

GENERAL HINDI

The Question paper shall be of **TWO HOURS** duration.

MM: 70

इकाई - I पद्य

- (i) मैथिलीशरणगुप्त: भारतकीश्रेष्ठता
(ii) सुमित्रानन्दनपंत: वापू, प्रथमरश्मि
(iii) सूर्य कान्तत्रिपाठीनिराला: जागोफिरएकवार, तोड़तीपत्थर
(iv) रामधारीसिंहदिनकर: हिमालय, बुद्धदेव(बोधिसत्व)

इकाई- II गद्य

- (i) बालमुकुन्दगुप्त: एकदुराशा
(ii) हजारीप्रसादद्विवेदी: शिरीषकेफूल
(iii) कुवेरनाथराय: हरीहरीदूब औरलाचारकोध
(iv) हरीशंकरपरसाई: इंस्पेक्टरमातादीनचांदपर

इकाई- III शब्दसंपदा

- (i) विलोम(ii) पर्यायवाची(iii) अनेकार्थक (iv) वाक्यांशकेलियेएकशब्द(v) मुहावरे औरलोकोक्ति

इकाई- IV शुद्धिकरणएवंप्रयोग

- (i) शब्द औरवाक्यशुद्धि
(ii) शब्दएवंवाक्यप्रयोग

इकाई- V शब्दनिर्माण

- (i) उपसर्ग
(ii) प्रत्यय

GENERAL ENGLISH

The Question paper shall be of **TWO HOURS** duration.

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Objectives:

- Reinforcing selected components of grammar and usages.
- Facilitating comprehension of a prose passage.
- To introduce the students to proper usage of dictionary and thesaurus.

Unit – I (Vocabulary)

- How to use a dictionary and thesaurus.
- Word formation: Prefix and suffix.

Unit – II (Grammar and Usage – I)

Transformation of sentences.

- Direct and indirect narration.
- Active and passive Voice.
- Interchange of Degrees of Comparison.

Unit – III (Grammar and Usage – II)

- Sequence of Tenses.
- Prepositions.

Unit – IV (Grammar and Usage – III)

- Modal Auxiliaries.
- Articles.

Unit – V (Comprehension)

- Comprehension of an unseen passage.

Suggested Reading:

1. A University Grammar of English by Quirk and Greenbaum.
2. A Foundation English Course for Undergraduates. Ed. Gunashekhar
3. Prose for Pleasure and Comprehension by H G Suryanarayan Rao.
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ENVIRONMENTAL STUDIES*Scheme of examination:**MM: 70*

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2. Q. No. 1 shall contain 20 (Twenty) objective type questions having four options, out of which one shall be correct. Each question shall carry one mark. (1 X 20 = 20 marks)
3. Q. No. 2 shall contain 8 (Eight) Short-Answer-Type-Questions. Word limit for each question is 100 words. Candidate has to attempt any five. Each question shall carry Four marks. (5 X 4 = 20 marks).
4. Q. No. 3 shall contain 4 (Four) Essay-Type-Questions. Word limit for each question is 500 words. Candidate has to attempt any two. Each question shall carry Fifteen marks. (2 X 15 = 30 marks).

UNIT – I**The multidisciplinary nature of environmental studies.**

Definition, Scope and importance, Need for public awareness.

Unit – II**Natural Resources**

Renewable and Non renewable resources: Natural Resources and associated problems.

- **Forest Resources:** Use and over exploitation, deforestation case studies, Timber extraction, mining, dams and their effects on forest and tribal people.
- **Water Resources:** Use and over exploitation of surface and ground water, Floods, draught, conflicts over water, dams- benefits and problems.
- **Mineral Resources:** Use and exploitation, effects of extracting and using mineral resources, case studies.
- **Food Resources:** World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- **Energy Resources:** Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

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

UNIT-III

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in ecosystems.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
 - ❖ Forest ecosystem
 - ❖ Grassland ecosystem.
 - ❖ Desert ecosystem.
 - ❖ Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

- (i).....
 - (a).....
 - (b).....
 - (c).....
 - (d).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....
- (ix).....
- (x).....
- (xi).....
- (xii).....
- (xiii).....
- (xiv).....
- (xv).....
- (xvi).....
- (xvii).....
- (xviii).....
- (xix).....
- (xx).....

(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....

(5 X 4 = 20)

Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....

(2 X 15 = 30)

ELEMENTARY COMPUTER APPLICATIONS*Scheme of examination:**MM: 70*

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UNIT – I**Introduction to computers and related terminology:****(Basic information only)**

(A) Hardware: CPU (Mother board, Microprocessors, (The Intel Pentium III, AMD and Cyrix), MMX technology, System clock, Address Bus, Data Bus, (PCI and ESIC) Cache Memory, Processing speed, Expansion slots (Video controller, sound Card, SCSI, Network Card), Memory – (Unit, RAM, ROM, EDO, RAM, SI, RAM), Input and Output devices- Keyboard (The standard Keyboard layout), Mouse, Printers (Dot matrix, Inkjet, Laser Jet), Microphone, Speakers, Digital Cameras), Storage devices – (Diskette Drive (Types, Density, Formatting Boot Record, FAT, Folder, Directory), Hard Disk Drive, CD ROM DRIVE, (CD ROM Speeds), CD-R Drive, DVD ROM Drive, Tape Drive.

(B) Software: Introduction to programming languages, System software (Operating Systems and Utilities), Application software (Word Processors, Spreadsheets, DBMS, Presentation Graphics, Browsers, Personal Information Managers) Introduction to Multilingual Word-Processors.

(C) Communications and Connectivity: Data Communication System, Data Transmission (Serial, Parallel, Bandwidth, Protocols), Emails, FAX, Voice and video massaging, Video

Conferencing, Online service user connection (Types), Networking of Computers, (Node, Client, Server, LAN, WAN), Using the Network, the internet and the Web.

UNIT – II

The Internet and Online Resources:

(Working Knowledge at Common Users Level only)

How the internet works, Introduction to (TCP/IP, and DNS Addresses. Features of the internet – (Email, News, Telnet, Chat, Channels, WWW, OnlineServices, Bulletin Board Services), Connection wizard, Overview of the internet explorer 5 and features therein, use of search engines, Surfing, creating and use of email, Awareness about e-commerce and its advantages.

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

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- (xvii).....
- (xviii).....
- (xix).....
- (xx).....

(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....
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(5 X 4 = 20)

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- (i).....
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UNIT – I

The multidisciplinary nature of environmental studies.

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Renewable and Non renewable resources: Natural Resources and associated problems.

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- Land Resources: Land as a resource, land degradation, man included landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
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UNIT-III

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Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

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(2 X 15 = 30)

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इकाई - I पद्य

- (i) हरिवंशरायवच्चनः पथकीपहचानलहरोकानिमंत्रण
(ii) केदारनाथअग्रवालः मैंने उसकोदेखा यह घरतीहै उसकिसानकी
(iii) सुभद्राकुमारीचौहानः झांसीकीरानीप्रभुतुममेरेमनकीजानो
(iv) नागार्जुनः कालिदासकेप्रतिप्रेतकेवयान

इकाई - II गद्य

- (i) अमृतलालवेगडः महाराजपुरसेग्वारीघाट
(ii) विजयदानदेथाः उजालेकेमुसाहिव
(iii) महादेवीवर्माः सिस्तरकावास्ते
(iv) कन्हैयालालमिश्रप्रभाकरः मैंऔरमैं

इकाई - III

- (i) संक्षेपण (ii) पल्लवन (iii) प्रारूप

इकाई - IV

प्रयोजनमूलकहिन्दीकेमुख्यतत्व

- (i) पारिभाषिकशब्दावली:वर्गीकरणएवंप्रयोग

इकाई - V

निबन्धकिसीसामान्यविषयपरलगभग 500 शब्दोंकानिबन्ध

GENERAL ENGLISH

The Question paper shall be of *TWO HOURS* duration.

MM: 70

Objectives:

- Introducing students to Phonetics, correct their pronunciation and word stress.
- Strengthening compositional skills.
- Introducing students to writing of notices, advertisements and poster making skills.

Unit – I(Phonetics)**10 Marks**

- Transcription of Phonetic symbols.
- Wordstress.

Unit – II(Writing Skills)**20 Marks**

- CV's and Job Applications.
- Precis Writing.

Unit – III(Compositional Skills)**20 Marks**

- Letter Writing (Formal and informal)
- Paragraph Writing.

Unit – IV(Writing Skills)**10 Marks**

- Notice Writing.

Unit – V(Use of Imagining Faculty)**10 Marks**

- Writing Advertisements.
- Poster Making.

Suggested Reading:

1. CVs and Job Applications by Judith Leigh.
2. English at workplace. Eds: Panja, Sawhney & Verma.
3. Professional Communication by R P Singh.
4. English made simple by Arthur Waldhorn and Arthur Zeiger.
5. The Written Word by Vandana R Singh.
6. Technical Writing by Sunder Rajan.

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UNIT – I**Biodiversity and its conservation.**

- Introduction – Definition: genetic, species and ecosystem diversity.
- Bio geographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, national and local levels.
- India as a mega diversity region.
- Hot spots of biodiversity.
- Threats to biodiversity – habitat loss, poaching of wild life, man – wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: *in situ* and *ex situ* conservation of biodiversity.

Unit – II**Environmental Pollutions:**

1. Definition, causes, effects and control measures of
 - Air Pollution,
 - Water Pollution,

- Soil Pollution,
 - Marine Pollution,
 - Noise Pollution,
 - Thermal Pollution,
 - Nuclear Pollution,
2. Solid waste management: Causes, effects and control measures of urban and industrial waste.
 3. Disaster management: Floods, earthquakes, cyclone and landslides.

UNIT-III

Social issues and the Environment:

- 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 solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environmental protection laws in India.
- Population growth, variation among nations.
- Population explosion – family welfare programmes.
- Environment and Human Health.

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

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(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
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(5 X 4 = 20)

Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

- (i).....
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ELEMENTARY COMPUTER APPLICATIONS

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UNIT I**OPERATING SYSTEMS(Working knowledgat common users level only):**

OVERVIEW OF IMPORTANT dos COMMANDS, Windows 98: Installation, Scandisk, Control Panel, Taskbar, Toolbars, Display settings (Background, wallpapers, screensavers, Desktop themes),Files and Folder management, WindowsExplorer, Finding Files and Folders Formatting Disks and copying files, Printer settings, Modem installation, mouse installation, Adding and removing programmes, Active desktop Concepts, Winzip and its\application, Norton antivirus and its use, Use of calculator, Paintbrush, win amp, MPEG player and windows help.

UNIT II**Application Software (Working knowledge at common users level only):****(a) Word processing software – MS Word**

Entering, editing and formatting text, Document formats (Page size and Orientation, Headers and Footers, Columns and Sections, Page layout), Spelling and grammer checks, Thesaurus, Find and replace, cut and Paste, Table and Formatting tables, Mail Merge, Styles and Templates.

(b) Spreadsheet Programme – MS Excel

Entering data, Labels, Values, Dates, formulas, Cell references, formats, Functions, Templates, charts and Maps, analysing data in a spreadsheet.

(c) DBMS – Microsoft Access

Database, Entering data into the database, Creating database tables, editing data, viewing records, sorting records, querying a database, generating reports.

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

- (i).....
 - (a).....
 - (b).....
 - (c).....
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- (xvii).....
- (xviii).....
- (xix).....
- (xx).....

(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....

(5 X 4 = 20)

Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....

(2 X 15 = 30)

GENERAL HINDI

The Question paper shall be of *TWO HOURS* duration.

MM: 70

इकाई - I पद्य

- (i) हरिवंशरायवच्चनः पथकीपहचानलहरोकानिमंत्रण
(ii) केदारनाथअग्रवालः मैंने उसकोदेखा यह धरतीहै उसकिसानकी
(iii) सुभद्राकुमारीचौहानः झांसीकीरानीप्रभुतुमभेरेमनकीजानो
(iv) नागार्जुनः कालिदासकेप्रतिप्रेतकेवयान

इकाई - II गद्य

- (i) अमृतलालवेगडः महाराजपुरसेग्वारीघाट
(ii) विजयदानदेथाः उजालेकेमुसाहिव
(iii) महादेवीवर्माः सिस्तरकावास्ते
(iv) कन्हैयालालमिश्रप्रभाकरः मैंऔरमैं

इकाई - III

- (i) संक्षेपण (ii) पल्लवन (iii) प्रारूप

इकाई - IV

प्रयोजनमूलकहिन्दीकेमुख्यतत्व

- (i) पारिभाषिकशब्दावलीःवर्गीकरणएवंप्रयोग

इकाई - V

निबन्धकिसीसामान्यविषयपरलगभग 500 शब्दोंकानिबन्ध

GENERAL ENGLISH

The Question paper shall be of **TWO HOURS** duration.

MM: 70

Objectives:

- Introducing students to Phonetics, correct their pronunciation and word stress.
- Strengthening compositional skills.
- Introducing students to writing of notices, advertisements and poster making skills.

Unit – I(Phonetics)**10 Marks**

- Transcription of Phonetic symbols.
- Wordstress.

Unit – II(Writing Skills)**20 Marks**

- CV's and Job Applications.
- Precis Writing.

Unit – III(Compositional Skills)**20 Marks**

- Letter Writing (Formal and informal)
- Paragraph Writing.

Unit – IV(Writing Skills)**10 Marks**

- Notice Writing.

Unit – V(Use of Imagining Faculty)**10 Marks**

- Writing Advertisements.
- Poster Making.

Suggested Reading:

1. CVs and Job Applications by Judith Leigh.
2. English at workplace. Eds: Panja, Sawhney&Verma.
3. Professional Communication by R P Singh.
4. English made simple by Arthur Waldhorn and Arthur Zeiger.
5. The Written Word by Vandana R Singh.
6. Technical Writing by Sunder Rajan.

ENVIRONMENTAL STUDIES

Scheme of examination:

MM: 70

1. The Question paper shall be of **TWO HOURS** duration.
2. Q. No. 1 shall contain 20 (Twenty) objective type questions having four options, out of which one shall be correct. Each question shall carry one mark. (1 X 20 = 20 marks)
3. Q. No. 2 shall contain 8 (Eight) Short-Answer-Type-Questions. Word limit for each question is 100 words. Candidate has to attempt any five. Each question shall carry Four marks. (5 X 4 = 20 marks).
4. Q. No. 3 shall contain 4 (Four) Essay-Type-Questions. Word limit for each question is 500 words. Candidate has to attempt any two. Each question shall carry Fifteen marks. (2 X 15 = 30 marks).

UNIT – I**Biodiversity and its conservation.**

- Introduction – Definition: genetic, species and ecosystem diversity.
- Bio geographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, asthetic and option values.
- Biodiversity at global, national and local levels.
- India as a mega diversity region.
- Hot spots of biodiversity.
- Threats to biodiversity – habitat loss, poaching of wild life, man – wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: *in situ* and *ex situ* conservation of biodiversity.

Unit – II**Environmental Pollutions:**

1. Definition, causes, effects and control measures of
 - Air Pollution,
 - Water Pollution,

- Soil Pollution,
 - Marine Pollution,
 - Noise Pollution,
 - Thermal Pollution,
 - Nuclear Pollution,
2. Solid waste management: Causes, effects and control measures of urban and industrial waste.
 3. Disaster management: Floods, earthquakes, cyclone and landslides.

UNIT-III

Social issues and the Environment:

- 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 solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environmental protection laws in India.
- Population growth, variation among nations.
- Population explosion – family welfare programmes.
- Environment and Human Health.

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

- (i).....
 - (a).....
 - (b).....
 - (c).....
 - (d).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....
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- (xiv).....
- (xv).....
- (xvi).....
- (xvii).....
- (xviii).....
- (xix).....
- (xx).....

(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....

(5 X 4 = 20)

Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....

(2 X 15 = 30)

ELEMENTARY COMPUTER APPLICATIONS

Scheme of examination:

MM: 70

1. The Question paper shall be of **TWO HOURS** duration.
2. Q. No. 1 shall contain 20 (Twenty) objective type questions having four options, out of which one shall be correct. Each question shall carry one mark. (1 X 20 = 20 marks)
3. Q. No. 2 shall contain 8 (Eight) Short-Answer-Type-Questions. Word limit for each question is 100 words. **Candidate has to attempt any five.** Each question shall carry Four marks. (5 X 4 = 20 marks).
4. Q. No. 3 shall contain 4 (Four) Essay-Type-Questions. Word limit for each question is 500 words. **Candidate has to attempt any two.** Each question shall carry Fifteen marks. (2 X 15 = 30 marks).

UNIT I

OPERATING SYSTEMS (Working knowledge at common users level only):

OVERVIEW OF IMPORTANT dos COMMANDS, Windows 98: Installation, Scandisk, Control Panel, Taskbar, Toolbars, Display settings (Background, wallpapers, screensavers, Desktop themes), Files and Folder management, Windows Explorer, Finding Files and Folders Formatting Disks and copying files, Printer settings, Modem installation, mouse installation, Adding and removing programmes, Active desktop Concepts, Winzip and its application, Norton antivirus and its use, Use of calculator, Paintbrush, win amp, MPEG player and windows help.

UNIT II

Application Software (Working knowledge at common users level only):

(a) Word processing software – MS Word

Entering, editing and formatting text, Document formats (Page size and Orientation,

Headers and Footers, Columns and Sections, Page layout), Spelling and grammar checks,

Thesaurus, Find and replace, cut and Paste, Table and Formatting tables, Mail Merge, Styles and Templates.

(b) Spreadsheet Programme – MS Excel

Entering data, Labels, Values, Dates, formulas, Cell references, formats, Functions, Templates, charts and Maps, analysing data in a spreadsheet.

(c) DBMS – Microsoft Access

Database, Entering data into the database, Creating database tables, editing data, viewing records, sorting records, querying a database, generating reports.

Format of the Question Paper

Q. 1 (Multiple Choice Question). Attempt all.

- (i).....
 - (a).....
 - (b).....
 - (c).....
 - (d).....
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- (xviii).....
- (xix).....
- (xx).....

(1 X 20 = 20)

Q. 2 (Short Answer Type Question). Attempt any FIVE. Word limit 100 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....
- (v).....
- (vi).....
- (vii).....
- (viii).....

(5 X 4 = 20)

Q. 3 (Essay Type Question). Attempt any TWO. Word limit 500 words for each.

- (i).....
- (ii).....
- (iii).....
- (iv).....

(2 X 15 = 30)

Algae, Fungi and Lichens

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 (objective/short answer type) will be compulsory having 14 questions (half mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

General characters of algae. Classification (F.E.Fritsch and Smith), Diverse habitat, Range of thallus structure, Photosynthetic pigments and food reserves.

Reproduction (vegetative, asexual and sexual), Types of life cycles and evolution of sex in algae. Economic importance (algae as food and fodder, algae in agriculture, pharmaceuticals and industries). Isolation and culture of algae.

UNIT – II

Habitat, structure, reproduction and life cycle of following forms:

Chlorophyceae – *Volvox, Coleochaete, Chara*

Xanthophyceae – *Vaucheria*

Phaeophyceae – *Ectocarpus*

Rhodophyceae – *Polysiphonia*

UNIT – III

General characters of fungi: Definition, occurrence, thallus organization, asexual and sexual reproduction, biological and economic importance of fungi.

(Dr. L. K. Sharma)
 प्रभार विभागाध्यक्ष
 कक्षा 10, कक्षा भवन
 भारतीय विश्वविद्यालय, मुंबई

Dr. Anurag

(Dr. Anurag)
 डॉ. अनुराग वाघेकर

(Tagat Pal Singh)
 टगत पाल सिंघ

(Rajal Khera)
 राज अलकेरा


Classification of fungi. (Saccardo and Ainsworth's).

UNIT - IV


Brief account, structure, importance and life history of the following:

Yeast, *Rhizopus*, *Aspergillus*, *Peziza*, *Agaricus*.

Lichens: General characters, habitat, structure, reproduction and economic importance of lichens, importance of lichens as colonizers and indicators of environment.



(Dr. Anshu Kishore)





(Dr. Rajendra Prasad)




(Dr. Veer Prakash Gupta)


Ri (राज अम्बेरा)


Dr. L. Sharma

भारतीय विश्वविद्यालय
वनस्पति शास्त्र विभाग
कानपुर विश्वविद्यालय, कानपुर



Microbiology and Plant Pathology

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 (objective/short answer type) will be compulsory having 14 questions (half mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

Meaning and scope of microbiology: Developments in the field of microbiology, spontaneous generation, discovery of bacteria, germ theory of diseases, Vaccination, Antibiotics.

General account of Eubacteria: occurrence, morphology (structure, shapes), flagella, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

UNIT – II

Mycoplasma: occurrence, morphology, reproduction and importance.

Virus: General characteristics and importance. Structure of TMV and Pox virus. Structure and multiplication of bacteriophage.

Cyanobacteria: *Oscillatoria* and *Nostoc*, occurrence, morphology, reproduction and importance.

UNIT – III

What is plant disease? Animate and inanimate plant diseases. Important symptoms of plant diseases caused by fungi, bacteria, viruses, MLO's

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(blights, mildew – downy and powdery, rust, smut, mosaic, little leaf, galls etc.)

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 of Bajra.

Claviceps and ergot.

UNIT – IV

Brief account, structure, importance and life history and/or disease cycle and control of the following:

Puccinia and rusts of wheat (Black, orange, yellow)

Ustilago and loose smut of wheat and covered smut of barley.

Alternaria and early blight of tomato/potato.

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Ri

सिद्धांत
संस्कृत विभागाध्यक्ष
संस्कृत विश्वविद्यालय
वाराणसी

विद्या

सुभाष

Bryophytes and Pteridophytes

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 (objective/short answer type) will be compulsory having 14 questions (half mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

General characters, Origin and evolution of Bryophyta. Classification (Eichler and Proskauer); Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generation; Evolution of sporophytes in Bryophytes; Economic importance of Bryophytes.

UNIT II

Habitat, structure, reproduction and alternation of generation in following forms: Hepaticopsida – *Riccia, Marchantia and Porella*.

Anthocerotopsida - *Anthoceros*.

Bryopsida - *Sphagnum, Funaria*

UNIT III

General characters of pteridophytes, classification by Smith, Bold & Sporne. Important characteristics of Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Habit & Habitat and economic importance of Pteridophytes. Alternation of Generation. Stellar system in Pteridophytes. Heterospory and seed habit.

Unit - IV

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Distribution, structure and life history of: *Psilotum*, *Selaginella*,
Equisetum, *Pteridium* and *Marsilea*.

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संयुक्त विभागाध्यक्ष
वसुदेव शंकर विभाग
राज्यीय महाविद्यालय, अजमेर

Gymnosperms and Palaeobotany

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 (objective/short answer type) will be compulsory having 14 questions (half mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

Resemblances and characteristics of seed plants. Differences between Gymnosperms and Angiosperms. General characters and classification of Gymnosperms (Andrews, Sporne & Bierhorst), Economic importance of Gymnosperms.

UNIT-II

Systematic position, distribution, Morphology of Vegetative and reproductive parts, anatomy, reproduction and life cycle of following genera: *Cycas*, *Pinus* and *Ephedra*

UNIT III

Formation of fossils, types of fossils, techniques of study of fossils. Geological time scale. Applied aspects of paleobotany - use in coal and petroleum exploration.

UNIT IV

Fossil Pteridophytes: *Rhynia*, *Lepidodendron*, *Calamites*, *Lepidocarpon*.

Fossil Gymnosperms - *Cycadeodea*, *Cordaites*, *Williamsonia*

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DISCRETE MATHEMATICS

Scheme of examination:

MM: 35

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

Sets and propositions, Cardinality, mathematical induction, principle of inclusion and exclusion. Computability and formal languages- ordered set, Languages, phrase, structure, grammars, Types of grammars and languages.

UNIT - II

Relations and functions; Binary relations, equivalence relations and partitions. Partial ordered relations and lattices chains and antichains. Pigeons hole principle.

UNIT - III

Finite state machine: equivalent machines. Finite state machines as language recognizers. Discrete numeric functions and generating functions. Recurrence relation and recursive algorithms, linear recurrence relations with constant coefficients.

Homogeneous solutions. Particular solution. Total solution. Solution by the method of generating function.

UNIT - IV

Boolean algebras-lattices and algebra structure, duality, distributive compliment lattices. Boolean lattices, Boolean function and expressions.

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DIFFERENTIAL CALCULUS

Scheme of examination: **MM: 35**

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

Series : Infinite series and convergent series, test for convergence of a series; comparison test, D' Alembert's test Cauchy's test, Raabe's test, De-Morgan and Bertrand's test, Cauchy's condensation test, gauss test, alternating series, absolute convergence (derivation of test is not required).

UNIT - II

Taylor' s theorem. Machlaurin's theorem, power series expansion of sin x, cos x, e^x , $\log_e (1+x)$, $(1 - x)^n$, derivative of the length of an arc, pedal equations.

UNIT - III

Curvature. Asymptotes,

UNIT - IV

Multiple points, curve tracing of standard curves (Cartesian and polar coordinates), Envelopes.

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THREE DIMENSIONAL GEOMETRY

Scheme of examination:

MM: 35

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

Sphere

UNIT - II

Cone, Cylinder.

UNIT - III

Central conicoids; ellipsoid, hyperboloid of one and two sheets condition of tangency for a plane, normals plane sections

UNIT - IV

Generating lines of hyperboloid of one sheet and its properties. Reduction of a general equations of second degree in three dimensions standard forms.

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GRAPH THEORY

Scheme of examination:

MM: 35

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

Groups, Rings, Fields (Definitions, simple examples and elementary properties only).

UNIT II

Graphs - Basic terminology, Multigraphs, Union, Join, Product and composition of graphs. Weighted Graphs.

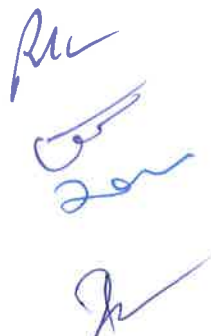
UNIT III

Paths and circuits, shorted paths, Eularian paths and circuits. Travelling salesman problems, Planar graphs and Geometric dual graphs.

UNIT IV

Trees, Rooted tree. Digraphs - Simple digraph, Asymmetric digraphs, Symmetric digraphs and complete digraphs. Digraph and Binary relations. Matrix representation of graphs and digraphs.







INTEGRAL CALCULUS

Scheme of examination:

MM: 35

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

Partial derivatives. Chain rules, Euler's theorem for homogeneous functions. Differentiation of implicit functions. Maxima and Minima of functions of two variables. Lagrange's multipliers.

UNIT II

Double integrals, Change of order of integration.

UNIT III

Triple integrals, Dirichlet's integral, Areas.

UNIT IV

Lengths, Volumes and Surfaces.

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OPTIMIZATION THEORY

Scheme of examination:

MM: 22

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit.

UNIT - I

The linear programming problem Formulation. L.P.P. matrix notation. Graphical solution of linear programming problems. Basic solution. Some basic properties of convex sets, Theorems based on convex sets.

UNIT II

Fundamental theorem of L.P.P. Application of the Simplex method for solution of a L.P.P. to simple problems.

UNIT III

Duality. Fundamental theorem of duality, Properties and Simple problems of duality.

UNIT IV

Assignment problems, Transportation problems.

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MECHANICS – I

Scheme of examination:

MM: 23

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Physical Laws and Frames of Reference: Transformation of displacement, velocity and acceleration between different frames of reference involving translation and rotation. Uniform relative motion. Inertial frames of reference-examples, Galilean transformations and invariance of Newton's laws. Non Inertial frames and their Examples.

UNIT-II

Special Theory of Relativity: Michelson-Morley's experiment, postulates of special theory of relativity, Lorentz transformations, transformation of velocity and acceleration, Addition of velocities, time dilation and length contraction. Experimental verification of time dilation. Some important results of special theory of relativity.

UNIT-III

Relative Rotational Motion: Transformation of velocity and acceleration between rotating frames, pseudo forces, coriolis forces, Motion relative to earth, Effects of centrifugal and Coriolis force on motion relative to earth. Foucault's pendulum.

UNIT-IV

Rigid Body Dynamics: Equation of motion of a rotating body. Inertial coefficients. Moments of Inertia of a disc. Cylinder and sphere. Case of

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angular momentum not parallel to angular velocity. Kinetic energy of rotation and idea of principle axes. Precessional motion of spinning top.

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ELECTROMAGNETISM – I

Scheme of examination:

MM: 23

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Vector Fields: Partial derivative. Gradient of a scalar function. Line intergral of vector field. Potential difference and potential function. Potential energy of a system, Application: energy required to build a uniformly charged sphere, classical radius of an electron, potential and field due to short dipole, torque and force on a dipole in a Z external field.

UNIT-II

Divergence and Curl of a vector field: Divergence of a vector field. Divergence in the Cartesian coordinates, concepts of solid angle. Gauss divergence theorem, Gauss law in differential form, Gauss law from inverse square law, physical meaning of divergence of a vector, the Laplacian operator. Poission's and Laplace's equations. Curl of a vector field, Curl in Cartesian coordinates, Stoke's theorem, physical meaning of Curl.

UNIT-III

The Field of Moving Charge: Magnetic force, Measurement of charge in motion, Invariance of charge. Electric field measured in different frames of reference. Field of a point charge moving with constant velocity, Force on a moving charge, Interaction between a moving charge and other moving charges.

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UNIT-IV

Electric Field in Matter: The Moments of a charge distribution. Atomic and molecular dipoles. Atomic polarizability. Permanent dipole moment, dielectrics. The Capacitor filled with a dielectric. The potential and field due to a polarized sphere. Dielectric sphere places in a uniform field, the field of charge in dielectric medium and Gauss's Law. The connection between electric susceptibility and atomic polarizability. Polarization in changing field. The bound charge (polarization) current.

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WAVE AND OSCILLATIONS – I

Scheme of examination:

MM: 24

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Simple harmonic and anharmonic Oscillators: Oscillations in an arbitrary potential well, Simple harmonic motion, examples-mass on a spring, LC Circuit, torsional oscillator, mass and two spring system. Energy of the oscillators. Anharmonic oscillator, simple pendulum as an example.

UNIT-II

Damped harmonic oscillators: Damped harmonic oscillators, mathematical formulation of damped harmonic oscillators Energy of damped harmonic oscillator, Power dissipation, relaxation time, Quality factor of damped harmonic oscillators. Examples – Electromechanical system-Ballistic galvanometer. Damped oscillation in LCR Circuit.

UNIT-III

Driven harmonic oscillators: Driven harmonic oscillators. Mathematical formulation of driven harmonic oscillator. Frequency response on amplitude and phase, Quality factor of driven harmonic oscillators, Resonance, Sharpness of resonance, Power absorption by forced oscillator. Series and parallel LCR Circuit.

UNIT-IV

Coupled Oscillators: Equation of motion of two coupled S. H. Oscillators, Normal modes, motion in mixed modes, Transient behavior, Effect of coupling in mechanical systems. Electrically coupled circuits, frequency response, reflected impedance. Effect of coupling and resistive load.

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amplitude
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MECHANICS - II

Scheme of examination:

MM: 23

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Conservation Laws: Conservative forces, Potential energy, potential energy in gravitational and electrostatic field. Rectilinear motion under conservative forces. Discussion of potential energy curves and motion of a particle. Centre of Mass. Two particle system. Motion of centre of mass and reduced mass. Application of reduced mass: Reduced mass of hydrogen atom, Reduced mass of deuteron, Reduced mass of earth and satellite.

UNIT II

Conservation of linear and angular momentum: Conservation of linear momentum 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 (Rocket). Angular momentum conservation and charged particle scattering by a nucleus as an example.

UNIT III

Motion under Central Forces : Motion under central forces. Gravitational interaction, inertia and gravitational mass, general solution under gravitational interaction. Rutherford scattering, Discussion of trajectories, Cases of elliptical and circular orbits, Kepler's Laws.

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UNIT IV

Elastic properties of Matter : Elasticity, Young's Modulus, Bulk modulus, Modulus of rigidity, Poisson's ratio and their relations. Bending of a beam. Torsion of a cylinder, experimental determination of elastic constants.

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ELECTROMAGNETISM - II

Scheme of examination:

MM: 23

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

The Magnetic Field : The definition of magnetic field, properties of the magnetic field. Ampere's circuital law with application. Ampere's Law in differential form. Vector potential. Poissons equation for vector potential. Field of any current carrying wire and deduction of Biot-Savart Law.

UNIT II

Magnetic Fields in Matter: Electric current due to an orbiting electron, the field of current loop, Bohr magneton. Orbital gyromagnetic ratio. Electron spin and magnetic moment. Magnetic susceptibility, magnetic field caused by magnetized matter. magnetization current. Free current and the field H.

UNIT III

Electromagnetic Induction: Faraday's law of Electromagnetic Induction in integral and differential form. Lenz's law Self and mutual induction. Transformer, measurement of self inductance by Rayleigh's method. Energy stored in magnetic field.

UNIT IV

Transient Currents and Maxwell's Equations: Transient behaviour of an R-C circuit, determination of high resistance by leakage method. Transient

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behaviour of an R-L circuit, the displacement current. Maxwell's equations in differential and integral forms.

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WAVES AND OSCILLATIONS - II

Scheme of examination:

MM: 24

- 1. In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT I

Lattice Vibrations: Concept of group and phase velocities, Equation of motion for one dimensional monoatomic and diatomic lattices, acoustic and optical modes, dispersion relations.

UNIT II

Electrical transmission line: transmission line, transmission line equation, propagation constant, characteristic impedance, standing waves and standing wave ratio, effect of terminal load.

UNIT III

Elastic waves in a solid rod, Pressure waves in a gas column. Transverse waves in a string, waves in three dimensions, spherical waves, Fourier series and determination of Fourier constants, Fourier analysis of a square, saw tooth and triangular wave forms.

UNIT IV

Electromagnetic Waves: Plane electromagnetic waves. EM waves in an isotropic medium. Properties of EM waves, Energy density of EM waves. Momentum density of EM wave. Radiation pressure. Radiation resistance of free space, EM waves in dispersive media. Spectrum of electromagnetic radiations. -----X-----

ANIMAL DIVERSITY - I

Scheme of examination:

MM: 35

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

TAXONOMY

Hierarchy, Binomial nomenclature, Trinomial nomenclature, Rules of nomenclature, Concept of Five kingdom

Basis of Classification- Grade of organization, Symmetry, Coelom, Embryogeny, segmentation.

Classification of Invertebrate phyla upto Class level.

UNIT - II

Phylum Protozoa:

Type study *Amoeba, Euglena, Paramecium* (Habit, Habitat & Salient features with particular reference to locomotion, nutrition and reproduction). Economic Importance

UNIT – III

Phylum Porifera

Type study- *Sycon* Canal system of Sponges, Skeletal system, Economic Importance

UNIT - IV

Phylum Coelenterata

Type study – *Obelia*, Polymorphism, Coral reefs

UNIT - V

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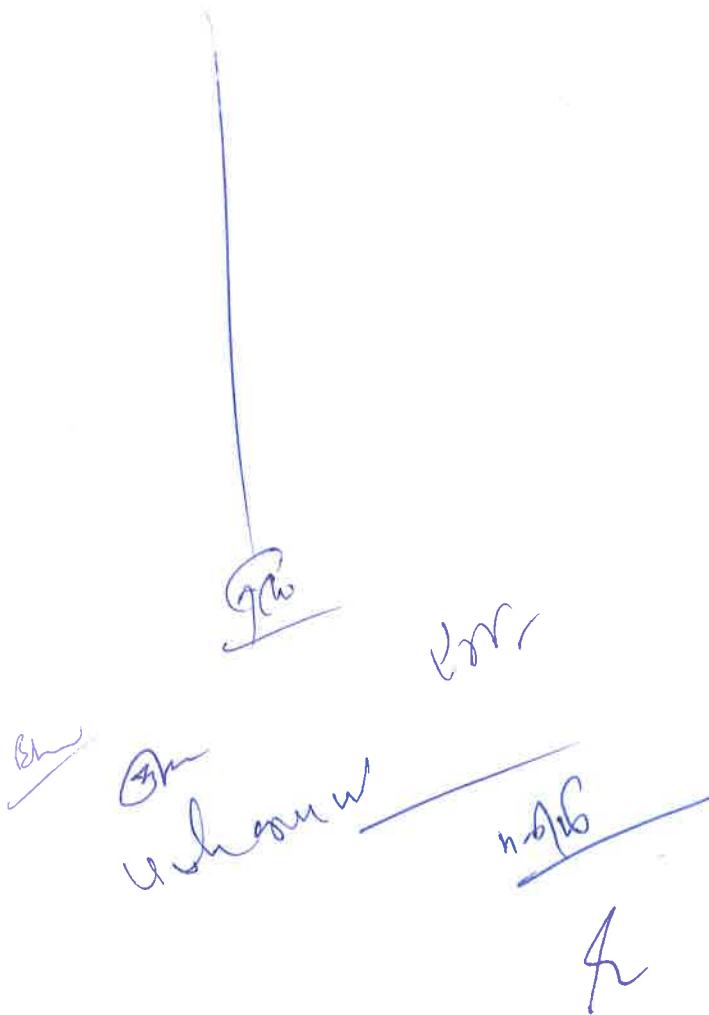
Phylum Platyhelminthes

Type study- *Taenia*

Phylum Nematelminthes

Ascaris (External features and life cycle), Parasitic adaptations of Helminthes

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CELL BIOLOGY

Scheme of examination:

MM: 35

1. *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Applications of Tools & Techniques in Cytology:

Principles of microscope and application:

Light Microscopy, Phase contrast microscopy, Fluorescence Microscopy, Interference Microscopy, Electron Microscopy (SEM & TEM)

Cell fractionation (Homogenization & Centrifugation)

Calorimetry/Spectrophotometry

UNIT - II

The Cell: Diversity of Cell Size & shape, Characteristics of Prokaryotic & Eukaryotic cells, Cell theory, Cell membrane – composition & ultrastructure (membrane models – Danielli & Davson, unit membrane, Singer & Nicholson – Fluid Mosaic model), Transport across cell membrane – Permeability, Passive and Active transport, Exocytosis, Endocytosis, (Pinocytosis, Phagocytosis).

UNIT - III

Cell organelles: structure, composition & function

Endoplasmic reticulum, Golgi complex, Ribosome, Lysosomes

Mitochondria: biogenesis, electron transport chain, generation of ATP molecules, (Chemiosmotic hypothesis of Mitchel)

Peroxisomes, Microtubules & Centrioles, cilia & flagella

UNIT – IV

Nuclear Organization: Ultrastructure of Nucleus - nuclear envelope, nuclear matrix and nucleolus, Chromosomes: Morphology, Chromatids, Chromonema, Chromomeres, telomeres, Primary & secondary constrictions, Chromosome type- Polytene & Lampbrush

Chromosomal Organization: euchromatin, Heterochromatin, folded fibre model & nucleosome Concept.

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UNIT - V

Cell Division

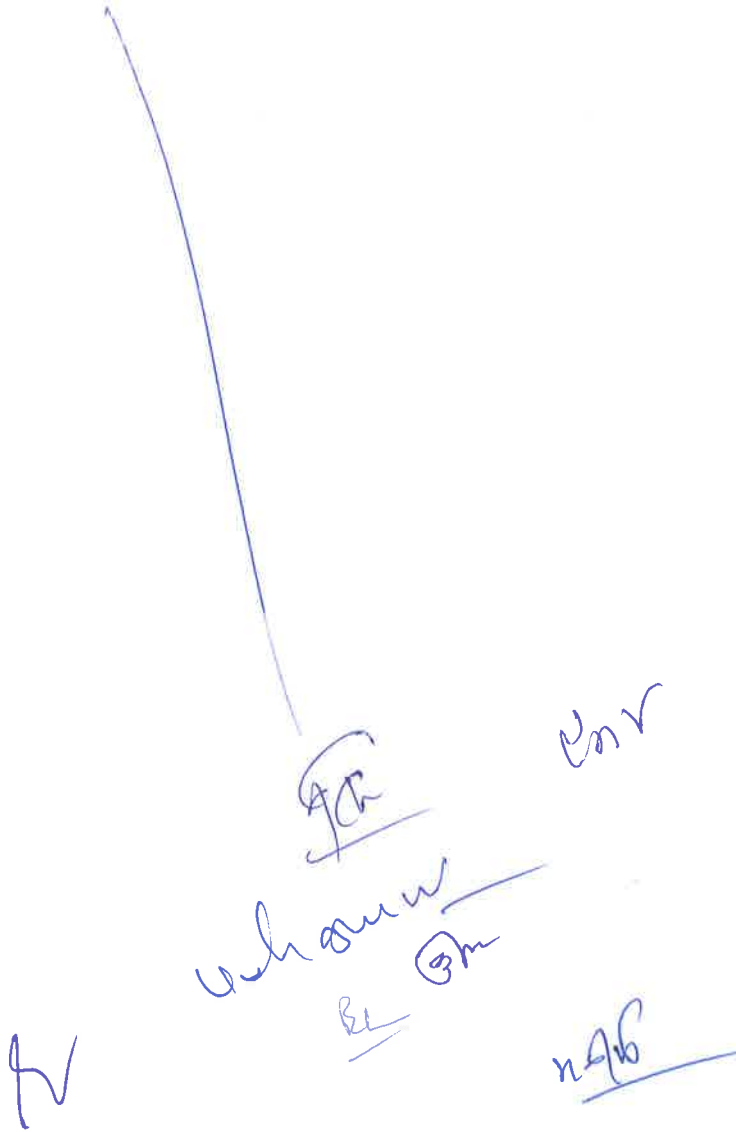
Cell cycle(S, G1, G2, M phase)

Mitosis: Phases & process of mitosis, structure & function of spindle apparatus

Meiosis: Phases & Process of meiosis

Cytology

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राज्यीय प्रशिक्षणालय, अलवर

ANIMAL DIVERSITY - II

Scheme of examination:

MM: 35

1. *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Type study- Habit, Habitat & Salient features & structural organization:

Phylum Annelida

- Type study: Earthworm
- Metamerism
- Vermiculture

UNIT - II

Type study- Habit, Habitat & Salient features & structural organization:

Phylum Arthropoda

- Type study: Prawn
- Metamorphosis in insects
- Sericulture
- Lac culture
- Apiculture
- Prawn culture

UNIT III

Type study- Habit, Habitat & Salient features & structural organization:

Phylum Mollusca

- Type study: Pila
- Respiration
- Torsion
- Pearl culture

UNIT IV

Type study- Habit, Habitat & Salient features & structural organization:

Phylum Echinodermata

- Type study: Starfish

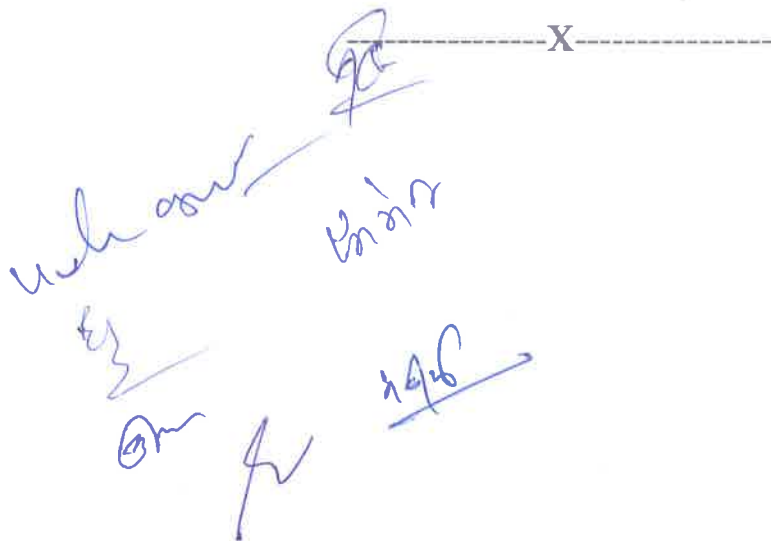
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- Water vascular system

UNIT V

Larval forms of Invertebrates (Parasitic & Free living forms)



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राजस्थान महाविद्यालय, अजमेर

MOLECULAR BIOLOGY AND GENETICS

Scheme of examination:

MM: 35

- 1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

DNA structure (Watson & Crick's model). Polymorphism (A, B, Z type), Replication (Semiconservative mechanism), Replication forks (both Unidirectional & Bidirectional), Leading & lagging strand, Okazaki fragments). Experiments of Messelson & Stahl. Elementary idea about Polymerases, Topoisomerases, Single stranded binding protein, RNA Primer, DNA repair

UNIT II

Genetic code, Protein synthesis (Translation), Gene expression – Gene concept, molecular structure of gene, gene regulation (lac operon), gene splicing & gene sequencing.

UNIT III**Mendelism – I**

Mendel's work and laws. Interactions of Genes: Co-dominance and incomplete dominance, Complementary, Epistasis(dominant & recessive), Polymorphic (multiple) genes. Multiple alleles- Inheritance of human blood group-(A, B, O) & Rh factor.

UNIT IV**Mendelism – II**

Chromosomal theory of inheritance. Linkage & linkage maps. Crossing over-Mechanism, theories, Cytological detection & significance, Mutations-Chromosomal & Gene, mutagens. Cytoplasmic inheritance.

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UNIT V

Determination of Sex – Chromosomal mechanism, Genic Balance Theory, sexual function of X & Y chromosome, Non disjunction, Gynandromorphs. Sex linked inheritance in man. Y linked genes, Sex limited genes, Sex influenced genes,

Human genetics – Human Chromosomes, Karyotype & Idiogram:

Chromosomal abnormalities (Autosomes & Sex chromosomes), Genetics counseling, Eugenics & Euthenics.



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Inorganic Chemistry

Scheme of examination:

MM: 52

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Ionic bond: General Characteristic, types of ions, size effects radius ratio and coordination number, Madelung-constant, Born-Haber Cycle Application of lattice energy. Polarizing power polariability, Fajan's Rules, Hydration energy, solubility of ionic compounds, Defects in crystal structures Frankel and Schattky defects, Non-stoichoimetric compounds.

UNIT – II

Solids: Metallic bond: qualitative idea of free electron, valence bond and band theories, semiconductors and insulators, conduction in ionic solids, electrical and magnetic properties of solids, introduction to super conductors and super conductivity.

UNIT – III

Covalent Bond :- General characteristic, valence bond theory and its limitations, Directional characteristics of Covalent bond resonance and resonance energy, Hybridization involving s, p & d orbitals, Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_2O , H_3^+O , SF_6 , ClF_3 , ICl_2 , shapes of simple inorganic molcules and ions. Dipole moment, percentage ionic character from dipole moment and electronegativity difference.

UNIT – IV

Molecular orbital theory: Detailed description of linear combination of atomic orbitals (LCAO), homonuclear (H_2 , He_2 , B_2 , C_2 , N_2 O_2 F_2) and

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heteronuclear diatomic molecules (CO, NO) and their ions, comparison of valence bond and molecular orbital theories.

Multicenter bonding in electron deficient molecules, bond strength and bond energy.

Weak interactions: Hydrogen Bond, Theories of hydrogen bonding, valence bond treatment, weak intermolecular forces of attraction. Vander Waal,s forces.

UNIT - V

Chemistry of noble gases: Position in the periodic table, discovery, Isolation, important compounds of noble gases with special reference to xenon compounds; Synthesis, bonding and their stereochemistry.



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Organic Chemistry (Paper Code 1017)

Scheme of examination: MM: 52

- 1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Mechanism of Organic Reactions:- Free Radical and ionic reactions, hemolytic and heterolytic bond breaking. Electrophiles and nucleophiles. Types of organic reactions. Energy considerations, transition states, Reactive intermediates-Carbocations, Carbanions, Free Radicals, Carbenes, arynes and nitrenes, Assigning formal charge on intermediates and other ionic species. Methods of determination of Reaction Mechanism.

UNIT – II

Alkanes and Cycloalkanes :- Nomenclature of branched and unbranched alkanes. Classification of carbon atoms in alkanes. Isomerism in alkanes. Methods of formation (with special reference of Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids) physical properties and chemical reactions of alkanes. Mechanism of free-radical halogenation of alkanes: orientation, reactivity and selectivity.

Cycloalkanes: Nomenclature, Methods of formation, chemical reactions. Baeyer's strain theory and its limitations. Ring strain in small rings (cyclo-propane and cyclo-butane). Theory of strainless rings. The case of cyclopropane rings : banana bonds.

UNIT – III

Alkenes and Cycloalkenes :- Nomenclature of alkenes, Methods of formation, Mechanism of dehydration of alcohols and

dehydrohalogenation of alkyl halides, Regioselectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, Physical properties and relative stabilities of alkenes. Chemical reactions of alkenes- mechanism involved in hydrogenation, electrophilic and free radical additions, Markownikoffs 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. Industrial applications of ethane and propene.

Cycloalkenes:- Methods of formation, conformations and chemical reactions.

UNIT – IV

Dienes and Alkynes:- Dienes:- Nomenclature and classification, Isolated, conjugated and cumulated dienes, structure of allenes and butadienes, methods of formation, polymerization, chemical reactions- 1,2 and 1,4 additions. Diels – Alder reaction

Alkynes:- Nomenclature, structure and bonding, Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reduction, oxidation and polymerization.

UNIT – V

Electromagnetic spectra :-Absorption spectra: Ultraviolet (UV) absorption Spectroscopy: Absorption laws (Beer-Lambert law), Molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. Absorption bands of simple molecules like alkenes, conjugated dienes, carbonyl compounds, enones, acids & aromatic compounds.

Physical Chemistry

Scheme of examination: MM: 52

- 1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Ideal gases:- Concept of molar mass and molar volume. Determination of molar mass of gas and volatile substances. The barometric distribution law Maxwell distribution law of molecular velocities. The Maxwell energy distribution law and its experimental verification.

UNIT – II

Real gases:- Causes of deviation from ideal gas behavior. Vander walls equation and its implications. Isotherms of Vander wall gas. Critical phenomena and critical constants. Reduced equations of state and the law of corresponding states.

UNIT – III

Chemical Dynamics:- Rate, initial rate, specific rate, rate constant and units. Methods of Determination of initial rate, Order, molecularity and tachometry of the reactions. Methods of Determination of order of a reaction. Derivation of integrated rate equations Zero order, First order, Second order, Third order. Graphical applications of these equations for the determination of rate constant. Effect of temperature on the rate constant, Arrhenius equations, Energy of activation and its Determination.

UNIT – IV

Complex reactions and their nature: How do these reactions differ from simple reactions. Derivations of rate equation for opposing

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reactions. ($A \leftrightarrow B \rightarrow C$), Parallel reactions $A \begin{cases} \rightarrow P \\ \rightarrow P \end{cases}$ (P's are products) and consecutive reactions ($A \rightarrow B \rightarrow C$) Characteristics of consecutive reactions.

UNIT - V

Solutions:- Solutions of gases in liquids. Henry's law and its applications to respiration. Solutions of solids in liquids and distribution law. Distribution law and extraction processes.

Osmosis, Osmotic pressure. Determination of osmotic pressure. Lowering of vapour pressure relative. Lowering of vapour pressure and Raoult's Depression in freezing point and elevation in boiling point. Vont's Hoff factor and its implications.

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Analytical Chemistry

Scheme of examination: MM: 52

- 1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Principle of Gravimetric analysis, precipitation methods, saturation and ppt. formation, the purity of the ppt, coprecipitation, post precipitation.

UNIT – II

Conditions of precipitation, precipitation from homogeneous solution, washing of the ppt. Ignition of the ppt, masking and demasking agents.

UNIT – III

Solvent extraction; principles and process of solvent extraction, the distribution law and the partition coefficient. Liquid- liquid extraction, factors favouring solvent extraction, choice of solvent for solvent extraction, stripping, solid - liquid extraction, organic reagents used in solvent extraction.

UNIT – IV

Organic reagents in quantitative inorganic analysis; application of the following organic reagents-DMG, cupferron, 8-hydroxquinoline, cupron, salicylaldehyde, oxim, 1-nitronaphthol, 4-bromoandelic acid, nitron, tannic acid, arsenic acid, pyridine, anthralic acid, pyrogallal, ethylenediamine.

UNIT – V

Compilation of gravimetric results, compilation of results, reliability of results-accuracy and precision, cleaning and calibration of glassware, standard deviation,t,Q and F tests, correction, significant figures, errors in analysis.

Inorganic Chemistry

Scheme of examination:

MM: 52

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

s – Block elements: Comparative study, diagonal relationship, salient features of hydrides, salvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

UNIT – II

p – Block Elements: Comparative studies of the p - block elements, Group trends, electronic configuration, Physical and Chemical properties, Atomic and ionic radii, Ionization potentials, Electron affinity, Electronegativity and oxidation states, Oxidation state diagrams on the basis of redox potentials, inert pair effect catenation.

UNIT – III

Compounds of p – Block Elements: Hydrides of Boron, diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), silicones, oxygenfluorides, per-acids of sulphur, tetrasulphur, tetranitride, basic properties of halogens. interhalogen-compounds and polyhalides.

UNIT – IV

d – Block Elements: Chemistry of the elements of first transition series: Electronic configuration and comparative study with respect to atomic and ions radii, oxidation states and ionization potential. Redox potential, oxidation state diagrams on the basis of redox potentials binary compounds and complexes illustrating relative stability of their oxidation

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states co-ordination number and geometry, metallic nature magnetic properties, catalytic, colour and spectral properties of transition metal ions.

UNIT - V

Chemistry of the elements of second and third transition series:

Electronic configuration general characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviours, special properties and stereochemistry.

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Organic Chemistry

Scheme of examination: MM: 52

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Stereochemistry of Organic compounds (Part I):

Concept of isomerism, Types of isomerism. Conformational isomerism: conformational analysis of ethane and n-butane.

Newman projection and saw horse formulae. Fisher and flying wedge formulae. Differences between configuration and conformation.

UNIT – II

Stereochemistry of Organic compounds (Part II):

Optical isomerism: Elements of symmetry, molecular chirality, enantiomers, stereogenic center, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization, Asymmetric synthesis. Relative and absolute configuration, sequence rules. D and L and R and S systems of nomenclature.

Geometrical isomerism: Determination of configuration of geometrical isomers, E & Z system of nomenclature, Geometrical isomerism in oximes and alicyclic compounds.

UNIT – III

Arenes and aromaticity: Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. Structure of benzene: Molecular formulae & Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckle rule

and its applications. Energy level of p- molecular orbitals (ethane, 1,3-butadiene benzene).

Aromatic electrophilic substitution: General pattern of mechanism, role of sigma and pi complexes, mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction.

Effect of substitution groups (inductive, mesomeric and hyperconjugative effect), activating and deactivating groups, determination of orientation up to disubstituted derivatives, ortho/para ratio, Birch reduction. Method of formation and chemical reactions of benzene, alkyl benzenes and biphenyl.

UNIT – IV

Alkyl and Aryl halides: Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution, reaction of alkyl halides SN^2 and SN^1 reactions with energy profile diagrams. Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanism of nucleophilic aromatic substitution reactions.

Relative reactivities of alkyl halides v/s allyl, vinyl and aryl halides.

Preparation and properties of vinyl, allyl and benzyl halides: synthesis and uses of DDT and BHC.

UNIT – V

Electromagnetic Spectrum: Absorption Spectra

Infrared (IR) Absorption Spectroscopy: Molecular vibrations, Hook's Law, selection rules, Intensity and position of IR bands, measurement of IR spectrum, finger print region, characteristic absorption of simple organic compounds, alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, carboxylic acids and their derivatives.

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Physical Chemistry

Scheme of examination:

MM: 52

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Liquid State: Thermal expansion and compressibility. Heat of vaporization vapour pressure and heat of vaporization. Disorder in liquid state and structure of liquid water. Intermolecular forces Cohesion of liquid. Eyring Theory of liquids.

UNIT – II

Solid State: Crystalline and amorphous states. Isotropy and anisotropy. Elements of symmetry Law of rational indices. Weiss and Miller indices and equation of plane in intercept form. Law of constancy of interfacial Angles. Unit cell and lattices, powder method of X-ray examination of crystals.

UNIT – III

Thermodynamics-I: Definition of thermodynamic terms. Concept of work and heat. Work of Expansion and compression. Zeroth Law of thermodynamics. First law of thermodynamics under isothermal and adiabatic conditions respectively. Enthalpy and changes are constant temperature and pressure. Concept of C_p and C_v and their thermodynamic relationship.

UNIT – IV

Thermodynamics-II: Application of First Law of Thermodynamics. The heat of reactions and heat of formation. Hess's Law. Heat of reactions at constant pressure and volume. Variation of heat of reaction with temperature. Bond enthalpies and Bond energies.

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UNIT – V

Phase Equilibria: Explanation of terms phase, component and degrees of freedom. Phase rule and its thermodynamic derivation. Restricted phase rule. Analysis of (a) One component system such as Sulfur and water. (b) Two component system - Lead Silver system.

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Analytical Chemistry

Scheme of examination:

MM: 52

- 1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Volumetric Analysis: Principal and applications of reagents used in titration, Iodometry and Iodimetry theory of complexation titration, methods of end point detection. EDTA as titrant, types of titration, titration of mixtures, selectivity masking and demasking agents metal indicators.

UNIT – II

Distillation methods of organic solvents, steams, fractional, vacuum distillations and monostates. Analysis of oil and fats, saponification value, iodine value, RM value, acid value. Quantitative estimation of following functional groups- alcoholic, phenolic, carboxylic acid and unsaturated groups (olefinic and ethylenic).

UNIT III

Polarimetry: Basic principal, instrumentation, experimental techniques, determination of (a) specific rotation of a substance (b) concentration of the substance and applications and elementary idea, refractrometry, interferometry circulat dichroism and optical rotatory dispersion.

UNIT IV

Water pollutants and their analysis: Water analysis pollutant, Analysis of water for DO, BOD, and COD Biological treatment methods, prevention of water pollution by treatment of industrial waste with special reference to cement industry, fertilizer industries and dying industries.

UNIT V



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Air pollution: General consideration, types of air pollutants, measurement, sampling, monitoring and analysis of CO and CO₂ in atmosphere, effect of air pollutants on plants and human health, methods for pollution control, specially for pollution by automobiles.

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