

CAREER POINT UNIVERSITY KOTA (RAJASTHAN)

School of Basic and Applied Science

**Syllabus and Course Scheme
(Annual Scheme)**

**Bachelor of Science
I Year
(Biology)
Session – 2021-22**

University Campus : Alaniya, Kota 325 003, Rajasthan Ph: +91-80941-62999

City office: CP Tower (4th Floor), IPIA, Road No-1, Kota (Raj.) -324005 Ph: +91-744-3040045 Fax: +91-744-3040050

Course Scheme of B.Sc. Part-I

Annual Course Scheme of B.Sc. Part-I				
Branch-Biology				
S.No.	Paper Code	Paper Name	Marks	
			Min. Marks	Max. Marks
1	HUL011	General English*	36	100
2	HIN011	General Hindi*	36	100
3	CSL011	Elementary Computer Application*	36	100
4	ENL011	Environmental Studies*	36	100
5	CHL011-I	Inorganic Chemistry	18	50
6	CHL011-II	Organic Chemistry	18	50
7	CHL011-III	Physical Chemistry	18	50
8	CHP011	Chemistry Practical	27	75
9	BOL011-I	Diversity of Microbes and Cryptogams(Thallophyta)	18	50
10	BOL011-II	Diversity of Cryptogams(Bryophyta, Pteridophyta & Paleobotany)	18	50
11	BOL011-III	Cell Biology, Genetics & Plant Breeding	18	50
12	BOP011	Botany Practical	27	75
13	ZOL011-I	Animal Diversity Part-I(Protozoa to Annelida)	18	50
14	ZOL011-II	Genetics & Biotechnology	18	50
15	ZOL011-III	Cell Biology, Bio chemistry & Microscopy	18	50
16	ZOP011	Zoology Practical	27	75
				G.T.
				675
*Eligibility Criteria on passing marks only, marks shall not be included in division				

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Syllabus of B.Sc. Biology Part - I

HUL011: General English

Objectives

An essentially language-based course that aims at making students study English Prose with a view to enlarge their comprehension of the language and develop all the four skills. It also aims at giving them basic skills in grammar, widening their vocabulary and teaching them to write simple and correct English. The question paper will have 100 multiple choice questions.

1) Comprehension and vocabulary Prose: Indian Voices: A course in English literature and language; ed. By Kshamta Chaudhary and Sanjay Chawla. Published by Orient Blackswan, Hyderabad. The following chapters from the text have been prescribed:

- 1.The Child: Premchand
- 2.The mark of Vishnu: Khushwant Singh
- 3.Brain Bhowmik's Ailment: Satyajit Ray
- 4.Drought: Sarat Chand Chatterjee
- 5.A vision for 2020: A.P.J. Abdul Kalam
- 6.Elixir of Life:C.V. Raman
- 7.Photographs: Shama Futehally
- 8.The death of a Hero:Jai Nimbkar

- Questions based on the content from the prescribed text
- Objective/Multiple choice questions based on the content from the prescribed text
- Short answered questions from the same text

2) Basic language skills: Parts of speech, Determiners, Voice, Reported-Speech, Correct Verbs, Form of Modals, Phrasal Verbs, Prepositions

& Question Tags.

3) Writing Skills: Paragraph writing/C.V. Curriculum-Vitae, Letter Writing/ E-Mail/ Report Writing.

HIN011: General Hindi

ij Hkxx

1-uj gks u fujk'k djks eu dks&eSfFkyh'kj.k xqlr

2-fgeky; ds vkaxu esa&t;'kadj izlkn

3.जागो फिर एक बार (भाग 2) निराला

4.दिल्ली दिनकर

5.हम अनिकेतन बालकृष्ण शर्मा नवीन

6.झांसी की रानी—सुभद्रा कुमारी चौहान

7.गीत फरोश—भवानी प्रसाद मिश्र ?

8.बादल को घिरते देखा है—नागार्जुन

9.पन्द्रह अगस्त —गिरिजा कुमार माथुर

10.मैं हार नहीं मानूंगा—श्री अटल बिहारी वाजपेयी

11. शहीद की मां—रघुराज सिंह हाड़ा

गद्य भाग

1.नाखून क्यों बढ़ते हैं—हजारी प्रसाद द्विवेदी

2.राष्ट्र का स्वरूप—वासुदेव शरण अग्रवाल

3.गेहूँ बनाम गुलाब—रामवृक्ष बेनीपुरी

4.भवानी शंकरौ वंदे—कुबरे नाथ राय

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5. बड़े घर की बेटी—प्रेमचन्द
6. अदम्य जीवन—रांगेय राघव
7. उत्सर्ग—राम कुमार वर्मा
8. गांधी जी से भेंट (आत्म कथा स)—राजेन्द्र प्रसाद
9. महाराजपुर से ग्वारी घाट (सौंदर्य की नदी नर्मदा से)—अमृत लाल बेगड़
10. भक्तिन—महादेवी वर्मा
11. हिन्दी हमारी मातृ भाषा है—मनहर चौहान

व्याकरण भाग

1. सधि
2. समास
3. उपसर्ग
4. प्रत्यय
5. विलोम
6. पर्यायवाची
7. शुद्धिकरण शब्द एवं वाक्य
8. वाक्यांश
9. मुहावरे
10. कहावतें
11. शब्दयुग्म
12. अनेकाथी
13. परिभाषिक शब्दावली
14. तत्सम
15. तदभव
16. देश

सहायक ग्रन्थ : आधार पुस्तक: गद्य साहित्य और पद्य साहित्य

1. हिन्दी व्याकरण : कामना प्रसाद गुरु, किताब घर, दिल्ली
2. हिन्दी व्याकरण : डॉ. नरेन्द्र भानावत
3. हिन्दी व्याकरण : डॉ. वेंकट

ENL011: Environmental Studies

Unit-I

Introduction: the multidisciplinary nature of environmental, studies: Definition, scope and important need for public awareness

Unit-II

Natural Resources: Renewable and non-renewable resources, natural resources and associated problems. **Forest resources:** use and overexploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest, and tribal people

Water resources: use and overutilization of surface and groundwater, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: use and exploitation, environmental 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 needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual

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in conservation of natural sources. Equitable use of resources for sustainable lifestyles.

Unit-III

Concept of an eco system: Structure and function of an ecosystem. Producers, consumers and de-composers. Energy flow in the ecosystem Ecological succession Food chains, food webs and ecological pyramids Introduction, type, characteristic, features, structure and function of the following ecosystem: a. Forest eco system grassland eco system desert ecosystem Aquatic ecosystems (ponds, streams, lakes)

Unit- IV

Bio diversity and its conservation Introduction definition: genetic, species and ecosystem diversity. Bio Geographically classification

of India. Value of biodiversity: Consumptive use, productive use, social, ethical, aseptic and option values Biodiversity at global, National and local levels. India as a megadiversity nation Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts Endangered and endemic species of India Conservation of biodiversity: in-situ and Ex-situ conservation of biodiversity.

Unit-V

Disaster Management & Environmental Pollution Disaster: Types – Natural and Manmade; Detailed study of the following – Earthquakes, Volcanic eruption, Landslides, Flood, Drought, Fire, Nuclear and Chemical disaster and their management. Causes, effects and control measures of Air pollution Water pollution Soil Pollution Marine pollution Noise pollution Thermal pollution Radioactive Pollution

Unit- VI

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 Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wild life protection Act. Forest conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Road and safety measures.

Unit-VII

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

CSL011: Computer Fundamentals

1.Introduction to Information Technology: evolution and generation of computers, types 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. Development of Super Computers in India "PARAM": History, Characteristics, Strength, Weakness and basic Architecture.

2.Number system: Binary, octal, decimal and hexadecimal) and their inter-conversions, character codes (ASCII, EBCDIC and Unicode). Logic gates. Boolean Algebra, machine, assembly and high level language including 3 GL and 4GL

3.Concept of Operating system: types of operating systems, need of OS, batch processing, multiprocessing, Single user & Multi user OS, distributed and time sharing operating systems, Process and memory management concept, Introduction to Unix, Linux, Windows, Windows NT systems and their simple commands.

4.Internet: Concepts, email services, world wide web, web browsers, search engines. Exploring various Citizen-centric services of Govt. of India such as Income Tax Services, Passport Seva, ticket Booking (IRCTC & RSRTC), National Voters Service Portal, LPG service.

5.Word processing packages:

standard features like tool bar, word wrap, text formatting, paragraph formatting. Effects to text, Mail-merge.

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6.Presentation packages: Slide creation, slide shows, adding graphics, formatting, customizing and printing custom and animation.

7.Computer networking: Type of networks, LAN, MAN and WAN, concept of bridges and routers, gateways and modems. ISDN and leased lines, Teleconferencing and videoconferencing.

8.Multimedia Technology: Introduction, framework for multimedia devices, image compression standards, JPEG, MPEG and MIDI formats.

9.Database Management Systems: Data, field and records, information database, creation of a database file, insertion, deletion and updating of records, modifying structure, editing and browsing of records, searching sorting and indexing of records, retrieving of records and report generation. Data processing in government organizations.

10.E-commerce: Concept of e-commerce, benefits and growth of e-commerce, security considerations and hazards of virus and other security risks, antivirus software, electronic payment system. E-Commerce: An Indian perspective, Digi locker, attendance gov.in, mygov.in, Swachh Bharat Mission, E-Hospital, National Scholarship portal, E-Sampark, UID, various modes of Digital payment of govt. of India

CHL011-I: Inorganic Chemistry

Unit-I Atomic Structure

Idea of De Broglie matter wavs, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2 , quantum numbers, radial and angular wave function and probability distribution curves, shapes of s, p, d, orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, Effective nuclear charge. Periodic Properties Atomic and ionic radii, ionization energy, electron affinity and electronegativity-definition, methods of determination or evaluation, trends in periodic table and application in predicting and explaining the chemical behaviour.

Unit –II Chemical Bonding

Covalent Bond- Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization 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 and H_2O .

MO Theory: Homonuclear and heteronuclear (CO and NO) diatomic molecules, multi-center bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Unit -III

Ionic Solids- Ionic Structures: radius ratio effect and coordination number, limitations of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber Cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions. Fajan's rule. Metallic

bond -free electron, valence bond and bond theories. Weak Intearactions-Hydrogen bonding, van der waals forces

Unit -IV

s-Block Elements Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls. Chemistry of Noble Gases Chemistry of the noble gases. Chemistry of xenon. Structure and bonding in xenon comp p-Block Elements Comparative study (including diagonal relationship) of groups, 13-17 elements compounds like hydrides, oxides, oxyacids and halides of groups 13-16.

Unit -V

Chemistry of the following compounds:

Hydrides of Boron -diborane and higher boranes, borazine, borazoles, fullerenes, carbides, fluorocarbons, silicates, structure principle, tetra sulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

Book Suggested:

1. Concise Inorganic Chemistry: J.D. Lee
2. General Inorganic Chemistry: J.A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry: B.R. Puri and L.R. Sharma

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4. Basic Inorganic Chemistry: F.A. Cotton and G. Wilkinson, Wiley Eastern
5. Molecular Geometry: R.J. Gillespie, Van Nostrand Reinhold

CHL011-II: Organic Chemistry

Unit –I

Structure and Bonding

Hybridization, bond lengths and bond angles. bond energy, localized and delocalized chemical bond, vander waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding. Mechanism of Organic Reactions Curved arrow notation, drawing electron movements with arrows, half headed and double headed arrow, homolytic and heterolytic bond breaking. Types of reagents, electrophiles and nucleophiles. Types of organic reactions, Energy considerations. Reactive intermediates carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (With examples). Assigning formal charges on intermediates and other ionic species. 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. Optical isomerism: elements of symmetry, molecular chirality enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers. meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration: sequence rules, D&L and R&S systems of nomenclature.

Geometric isomerism: determination of configuration of geometric isomers, E&Z systems of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism: conformational analysis of ethane and n-butane. conformations of cyclohexane, axial and equatorial bond, conformation of mono substituted cyclohexane derivatives. Newmann projection and sawhorse formulae, Difference between configuration and conformation.

Unit-III

Alkanes and Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reactions, Corey House reaction and decarboxylation of carboxylic acids) Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. Cyclo-alkanes nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations, Ring strains in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.

Unit-IV

Alkenes, Cycloalkenes, Dienes and alkynes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity

in alcohol dehydration The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof'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. Industrial applications of ethylene and propene. Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1,2- and 1,4- additions, Diels-alderreaction. Nomenclature, structure and bonding in alkynes.

Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal ammonia reductions, oxidation and polymerizations.

Unit-V

Arenes, Aromaticity, Alkyl & Aryl Halides

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain structure of benzene: molecular formula and Kekule structure Stability. Aromaticity: the Huckle's rule, aromatic ions. Aromatic electrophilic substitution-general pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation,

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mercuration and Friedel Crafts reaction, energy profile diagrams. Activating & deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides, SN₂ and SN₁ 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 mechanism of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl vs allyl, vinyl and aryl halides. Synthesis and use of D.D.T. and B.H.C

Book Suggested:

1. A Text Book of Organic Chemistry: K.S. Tiwari, S.N. Mehrotra and N.K. Vishnoi
2. Modern Principles of Organic Chemistry: M.K. Jain and S.C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I&II) O.P. Agarwal
4. A Text Book of Organic Chemistry: P.L. Soni
5. Organic Chemistry: (Vol. I,II & III) S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd.
6. Organic Chemistry: Morrison & Boyd, Prentice Hall

CHL011-III: Physical Chemistry

Unit-I

Mathematical Concept and Computers

(a) Mathematical Concepts

Logarithmic relations, curve sketching, linear graphs and calculations of slopes differentiation of functions like $kx, ex, xn, \sin x, \log x$; maxima and minima, partial differentiation and reciprocity relations, integrations of some useful/relevant functions: Permutations and combinations. Factorials. Probability.

(b) Computers

General introduction to computers, different components of a computer, hardware and software input output devices; binary numbers and arithmetic; introduction to computer languages. Programming, operating systems.

Unit II

Gaseous States Postulates of kinetic theory of gases, deviation from ideal behaviour, vander waals equation of state. Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of vander Waals equation, relationship between critical constants and vander waals constants, the law of corresponding states, reduced equation of state. Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussions 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

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. 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 liquids (emulsions): types of emulsions, preparation. Emulsifier. Liquids in solids (gels): classification, preparation and properties inhibition, general applications of colloids.

Unit IV

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. X-ray diffraction by crystals. Derivation of Bragg's equation Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method.)

Unit V

Chemical Kinetics and Catalysis

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 period.

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Determination of the order of reaction: 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 concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Catalysis, characteristics of catalysed reactions, classification of catalysis, miscellaneous examples.

Book Suggested:

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2. Modern Principles of Organic Chemistry: M.K. Jain and S.C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I&II) O.P. Agarwal
4. A Text Book of Organic Chemistry: P.L. Soni
5. Organic Chemistry: (Vol. I,II & III) S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd.
6. Organic Chemistry: Morrison & Boyd, Prentice Hall

CHP011-CHEMISTRY PRACTICAL

Inorganic Chemistry:

Semi-micro / macro Analysis:

1. Anion analysis (3 radicals).
2. Cation analysis: Separation and identification of ions from groups I, II, III, IV, V and VI (3 radicals).

Organic Chemistry:

Laboratory Techniques:

Section-A

1. Determination of melting point:-
 - Naphthalene 80-82°C, Benzoic acid 121.5-122 °C, Urea 132.5- 133°C, Succinic Acid 184.5-185°C, Cinnamic acid 132.5-133°C, Salicylic acid 157.5-158°C, Acetanilide 113.5-114°C, m-Dinitrobenzene 90°C, p-Dichlorobenzene 52°C, Aspirin 135°C.
2. Determination of boiling points:-
 - Ethanol 78°C, Cyclohexane 81.4°C, Toluene 110.6°C, Benzene 80°C
3. Determination of mixed melting point:-
 - Urea-Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1)
4. Distillation
 - Simple distillation of ethanol-water, using water condenser or Distillation of nitrobenzene and aniline using air condenser
5. Crystallization
 - Concept of induction of crystallization
 - Phthalic acid from hot water (using fluted filter paper and stemless funnel)
 - Acetanilide from boiling water.
 - Naphthalene from Ethanol.
 - Benzoic acid from water.
6. Decolorisation and crystallization using charcoal
 - Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration.
 - Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g. of Congo Red using 1.0g decolorising carbon) from ethanol.
7. Sublimation (Simple and vacuum)
 - Camphor, Naphthalene, Phthalic acid and Succinic acid.

Section-B

Qualitative Analysis:

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Detection of extra elements (N, S and halogens) and functional groups (phenolic, carboxylic, carbonyl, ester, carbohydrates, amine, amide, nitro and anilide) in simple organic compounds.

Physical Chemistry:

1. Chemical Kinetics

- To determine the specific reaction rate of the hydrolysis of methyl acetate / ethyl acetate catalyzed by hydrogen ions at room temperature.
- To study the effect of acid strength on the hydrolysis of an ester.
- To compare the strengths of HCl and H₂SO₄ by studying the kinetics of hydrolysis of ethyl-acetate.
- To study kinetically the reaction of decomposition of iodide by H₂O₂

2. Distribution Law

- To study the distribution of iodine between water and CCl₄
- To study the distribution of benzoic acid between benzene and water.

3. Colloids

- To prepare arsenious sulphide sol and compare the precipitating power of mono-, bi- and trivalent anions.

4. Viscosity, Surface Tension

- To determine the percentage composition of a given, mixture (non interacting systems) by viscosity method.
- To determine the viscosity of Amyl alcohol in water at different concentrations and calculate the viscosity of these solutions.
- To determine the percentage composition of a given binary mixture by surface tension method (acetone & ethyl-ketone).

Books suggested :

1. Practical Chemistry: Giri Bajpai and Pandey, S. Chand & Co. Ltd., New Delhi

BOT011-I : Diversity of Microbes and Cryptogams (Thallophyta)

Unit-I

Viruses and Bacteria: General account of viruses and mycoplasma, bacteria-structure, nutrition. reproduction and economic importance, General account of Cyanobacteria, economic importance, Nostoc, Oscillatoria.

Unit-II

Algae: General Characters, classification and economic importance, important features and life history of chlorophyceae: Volvox, Oedogonium, Coleochaete, Chara.

Unit-III

Algae: General Characters, classification and economic importance, important features and life history of Xanthophyceae - Vaucheria, Phaeophyceae-Ectocarpus Sargassum, Rhodophyceae - Polysiphonia.

Unit-IV

Fungi: General characters, classification and economic importance; important features and life history of Mastigomycotina-Phytophthora Oomycotina-Albugo, Ascomycotina-Saccharomyces, Penicillium, Erysiphae, Basidiomycotina-Puccinia, Ustilago and Agaricus, Deuteromycotina-, Colletotrichum, Alternaria.

Unit-V

Plant diseases and General account of Lichens, special studies about green ear disease, white rust, Stem rust disease of Wheat, Smut disease, Citrus canker, Tobacco mosaic disease, Little leaf disease of brinjal.

BOT011-II : Diversity of Cryptogams (Bryophyta, Pteridophyta & Paleobotany)

UNIT-I

Bryophyta: General Characteristics and classification of bryophyte, economic importance and alternation of generation

UNIT-II

Structure, reproduction and economic importance of Hepaticopsida. Riccia, Marchantia, Porella, Anthocerotopsida-Anthoceros Bryopsida: Sphagnum, Polytrichum.

UNIT-III

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Pteridophyta: The first vascular land plant, types of steles, important characteristics of Psilopsida, Lycopsidea, Sphenopsida, and Pteropsida, classification of Pteridophyta

UNIT-IV

Structure and reproduction in Lycopodium, Selaginella, Equisetum, Adiantum and Marsilea.

Unit-V

Fossilization, Types of fossils, Techniques of fossil study, Geological time scale. General characters of Rhynia, Lepidodendron, Calamites, Cladoxylon in brief. Indian Gondwana System – Threefold division with major megafossil assemblages. Palynology: Spore and Pollen, Pollen aperture types, NPC classification (Erdtman). Pollen wall, Sporopollenin

BOT011-III : Cell Biology, Genetics & Plant breeding

UNIT-I

Membrane structure and function

The cell envelopes: Plasma membrane, bilayer lipid structure, membrane protein diffusion, osmosis, ion channels, active transport, membrane pumps, electrical properties of membranes functions of the cell wall, ultra structure of prokaryotic and eukaryotic cells. Structure and function of other organelles. Mitochondria, Golgi bodies, lysosomes, E.R. Peroxisomes, plastids, vacuoles. Structure and function of nucleus: Ultrastructure, nuclear membrane, nucleolus.

UNIT-II

Chromosome organization: Morphology, Centromere and telomere, chromosome alterations, deletion, duplication, translocation, inversion, variations in chromosome number, aneuploidy, polyploidy, sex chromosomes. DNA the genetic material; DNA structure, replication DNA, protein interactions, the nucleosome model, genetic code, satellite and repetitive DNA, cell division-Mitosis, Meiosis.

UNIT-III

Genetic Inheritance: Mendelian laws of segregation and independent assortment Linkage analysis, allelic and non allelic interaction. **Gene expression:** Structure of gene, transfer of genetic information, transcription, translation, protein synthesis: ribosomes, RNA; regulation of gene expression in prokaryotes, Lac operon.

UNIT-IV

Genetic Variations: Mutations, spontaneous and induced mutation. Extranuclear genome: presence and function of mitochondrial and plastid DNA, Plasmids.

UNIT-V

Plant Breeding: Methods of plant breeding selection (Mass, Pureline and clonal) introduction and acclimatization, Hybridization and hybrid vigour, inbreeding depression.

Books Recommended :

1. Atherly, A.G., Girton, J.R. and Mc Donald, J.F. 1999 The Science of Genetics
2. Saunders College Publishing, Fort Worth, U.S.A.
3. Gupta, P.K. 1999 A Text book of cell and Molecular Biology, Rastogi Publications, Meerut, India.
4. Russel, P.J. 1998 Genetics, Saunders College Publishing, Fort Worth, U.S.A.
5. Snustad, D.P. and Simmons, M.J. 2000 Principles of Genetics, John Wiley and Sons, Inc., U.S.A.
6. Gupta P.K. 1999. Genetics Rastogi Publications Meerut.
7. Vashistha, B.R. 1989, Algae, S. Chand and Co. Delhi.
8. Vashistha, B.R. 1989, Fungi, S. Chand and Co. Delhi.
9. Pandey S.N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Dehli
10. Pandey S.N. & others. 1995, A Text Book of Botany Vol. II, Vikas Publications Dehli

BOP011-BOTANY PRACTICAL

1. Microscopic preparations and study of the following algal material : Nostoc, Oscillatoria, Chlamydomonas, Volvox, Coleochaete, Oedogonium, Vaucheria, Chara, Ectocarpus Sargassum and Polysiphonia.
2. Staining of different types of Bacteria.
3. Study of some locally available plant diseases caused by Viruses. Mycoplasma, Bacteria and Fungi in field/laboratory- TMV, Little leaf of Brinjal. Citrus canker, Green ear disease of Bajra.
4. Study of External morphology and microscopic preparations of following Bryophytes : Riccia, Marchantia, Anthoceros, Sphagnum and Polytrichum.

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5. Microscopic examination of fossil slides, specimen/photograph-Rhynia, Lepidodendron Calamites and Cladoxylon.
6. Microscopic temporary, double stained preparations and study of stem/cone/sporocarp of Selaginella. Equisetum and Marsilea.

ZOL011-I Animal Diversity Part-I (Protozoa to Annelida)

Unit –I

Taxonomy: -

1. Classification of Protozoa, Porifera, Coelenterata, Platyhelminthes and Nematoda up to order with examples.
2. Fundamentals of body organization emphasizing symmetry, metamerism, coelome and levels of structural organization.

Unit –II

Protozoa: -

1. Study of structural organization and life history of Trypanosoma and paramecium.
2. Study of locomotion, osmoregulation, nutrition and reproduction in protozoa.
3. Parasitism, pathogenicity and control in protozoans with special reference to Entamoeba, Giardia, Leishmania, Trichomonas and Plasmodium.

Unit-III

1. **Porifera:** - Habit, habitat, structure and function of Sycon. Types of canal system.
2. **Coelenterata:** - Habit, habitat, structure, function and life history of Aurelia. Polymorphism in coelenterata, coral reef.
3. **Ctenophora** - Structural organization and affinities.

Unit IV

1. **Platyhelminthes:** - Structural organization and life history of Dugesia & Fasciola.
2. Parasitic adaptation in Helminthes.
3. **Nematyhelminthes:** - Study of structure and life history of Dracunculus medinensis Nematode parasites and human diseases.

Unit-V

1. Classification of Annelida (up to subclass); metamerism and coelome in Annelida General account and types of Annelida (earthworm)
2. Structural organization, Physiology & life history of Hirudinaria, Trochophore larva.

ZOL011-II Genetics and Biotechnology

Unit-I

1. **Mendelian Genetics:** - Mendel's laws of inheritance. Monohybrid and dihybrid cross. Dominance. Incomplete dominance. Current status of Mendelism.
2. Genetic variation: Variation in chromosome number (Euploidy and Aneuploidy).

Unit-II

1. Genetic disorders in Human beings: Down's, Turner's, Klinefelter's and Edward's syndrome.
2. Types of chromosomal mutations. Molecular basis of gene mutation, mutagens, crossing over and linkage.
3. Polytene and lamp-brush chromosomes.
4. Extra Chromosomal Inheritance

Unit- III

1. Sex-determination XX-XY. XO-XY and WZ mechanisms.
2. Sex-linked inheritance (X-and Y-linked) Color blindness, Hemophilia
3. Gene interactions. Supplementary, complementary, epistasis and inhibitory. Multiple allele-ABO, Rh and MN blood groups and their inheritance, polymorphic genes.

Unit-IV

1. Gene structure (Recon, muton, cistron) and regulation of gene (lac operon: inducible and repressible system).
2. Bacterial genetics: Transformation, Transduction and conjugation. Lytic and lysogenic cycle. Elementary idea about eugenics. Elementary idea about genetic engineering.
3. Gene cloning and recombinant DNA technology (Vectors for gene transfers. Plasmids and phages). Restriction enzymes.

Unit V

1. Introduction: Historical prospective animal cell hybridoma, major areas and future prospects of biotechnology.

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2. Medicines and Biotechnology: Microbes in medicine, antibiotics, vaccine, antibodies, antigens
3. Environmental Biotechnology: Use of micro-organisms in metal and petroleum recovery pest control. Waste treatment, Processing of industrial waste. Degradation of Xenophobic compounds including pesticides and surfactants. Surfactants, Surfactants and oil pollutants, Food and drink biotechnology, Ferment food dairy products. Food preservation microbial spoilage, alcoholic beverages, Vinegar. Monoclonal antibodies and their applications.

ZOL011-III Cell Biology, Biochemistry and Microscopy

Unit-I

1. Introduction, Discovery of cell, cell theory, golden period of cytology, prokaryotic and eukaryotic cell characteristics of animal cell.
2. Protoplasm:- History, physical characters, colloidal property, chemical composition and Biological characters of protoplasm.
3. Cell organelles: - Structure chemical composition and functions of plasma membrane, endoplasmic reticulum, Golgi apparatus, lysosome ribosome, mitochondria, nucleus and nucleolus.

Unit- II

1. Mitosis: - cell cycle, mitotic apparatus, centriole aster, and significance, Amitosis
2. Meiosis: - Introduction, meiotic cycle, synapses of chromosomes, crossing over mechanism, Initiation and control of meiosis, significance.
3. Gametogenesis: - Introduction, spermatogenesis and oogenesis significance, Structure of Sperm and Ovum

Unit III

1. Nucleic Acid: - Chemistry, Molecular model, Duplication, properties and functions of DNA, Types of RNA, Nucleic Acid as Genetic material.
2. Nucleic Acid synthesis: - Synthesized DNA, RNA biosynthesis of DNA and RNA. Genetic code, transcription and translation.
3. Protein synthesis: - Genetic code, transcription, translation, Role of RNA,
4. Mechanism of protein-synthesis, Regulation of protein synthesis.

Unit –IV

1. Cell chemistry: - Nomenclature, classification, Action theory and specificity of Enzyme, enzyme activator, inhibitor, regulation and control of enzyme activity.
2. Cell metabolism: - Anabolic and catabolic process, metabolism of protein, carbohydrates and fats, ketone bodies.
3. Energy cycle: - Anaerobic and aerobic respiration, Energy transfer, redox, cytochrome-system.

Unit-V

1. Microscopy & cytological techniques: - Introduction, types of microscopes.
2. Autoradiography.
3. Isolation of cell components.

Text Book:

1. R.L. Kotpal "Invertebrates"
2. E.L. Jordan and Dr. P.S. Verma "Invertebrate Zoology" S. Chand Publication
3. Veer Bala Rastogi "Genetics" Rastogi Publication
4. P.S. Verma and V.K. Agrawal "Cell Biology and Genetics" S. Chand

Reference Books:

1. Benjamin Pierce, "Genetics A Conceptual Approach" 2nd edition
2. B.D. Singh, "Biotechnology Expanding Horizon" Kalyani Publication

ZOP011-ZOOLOGY PRACTICAL

1. General survey of Invertebrate (Spot & Slides)
 - (a) **Protozoa:** - Entamoeba, Polystomella, Monocystis, Euglena, Noctiluca Leismania, Nyctotherus, Paramecium, Vorticella.
 - Porifera:-** Sycon, Hyalonema, Euplectella, Spongilla and Euspongia.
 - Coelenterate:-** Obelia colony (polyp & medusa) Physalia, Porpita, Aurelia, Rhizostom, Alcyonium, Corallium, Gorgonia, Pennatula, Madrepora.

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Platyhelminthes:- Dugesia, Fasciola, Taenia, Schistosoma.

Nematode:- Filaria, Dracunculus, Wuchereria, Enterobius

Annelida:- Nereis (Heroneries with parapodia) Aphrodite, Arenicola, Pontobdella, Hirudinaria, Peripatus.

(b) **Study of TS/LS of organs & developmental stages.** (i) Porifera: - T.S. of Sycon. (ii) Coelenterata- Planula larva of jelly fish. (iii) Platyhelminthes- T.S of Fasciola, scolex of Taenia, mature & gravid segment of Taenia, Hexacanth, bladderworm & cysticercus stage of Taenia, miracidium, sporocyst, redia, cercaria larva of Fasciola. (iv) Annelida- T.S through different region of leach & Nereis. Parapodia of Nereis and Heteronereis, trochophore larva.

(c) **Dissection Through chart / model / Photograph / CD. –**

Hirudinaria – Morphology, general anatomy, digestion, nervous & excretory and reproductive system. Earthworm – Anatomy, morphology, digestive and nervous system.

(d) **Mounting- (Permanent)**

Protozoa – Euglena, Paramecium, Polystomela Porifera- Spicules, fibres, gemmule Coelenterata- Obelia medusa Platyhelminthes – Taenia (proglotid) Annelida – Nereis (parapodia)

2. Genetics:

- Drosophila – life cycle and its culture.
- Identification of male and female and wild and mutants (yellow. Ebony body. Vestigial wings. White-eye and vestigial wings).
- Prepare slides of sex combs and salivary gland chromosomes of Drosophilae.
- Barr body of human chromosomes.
- Identification of blood group (ABO and Rh factors).
- Simple problems based on monohybrid / dihybrid cross.

3. Tests: - Biochemistry

- Protein
- Fat
- Carbohydrate
- Catalases enzyme in animal tissue

4. Cell Biology

- Cell permeability
- Acetocarmin preparation of mitotic activity
- Demonstration of mitochondria by using vital stain.
- Demonstration of Bacteria by using Gram's stain.

Note- Animals used in dissection are subject to the condition that these are not banned under the wild life protection act.

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