics - One-Group model for Bare Reactor, Prompt Neutron Lifetime, One Group of Delayed Neutrons and Negative Reactivity, Reactivity and Period: Positive and Negative Reactivities, Neutron flux after shut down, Inhour Formula, The Prompt critical condition.

Fission Product Poisoning – Xenon Poisoning during reactor operation and after shut down, Samarium Poisoning during reactor operation and after shut down, Other Poisions Produced by Fission

Unit – III

Effect of Temperature on Reactivity- Thermal Reactors, Prompt and Delayed Temperature Coefficients, Temperature Coefficients in thermal reactors, Reactor Stability Analysis- Laplace Transform Representation, Fuel Moderator Time Constants, Transfer Functions, Large increase in Reactivity, General Features of Reactor Controls- Control Loops, Water gap Effects, Control materials, Control System Functions, Control-Rod Worth Evaluation

Unit-IV

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Radiation Protection and Shielding – Effect of different types of Radiation, Radiation Units, Biological effects of Radiation- Somatic and Genetic effects of Radiation, Radiation Dose from Nuclear Power operations, Radiation Protection Standards, Radiation Shielding Principles

Reference Books:

1. Nuclear Reactor Engineering (Reactor Design and Basics) – Samuel Glasstone& Alexander Sessonske.
2. Introduction to Nuclear Engineering – John R. Lamarsh.
3. Fundamentals of Nuclear Reactor Physics – Elmer E. Lewis
4. Neutron Physics – K. H. Becuts, K. Wirtz.

Course Learning Outcomes:

After successful completion of this course, students will be able to:

- Understand multigroup diffusion theory and its applications
- Perform fuel depletion calculations
- Derive and understand the neutron transport equation.
- Apply approximations of the neutron transport equation to simplify complex reactor physics problems.
- Analyze reactor kinetics and control mechanisms**:
- Evaluate reactor stability and control strategies**:
- Integrate principles of multigroup diffusion theory, neutron transport, and reactor kinetics to design nuclear reactors.
- Develop strategies for controlling reactor reactivity and maintaining stability under various operating conditions
- Implement Radiation Protection and Shielding.

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Laboratory Elective Courses

PHYY11/PHYY22:SpectroscopyLab

1. TodeterminetheRydbergconstantusingHydrogendischargetubeandspectrometer.
2. TodetermineopticalbandgapofCdSthinfilmsusingoceanopticalspectrometer
3. ToverifythevalidityofHartmann'sformulausingconstantdeviationprismforunknownmaterial
4. Todeterminethemagnetostrictionofunknownmaterialusing Michelsoninterferometer.
5. Todeterminethedissociationenergyofiodineusingtheconcavegratingon Ronald'smounting
6. TostudythediffractionpatternofLASERlightusing
   i. singleslit
   ii. multislit.
7. TostudytheZeemansplittingofNeonlightusingconstantdeviationprismandCCDcamera.
8. TostudytheRamanspectraofC-HbandsusingRamanspectrometer.
9. Fabryperotinterferometer.
10. StudyofEllipticallypolarisedlightbyBabinetCompensator.
11. VerificationofCauchy'sDispersionrelation.

PHYY12/Y22:ComputationalPhysicsProgramminginC

WriteprograminCProgrammingLanguagesbasedoncourseofPHY105andPHYH02involvingcomputation asrelevanttoPhysics.

PHYY14:CondensedMatterPhysicsLaboratory

Laboratoryworkbasedoncurriculumofelectivepapersof ClusterCMP:CondensedmatterPhysics.

PHY Y15: HEP:HighEnergyPhysics

Computationalworkbasedoncurriculumofelectivepapersof ClusterHEP:HighEnergyPhysics.

PHYY17:EnergystudiesLaboratoryWork

Laboratoryworkbasedoncurriculumofelectivepapersof ClusterES:EnergyStudies.

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