

PROGRAMME GUIDE

DISTANCE EDUCATION PROGRAMMES

BACHELOR OF SCIENCE (B. Sc.) -BIO

- **Scheme of Examination**
- **Detailed Syllabus**



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BACHELOR OF SCIENCE (B.Sc.) –BIOLOGY GROUP

Duration : 36 Months

 Eligibility : 12th Pass from Science Subjects

New Proposed Scheme of Examination

Course Code	Name of the Course	Credit	Total Marks	Theory		Practical Marks		Assignments	
				Max	Min	Max	Min	Max	Min
First Semester									
1BSC1	Hindi Language Structure - I	2	50	35	12	-	-	15	5
1BSC2	Entrepreneurship Development	2	50	35	12	-	-	15	5
1BSC3	Botany-I	4	150	70	23	50	17	30	10
1BSC4	Chemistry-I	4	150	70	23	50	17	30	10
1BSC5	Zoology-I	4	150	70	23	50	17	30	10
	Total	16	550	280	101	150	54	120	43
Second Semester									
2BSC1	English Language and Indian Culture	2	50	35	12	-	-	15	5
2BSC2	Development of Entrepreneur	2	50	35	12	-	-	15	5
2BSC3	Botany-II	4	150	70	23	50	17	30	10
2BSC4	Chemistry-II	4	150	70	23	50	17	30	10
2BSC5	Zoology-II	4	150	70	23	50	17	30	10
	Total	16	550	280	101	150	54	120	43
Third Semester									
3BSC1	Hindi Language aur Samvedana	2	50	35	12	-	-	15	5
3BSC2	Environmental Studies	2	50	35	12	-	-	15	5
3BSC3	Botany-III	4	150	70	23	50	17	30	10
3BSC4	Chemistry-III	4	150	70	23	50	17	30	10
3BSC5	Zoology-III	4	150	70	23	50	17	30	10
	Total	16	550	280	101	150	54	120	43
Fourth Semester									
4BSC1	English Language and Scientific Temper	2	50	35	12	-	-	15	5
4BSC2	Environmental Study	2	50	35	12	-	-	15	5
4BSC3	Botany-IV	4	150	70	23	50	17	30	10
4BSC4	Chemistry-IV	4	150	70	23	50	17	30	10
4BSC5	Zoology-IV	4	150	70	23	50	17	30	10
	Total	16	550	280	101	150	54	120	43
Fifth Semester									
5BSC1	Hindi Language (Bhasha Kaushal aur Sanchar Sadhan)	2	50	35	12	-	-	15	5
5BSC2	Computer & Information Technology Basics-I	2	100	35	12	50	17	15	5
5BSC3	Botany-V	4	150	70	23	50	17	30	10
5BSC4	Chemistry-V	4	150	70	23	50	17	30	10
5BSC5	Zoology-V	4	150	70	23	50	17	30	10
	Total	16	600	280	101	200	72	120	43
Six Semester									
6BSC1	English Language and Aspects of Development	2	50	35	12	-	-	15	5
6BSC2	Computer & Information Technology Basics-II	2	100	35	12	50	17	15	5
6BSC3	Botany-VI	4	150	70	23	50	17	30	10

6BSC4	Chemistry-VI	4	150	70	23	50	17	30	10
6BSC5	Zoology-VI	4	150	70	23	50	17	30	10
Total		16	600	280	101	200	72	120	43

Evaluation Scheme

1. 33% in each theory papers, practical, project-work dissertation & Assignments.
2. Aggregate marks to pass will be 36% including the theory papers, practical, project-work dissertation & Assignments.

DETAILED SYLLABUS FOUNDATION COURSE - PAPER I HINDI LANGUAGE STRUCTURE – I

इकाई-1

भारत वंदना (काव्य)	सूर्यकांत त्रिपाठी 'निराला'
जाग तुझको दूर जाना	सुश्री महादेवी वर्मा
स्वतंत्रता पुकारती (काव्य)	जयशंकर 'प्रसाद'
हम अनिकेतन (काव्य)	बालकृष्ण शर्मा 'नवीन'
भाषा की महत्ता और उसके विविध रूप	
भाषा-कौशल	

इकाई-2

करुणा (निबंध)	आचार्य रामचन्द्र शुक्ल
समन्वय की प्रक्रिया (निबंध)	रामधारी सिंह 'दिनकर'
बिच्छी बुआ (कहानी)	डॉ. लक्ष्मण विष्ट 'बटरोही'
अनुवाद	परिभाषा प्रकार, महत्व, विशेषताएं
हिन्दी की शब्द-संपदा	
परिभाषिक शब्दावली	

इकाई-3

विलायत पहुंच ही गया (आत्मकथांश)	महात्मा गांधी
अफसर (व्यंग्य)	शरद जोषी
तीर्थयात्रा (कहानी)	डॉ. मिथिलेश कुमार मिश्र
मकड़ी का जाला (व्यंग्य)	डॉ. रामप्रकाश सक्सेना
वाक्य-संरचना: तत्सम, तद्भव देशज विदेशी	

इकाई-4

अप्प दीपो भव (वक्तृत्व कला)	स्वामी श्रद्धानंद
भारत का सामाजिक व्यक्तित्व (प्रस्तावना)	जवाहरलाल नेहरू
पत्र मैसूर के महाराजा को (पत्र-लेखन)	स्वामी विवेकानंद
बनी रहेंगी किताबें (आलेख)	डॉ. सुनीता रानी घोष
पत्र-लेखन: महत्व और उसके विविध रूप	
सड़क पर दौड़ते ईहा मृग (निबंध)	डॉ. श्यामसुन्दर दुबे

इकाई-5

योग की शक्ति (डायरी)	डॉ. हरिवंशराय बच्चन
कोश के अखाड़े में कोई पहलवान नहीं उतरता (साक्षात्कार)	भाषाविद् डॉ. हरदेव बाहरी से प्रो. त्रिभुवननाथ शुक्ल
नीग्रो सैनिक से भेंट (यात्रा-संस्मरण)	डॉ. देवेन्द्र सत्यार्थी
यदि बा न होती तो शायद गांधी को	गिरिराज किशोर से सत्येन्द्र शर्मा
यह ऊँचाई न मिलती (साक्षात्कार) 5 कथाकार	
सर-लेखन, भाव-पल्लवन साक्षात्कार और कौशल	

FOUNDATION COURSE - PAPER II

ENTREPRENEURSHIP DEVELOPMENT

Unit-I

Entrepreneurship-

Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.

Unit-II

Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of self confidence.

Communication skills, Capacity to influence, leadership.

Unit-III

Project Report- Evaluation of selected process. Detailed project report - Preparation of main part of project report pointing out necessary and viability.

Selecting the form of Organization: Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organization.

Economic management -Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, keeping of accounts.

Unit IV

Production management - Methods of purchase. Management of movable assets/goods. Quality management. Employee management. Packing.

Marketing management Sales and the art of selling. Understanding the market and market policy. Consumer management. Time management.

Unit-V

Role of regulatory institutions - district industry centre, pollution control board, food and drug administration, special study of electricity development and municipal corporation.

Role of development organizations, khadi & village Commission/ Board, State Finance Corporation, scheduled banks, MP Women's Economics Development Corporation.

Self-employment-oriented schemes, Prime Minister's Employment schemes, Golden Jubilee Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self-employment scheme.

Various grant schemes - Cost-of-Capital grant, interest grant, exemption from entry tax, project report, reimbursement grant, etc.

Special incentives for women entrepreneurs, prospects & possibilities.

Schemes of Tribal Finance Development Corporation, schemes of Antyavasai Corporation, schemes of Backward Class and Minorities Finance Development Corporation.

CHEMISTRY-I

Unit I

A. Mathematical Concepts : Logarithmic relations, curves stretching, linear graphs and calculation of slopes, Differentiation of functions like Kx , ex , xn , $\sin x$, $\log x$; maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions; permutations and combinations. Factorials, Probability.

B. Gaseous States : Deviation from ideal behaviour, van der Waals equation of state. Critical phenomenon : PV isotherms of ideal gases, continuity of states, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of states.

Unit II

A. Liquid State : Intermolecular forces, structure of liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

B. 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 III

Chemical Kinetics : Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction concentration, temperature, pressure, solvent, light and catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions- zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction - differential method, method of integration, method of half life period and isolation method.

Experimental methods of chemical kinetics - conductometric, potentiometric, optical methods- polarimetry and spectrophotometry. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis) Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Unit IV

A. Structure and Bonding : Hybridizations, Bond lengths and bond angles, bond energy : Localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

B. Mechanism of Organic reactions : Curved arrow notations, drawing electron movements with arrows, half-headed and double headed arrows, homolytic and heterolytic bond breaking.

C. Types of Reagents : Electrophiles and nucleophiles. Types of organic reactions. Energy consideration. Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Methods of determination of reaction mechanism.

Unit V

A. Stereochemistry : Concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centres, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configurations, sequence rule, D & L , R & S systems of nomenclature. E and Z

system of Nomenclature geometrical isomerism in alicyclic compounds. Conformation, conformational analysis of ethane and n-butane. Conformations of cyclohexanes, axial and equatorial bonds, Newman projection and Sawhorse formulae, Fischer and Flying wedge formulae.

Practical- Chemistry

Class : B.Sc. Semester I

Duration of practicals during the entire semester : 90 hours

Duration of practical during the semester examination : 4 hours

Physical Chemistry

A. (Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Calibration of thermometer
2. Determination of melting point
3. Determination of boiling point
4. Determination of mixed melting point
5. Preparation of solutions of various concentrations, NaOH, HCl, H₂SO₄.

B. (Any one experiment will be asked in examination form the following carrying 12 Marks)

1. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To compare the strength of HCl and H₂SO₄ by studying the kinetics of hydrolysis of ester.
4. To study kinetically the reaction rate of decomposition of iodide by H₂O₂.
5. Determination of surface tension / percentage composition of given organic mixture using surface tension method.
6. Determination of viscosity / percentage composition of given organic mixture using viscosity method.

Organic chemistry

(Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Distillation
2. Crystallization
3. Decolourisation and crystallization using charcoal
4. Sublimation

Viva: 6 marks

Records: 8 marks

B.SC. SEMESTER I

ZOOLOGY

INVERTEBRATE AND CELL BIOLOGY

Unit-1

Classification of Non Chordates upto classes according to Parker and Heswell.(7th Edition)

1. Classification of lower Invertebrates.
2. Classification of higher invertebrates.
3. Protozoa – Type study of Plasmodium.
4. Porifera – Type study of Sycon.

Unit-2

1. Coelenterata – Type study of Obelia.
2. Helminthes – Type study of Liver Fluke.
3. Annelida – Type study of Earthworm, Metamerism, Trochophore Larva.

Unit-3

1. Arthropoda – Type study of Prawn.
2. Mollusca – Type study of Pila.
3. Echinodermata – External Features of Star Fish and Echinoderm Larvae.

Unit-4

1. The cell – History of Cell Biology, Cell theory, Prokaryotic and Eukaryotic cell.
2. Microscopy : Compound and Electron Microscopy.

Unit-5

1. Nuclear Organization of cell.
2. Extra nuclear organization of cell.
3. Cell reproduction – Amitosis, mitosis, meiosis.

PRACTICALS – ZOOLOGY-I

The Practical's work will be based on theory syllabus and the candidates will be required to show knowledge of the following –

1. Study of Museum Specimens, slides relevant to the type study in theory
2. Mounting (Temporary)
 - a. Mouth parts of insects
 - b. Statocyst of Prawn
 - c. Ctenidium and Osphradium of Pila
 - d. Scales of Teleost fish
 - e. Mounting Material

3. Major Dissection

- a. Earthworm: Digestive system, nervous system and reproductive system.
- b. Cockroach : Digestive system, Nervous system, ..
- c. Prawn : Nervous System, Appendages.

4 Minor Dissection

- a. Hastate plate and appendages of Prawn.
- b. Salivary glands of Cockroach.
- c. Radula of Pila.

5. Cell Biology

- a. Study of Prokaryotic and eukaryotic cell.
- b. Study of DNA and RNA models.
- c. Squash preparation of chromosomes from onion root tip.
- d. study of meiosis in grasshopper testis.

PRACTICAL MARKS DISTRIBUTION

1. Major Dissection 8
 2. Minor Dissection 4
 3. Mounting 3
 4. Spotting (Representative of Each phylum) 10
 5. Cytological exercise (any two) 10
 6. Viva 5
 7. Record & Collection 10
- Total 50

BOTANY-I

DIVERSITY OF MICROBES AND CRYPTOGAMS

Unit-1 Viruses, Mycoplasma and Bacteria : characteristics of viruses and mycoplasma, general account of TMV and T4 bacteriophage. Bacterial structure, nutrition, reproduction and economic importance; general account of Cyanobacteria.

Unit-2 Algae : General characters, classification and economic importance; important features and life history of Chlorophyceae- volvox, oedogonium, Charophyceae-chara Xanthophyceae - vaucheria, Phaeophyceae - ectocarpus, sargassum, Rhodophyceae - polysiphonia.

Unit-3 Fungi: general characters, classification and economic importance, important features and life history of Mastigomycotina- Phytophthora, Zygomycotina-Mucor. Asco mycotina : Aspergillus, Peziza, Basidomycotina - puccinia, Deuteromycotina- Cercospora, Colletotrichum, general account of lichens.

Unit-4 Bryophyta : classification, study of morphology, anatomy, reproduction of Hepaticopsida Riccia, Marchantia, Anthocerotopsida Anthoceros, Bryopsida- Polytrichum

Unit-5 Pteridophyta : Important characters and classification. Stelar organization. Morphology and anatomy of Rhynia. Structure, anatomy and reproduction in Lycopodium, Selaginella, Equisetum and Marsilea.

PRACTICAL WORK : BOTANY-I

PRACTICAL MARKS DISTRIBUTION

Algae / Fungi 05

Brophyta 10

Pteridophyta 10

Plant disease 05

Spotting 10

Sessional 10

Total 50

SEMESTER-II

FOUNDATION COURSE - PAPER I

ENGLISH LANGUAGE AND INDIAN CULTURE

UNIT – I

1. Amalkanti : Narendranath Chakrabarti
2. Sita : Toru Dutt
3. Tryst with Destiny : Jawaharlala Nehru
4. Delhi in 1857 : Mirza Ghalib
5. Preface to the Mahabharata : C., Rajagopalachari
6. Where the Mind is Without Fear : Rabindranath Tagore
7. A Song of Kabir : Translated by Tagore
8. Satyagraha : M.K. Gandhi
9. Toasted English : R.K. Narayan
10. The Portrait of a Lady : Khushwant Singh
11. Discovering Babasaheb : Ashok Mahadevan

Unit – II Comprehension

Unit – III Composition and Paragraph Writing (Based on expansion of an idea).

Unit – IV Basic Language Skills : Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, Speech Skills.

Unit – V Basic Language Skills : Grammar and usage – The Tense Forms, Propositions, Determiners and Countable/Uncountable Nouns, Verb, Articles, Adverbs.

FOUNDATION COURSE - PAPER II

DEVELOPMENT OF ENTREPRENEURSHIP

Unit - I Entrepreneurship – Meaning, Concept, Characteristics of entrepreneur.

Unit – II Types of entrepreneurship, importance and views of various thinkers (Scholars).

- Formation of goals, How to achieve goals.
- Problems in achieving targets and solution.
- Self motivation, elements of self motivation and development
- Views of various scholars, evaluation, solutions.

Leadership capacity : Its development and results.

Unit – III Projects and various organizations (Govt., non-Govt), Govt. Projects, Non-Govt.projects.

Contribution of Banks, their limitations, scope.

Unit – IV Functions, qualities, management of a good entrepreneur.

Qualities of the entrepreneur (Modern and traditional).

Management skills of the entrepreneur.

Motive factors of the entrepreneur.

Unit – V Problems and Scope of the Entrepreneur:

- Problem of Capital
- Problem of Power
- Problem of registration
- Administrative problems
- Problems of Ownership.

CHEMISTRY-II

Unit I

A. Atomic Structure : Idea of de Broglie's matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of ψ and ψ^2 , quantum numbers, radial and angular wave functions and probability distribution curves, effective nuclear charge.

B. Periodic Properties : Atomic and ionic radii, ionization energy, electron affinity and electronegativity : definition, method of determination, trends in periodic table and applications.

C. Chemical Bonding : Covalent bond- valence bond theory and its limitations, directional characteristic of covalent bond. Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH_3 , SF_4 , ClF_3 , ICl_2 - and H_2O .

Unit II

A. Molecular Orbital theory for homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and the bond energy, % ionic character from dipole moment and electronegativity difference. Weak interactions, hydrogen bonding, van der Waals forces.

B. Ionic Solids : Ionic structures , radius ratio effect and coordination number, limitation of radius ratio rule, Lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions. Fajan's rule, Metallic bond, free electron, Valence bond and Band theories.

C. Noble Gases : Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

Unit III

A. s-Block Elements : Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

B. p-Block Elements : Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16.

Hydrides of boron-diborane and higher boranes. Borazine, borohydrides. Fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens.

Unit IV

A. Arenes and Aromaticity : Nomenclature of benzene derivatives. The aryl group, Aromatic nucleus and side chain structure of benzene, molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure. MO picture. Aromaticity the Huckel rule, aromatic ions. Aromatic electrophilic substitution, general pattern of the mechanism, role of s and p complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. Methods of formation and chemical reactions of alkylbenzenes and biphenyl.

Unit V

A. Cycloalkenes, Dienes and alkynes : 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-Alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidation and polymerization.

B. Alkyl and Aryl Halides : Nomenclature and classes of alkyl halides, methods of formation, chemical reactions; mechanisms of nucleophilic substitution reaction of alkyl halides, SN2 and SN1 reactions with energy profile diagrams.

Chemistry Practical

Max. Marks 50

Duration of practicals during the entire semester : 90 hours

Duration of practical during the semester examination : 4 hours

Inorganic chemistry

Inorganic mixture analysis 12 Marks

Macro/Semi-micro Analysis- Cation analysis, separation and identification of ions from

group I-VI, anion analysis

Separation of cations by paper chromatography. 4 marks

Preparation of ferrous alum. 8 marks

Organic Chemistry: (12 marks)

1. Detection of elements (N, S and halogens) 2 elements, 4 marks

2. Functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and aniline) in simple organic compounds.

2 functional groups: 8 marks

Viva: 6 marks

Records: 8 marks

ZOOLOGY-II

VERTEBRATES & DEVELOPMENTAL BIOLOGY

Unit-1

1. Origin of Chordates. Classification of phylum Chordata upto orders according to Parker and Haswell (Latest edition).

2. Hemichordata – External features and affinities of Balanoglossus.

Unit-2

1. Urochordata – Type study of Herdmania (excluding Development).

Cephalochordata – Type study of Amphioxus. Affinities of Amphioxus.

Unit-3

1. Comparison between Petromyzon and Myxine.

2. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals).

Unit-4

1. Parthenogenesis.

2. Gametogenesis.

3. Fertilization, Patterns of cleavage

Unit-5

1. Frog and chick embryology upto the formation of three germinal layers.

2 Fate map construction in frog & chick Gastrulation in frog and chick upto the formation of germinal layers.

3. Concept of competence, determination and differentiation.

4. Extra embryonic membranes in chick.

5. Concept of regeneration

PRACTICALS – ZOOLOGY-II

The practical work will be based on theory syllabus and the candidates will be required to show knowledge of the following :

2 Study of museum specimens and slides relevant to theory paper.

3 Osteology

a. Girdles and limb bones of : Frog, Varanus, Fowl and Rabbit

4 Cell Biology.

Study of DNA and RNA Models.

a. Preparations of polytene chromosome in chironomous larva

b. Squash preparation of chromosome from Onion root tip.

c. Study of Meiosis in Grasshopper testis.

4 Embryology : Study of different developmental stages of frog and chick – whole mounts and sections.

BOTANY-II

CELL BIOLOGY & GENETICS

Unit-1 The cell envelops; plasma membrane, bilayer lipid structure, function of the cell wall. Structure and function of cell organelles: Golgi bodies, ER, Peroxisome, Vacuole, Chloroplast and Mitochondrion.

Unit-2 Ultrastructure and function of nucleus: Nuclear membrane, Nucleolus, Extranuclear genome, Presence and functions of mitochondrial and plastid-DNA, Plasmids. chromosomal organization; morphology, centromere and telomere, special types of chromosome, Mitosis and Meiosis

Unit-3 Variations in chromosomes structure : Deletions, duplications translocations. inversions; variation in chromosome number, aneuploidy, polyploidy, DNA the genetic material, DNA structure and replication, the nucleosome model, satellite and repetitive DNA.

Unit-4 Structure of gene, genetic code, transfer of genetic information; transcription, translation, protein synthesis, tRNA, and ribosomes. Regulation of gene expression in prokaryotes and eukaryotes.

Unit-5 Genetic inheritance; Mendelism; laws of segregation and independent assortment; linkage analysis; interactions of genes. Genetic variations; mutations, spontaneous and induced; transposable elements; DNA damage and repair.

PRACTICALS : BOTANY-II

Scheme of practical examination Marks:

Mitosis/Meiosis 10

Genetic problem 10

Cell and Cell inclusions 10

Spotting 10

Sessional 10

Total 50

SEMESTER – III

3BSC1-HINDI LANGUAGE AUR SAMVEDENA

इकाई .एक

1. आचरण की सभ्यता : सरदार पूर्ण सिंह
2. जवानी (काव्य) : श्री माखनलाल चतुर्वेदी
3. विज्ञान : परिभाषा, शाखाएँ, संक्षिप्त इतिहास
4. सपनों की उड़ान : ए. पी.जे अब्दुल कलाम
5. प्रमुख वैज्ञानिक आविष्कार और हमारा जीवन
6. त्रुटि संशोधन

इकाई .दो

1. शिरीष के फूल-निबंध : आचार्य हजारी प्रसाद द्विवेदी
2. विकास का भारतीय मॉडलर: धर्मपाल
3. निबंध लेखन की कला
4. संधि.समास : संरचना और प्रकार
5. निराला : संस्मरण - महादेवी वर्मा

इकाई .तीन

1. मांडव (यात्रा वृत्तांत): पं. रामनारायण उपाध्याय
2. हिन्दी भाषा का मानकीकरण
3. भारतीय कृषि
4. जीवन : उद्भव और विकास
5. जनजातीय जीवन
6. उसने कहा था (कहानी) : श्री चन्द्रधर शर्मा गुलेरी

इकाई .चार

1. महाजनी सभ्यता (निबंध) : प्रेमचन्द्र
2. मुहावरे और लोकोक्तियाँ
3. सौर मण्डल
4. ब्रह्माण्ड और जीवन
5. शिकागो (व्याख्या) : स्वामी विवेकानंद
6. संक्षिप्तियाँ

इकाई .पांच

1. मध्यप्रदेश एवं छत्तीसगढ़ के पर्यटन स्थल
2. फिल्टर तो चाहिए ही. डॉ. देवेन्द्र दीपक
3. भारतीय वनस्पतियाँ और जीव
4. पर्यावरण
5. भोलाराम का जीवन (व्यंग्य) हरिशंकर परसाई
6. टाँगन का पंछी : विद्यानिवास मिश्र

3BSC2-ENVIRONMENTAL STUDIES

UNIT – I Study of Environmental and ecology :

- (a) Definition and Importance.
- (b) Environmental Pollution and problems.
- (c) Public participation and Public awareness.

UNIT – II Environmental Pollution :

- (a) Air, water, noise, heat and nuclear pollution.
- (b) Causes, effect and prevention of pollution.
- (c) Disaster management – Flood, Earthquake, cyclones and landslides.

UNIT – III Environment and social problems :

- (a) Development – non-sustainable to Sustainable.
- (b) Energy problems of cities.
- (c) Water preservation – rain-water collection.

UNIT – IV Role of mankind in conserving natural resources :

- (a) Food resources – World food problem.
- (b) Energy resources – increasing demand for energy.
- (c) Land resources – Land as resources.

UNIT – V Environment conservation laws :

- (a) Conservation laws for air and water pollution.
- (b) Wildlife conservation laws.
- (c) Role of information technology in protecting environment & health.

CHEMISTRY-III

UNIT I

Thermodynamics-1 Definition of thermodynamic terms: System, surrounding, Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's Law: Joule Thomson coefficient and inversion temperature.

Second Law of Thermodynamics- Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

UNIT II

Thermodynamics-II (a) Concept of entropy: Entropy as a state function, entropy as a function of P&T, entropy change in physical change, Clausius inequality, entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helmholtz functions, Gibbs function (G) and Helmholtz function(A) as a thermodynamic quantities, A and G as a criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

(b) Chemical equilibrium Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction isotherm and reaction isochore: Clapeyron equation and Clausius- Clapeyron equation, applications.

UNIT III

Chemistry of elements of I transition series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds such as carbides, oxides and sulphides. Complexes illustrating relative stability of their oxidation states, coordination number and geometry chemistry of elements of II and III transition series: General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry

UNIT-IV

(a) Coordination Compounds: Werner's coordination theory and its experimental verification, EAN Concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, VBT of transition metal complexes.

(b) Oxidation and Reduction: Use of redox potential data, analysis of redox cycle, redox stability in H₂O: Frost, Latimer and Pourbaix diagram. Principles involved in the extraction of elements.

UNIT-V

(a) Electromagnetic Spectrum: Absorption Spectra; 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. UV spectra of conjugated enes and enones. IR absorption spectroscopy; molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

Chemistry-III Practical

Time: 6 hours

Inorganic Chemistry 18 marks

Calibration of the fractional weights, pipettes and burettes. Preparation of standard solutions. Dilution of 0.1 M to 0.001 M solutions.

Quantitative analysis -Volumetric analysis.

(a) Determination of acetic acid in commercial vinegar using NaOH.

(b) Determination of alkali content- antacid tablet using HCl.

(c) Estimation of calcium content in chalk as calcium oxalate by permagnometry.

(d) Estimation of hardness of water by EDTA

Gravimetric analysis:

Barium as barium sulphate

Organic Chemistry Laboratory Techniques 18 marks

A. Thin layer chromatography

Determination of Rf values and identification of organic compounds.

(a) Separation of green leaf pigments (spinach leaves may be used).

(b) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:6).

(c) Separation of a mixture of dyes using cyclohexane and ethylacetate (8:5:1.5). B. Paper chromatography: Ascending and Circular Determination of Rf values and identification of organic compounds

(a) Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid. Spray reagent ninhydrin.

(b) Separation of a mixture of DL-alanine, glycine and L-leucine using nbutanol: acetic acid: water (4:1:5). Spray reagent ninhydrin.

(c) Separation of monosaccharides- a mixture of D-galactose and Dfructose using n-butanol: acetone: water (4:1:5). Spray reagent-aniline hydrogen phthalate.

BOTANY-III

DIVERSITY & SYSTEMATICS OF SEED PLANTS

UNIT – I Characteristics and Classification of Gymnosperms, Heterospory and Origin of Seed Habit, Evolution and Diversity of Gymnosperms, Geological Time Scale, and Fossilization. Fossil Gymnosperms:

Lyginopteris and Lagenostoma.

UNIT – II Morphology, Anatomy Reproduction and life cycle of Cycas, Pinus and Ephedra.

UNIT – III Origin and Evolution of Angiosperms, Fundamental components of 6, 7, 8 taxonomy, Plant Identification, Principles and rules of Botanical Nomenclature, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Hutchinson, Modern trends in Taxonomy.

UNIT – IV Diagnostic characteristics and Economic Importance of Families –Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apiaceae.

UNIT – V Diagnostic characteristics & Economic Importance of Families – Asteraceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae.

PRACTICALS – BOTANY-III

Gymnosperms-

-Morphological and anatomical study of Cycas, Pinus, and Ephedra (all parts).

- Study of permanent slides of Cycus, Pinus and Ephedra.

Angiosperms-

-Study of types of inflorescence and flowers with labelled sketches.

- Technical description of common flowering plants belonging to families mentioned in theory syllabus.

Spotting-

Viva- voce-

ZOOLOGY-III

GENETICS

Unit I: Heredity & Variation, Gene and Genetic Material

1. Chromosome: The Physical basis of heredity and transmitters of heredity.
2. Types of chromosomes: Lampbrush, salivary gland and Beta Chromosomes.
3. Nucleocytoplasmic interactions : Ultra structure of nucleus, nucleolus, Role of nucleus and nucleolus in nucleocytoplasmic interactions including Synthesis & Export of RNA, transport of Proteins
4. Heredity and Variation : Sources of variation, Genotype, phenotype and environmental variations (elementary idea)
 - Mendel's laws of heredity
 - Kinds of variations
 - Genetic basis of variation.
- 5 (a) Chemistry of Gene ; Nucleic Acids and their structure.
 - (b).Concept of DNA replication.
 - (c).Nucleosome (Solenoid model).
 - (d) Split genes, overlapping genes and Pseudo genes.
 - (e) Genetic Code.

Unit II: Cytoplasmic Inheritance, Gene Expression and Regulation

1. Cytoplasmic inheritance: Maternal effect on limnea (Shell Coiling), Kappa particles in Paramecium.
2. Transcription in Prokaryotes and Eukaryotes
3. Translation in Eukaryotes
4. Gene Expression: Regulation of protein synthesis, transcription in Prokaryotes and Eukaryotes.
- 5: Gene Expression: Operon model

Unit III: Linkage and Chromosomal Aberrations

1. Gene Linkage: Kinds and Theories of linkage, significance of linkage.
2. Gene linkage, Mechanism of genetic recombination.
3. Sex Chromosomes System: Sex differentiation, chromosome theory of sex determination.
4. Sex linked inheritance (Haemophilia, Colour blindness)
5. Structural changes in chromosomes.
6. Numerical changes in chromosomes.

Unit VI: Mutation and Applied Genetics

1. Types of Mutation.
2. Causes of mutation.
3. Mutagens- classification, Types & effects.

4. Gene therapy.

5. DNA finger printing.

Unit V: Human Genetics & Genetic Engineering

1. Human chromosomes, Elementary idea of Human Genome Project

2. Common genetic diseases in man (Autosomal syndromes, sex chromosome syndromes, diseases due to mutation-Sickle cell anaemia, Albinism & Alkaptonuria.

3. Multiple factors and blood groups.

4. Twins- physical traits, mental traits.

5. Techniques used in recombinant DNA technology. Construction of Chimeric DNA, Elementary idea of plasmids & vectors.

6. Gene cloning and Polymerase Chain Reaction (PCR) ,Gel Electrophoresis, Northern & Southern Blotting.

PRACTICAL- ZOOLOGY-III

1. Identification of spots related to theory.

2. Squash preparation of onion root tip / Chironomous larva salivary gland/grass hopper testis.

3. Study of instruments techniques related to applied genetics – PCR, Gel electrophoresis, DNA fingerprinting etc.

4. Problems based on genetics.

Scheme of Practical Examination

Time: 3 hours MM: 50

1. Spotting (5 Spots) 10 Marks

2. Squash preparation 05 Marks

3. Study of instruments / techniques related to applied genetics 05 Marks

4. Problems on Genetics 10 Marks

5. Viva-Voce 10 Marks

6. Practical Record and Collection 10 Marks

Total 50 Marks

SEMESTER IV

4BSC1-ENGLISH LANGUAGE AND SCIENTIFIC TEMPER

UNIT – I

- | | | |
|-----------------------|---|------------------------------------|
| 1. Tina Morris | : | Tree |
| 2. Nissim Ezekiel | : | Night of the Scorpion |
| 3. C.P. Snow | : | Ramanujan |
| 4. Roger Rosenblatt | : | The Power of WE |
| 5. George Orwell | : | What is Science? |
| 6. C.Rajagopalachari: | | Three Questions |
| 7. Desmond Morris : | | A short extract from the Naked Ape |

8. A.G. Gardiner : On the rule of the road

UNIT – II Comprehension of an unseen passage.

UNIT – III Letter Writing : Formal Letters, Informal letters, Applications.

UNIT – IV Report Writing.

UNIT – V Language Skills

Correction of common errors in sentence structure : usage of pronouns, subject/verb agreement word order, gender; compound nouns, collective nouns, possessives, articles and prepositions. (advanced)

4BSC2-ENVIRONMENTAL STUDY

UNIT – I Problem of natural resources

- (a) Problem of water resources – Utilization of surface and ground water, over utilization, flood, drought, conflicts over water, dams-benefits and problem.
- (b) Problems of forest resources – uses and over utilization, deforestation, utilization of timber, dams and its effect on forests and tribes.
- (c) Problems of land resources – Land as a source, erosion of land, man-induced landslides and desertification.

UNIT – II Bio-diversity and its protection –

- (a) Value of bio-diversity – Consumable use : Productive use, Social, alternative, moral aesthetic and values.
- (b) India as a nation of bio-diversity and multi-diversity at global, national and local levels.
- (c) Threats to bio-diversity – Loss of habitat, poaching of wildlife, man-wildlife conflicts.

UNIT – III Human Population and Environment

- (a) Population growth, disparities between countries.
- (b) Population explosion, family welfare Programme.
- (c) Environment and human health.

UNIT – IV Multidisciplinary nature of environmental studies :

- (a) Natural resources
- (b) Social problems and the environment
- (c) Eco system.

UNIT – V Environmental Wealth :

- (a) Rivers, ponds, fields and hills.
- (b) Rural, Industrial, Agricultural fields.
- (c) Study of common plants, insects and birds.

CHEMISTRY-IV

UNIT I

Phase equilibrium Statement and the meaning of the terms: phase component and the degree of freedom, derivation of the Gibbs phase rule. Phase equilibria of one component system: water, CO₂ and S system. Phase equilibria of two component system: solid liquid equilibria, simple eutectic: Bi-Cd, Pb-Ag system, desilverisation of lead.

Partial miscible liquids: Phenol-water, trimethylamine-water and nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation, Nernst distribution law: thermodynamic derivation, applications.

UNIT-II

Electrochemistry Electrical transport- conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific conductance and equivalent conductance with dilution.

Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number: Definition and determination by Hittorf method and moving boundary method. Application of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salt, conductometric titrations.

Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods.

UNIT III (a) Chemistry of Lanthanides Elements: electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.

(b) Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Similarities between the later actinides and later lanthanides.

(c) Acids and Bases: Arrhenius, Brønsted-Lowry, Lux-Flood, Solvent system and Lewis concepts of acids and bases.

(d) Non-aqueous Solvents: Types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid NH₃ and liquid SO₂

UNIT IV

(a) Aldehydes and ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes and ketones from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction.

(b) Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of formation and effect of heat and dehydrating agents. Methods of formation and chemical reactions of halo acids, hydroxyl acids, malic, tartaric and citric acids.

UNIT- V

Organic Compounds of Nitrogen Preparation of nitroalkanes and nitroarenes. Chemical reaction of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid.

Halonitroarenes: reactivity, structure and nomenclature. Structure and nomenclature of amines, physical properties and stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Amine salt as phase transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalamide reaction, Hoffmann bromamide reaction, Reactions of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformation of aryl diazonium salts, azo coupling.

Chemistry Practical

Time: 6 hour

Organic Chemistry 12 marks

Qualitative analysis

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

Physical Chemistry 12 marks

Transition temperature

1. Determination of transition temperature of given substance by thermometric, dilatometric method (e.g.) ($\text{MnCl}_2 \times 4\text{H}_2\text{O}$ / $\text{SrBr}_2 \times 2\text{H}_2\text{O}$).

Phase equilibrium

1. To study the effect of solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquid (e.g., phenol water system) and to determine the concentration of that soluble in phenol water system.

2. To construct the phase diagram of two component (e.g., diphenyl amine benzophenone) by cooling curve method.

Thermochemistry 12 Marks

1. To determine the enthalpy of neutralization of weak acid/weak base versus strong acid/strong base and determine the enthalpy of ionization of the weak acid/ base.

Inorganic chemistry-Quantitative Volumetric Analysis

1. Estimation of ferrous and ferric by dichromate method.
2. Estimation of copper using thiosulphate.

Viva 6 Marks

Sessional 8 Marks

BOTANY-IV

STRUCTURE, DEVELOPMENT & REPRODUCTION IN FLOWERING PLANTS

UNIT – I The Root system: Root apical meristems, Differentiation of primary and secondary tissues and their roles, Anatomy of Monocot and Dicot roots, Morphological modification of root for storage, respiration, reproduction and interaction with microbes.

UNIT – II The Shoot system: Shoot apical meristem and histological organization, Anatomy of primary stem in Monocotyledons and Dicotyledons, Secondary growth in stem and root – Vascular cambium and its functions, Characteristics of growth rings, Sapwood and Heart wood, Secondary Phloem, Cork Cambium and Periderm.

UNIT – III The Leaf system: Origin, Development, Diversity in size, shape and arrangement, Internal structure of Dicot and Monocot leaf in relation to photosynthesis and water loss, Adaptations to water stress, senescence and abscission.

UNIT – IV The Flower system: Concept of flower as a modified shoot, Structure of Anther, Microsporogenesis and Male Gametophyte, Structure of Pistil, Ovules, Megasporogenesis and Development of Female Gametophyte (Embryo Sac) and its types, Pollination –Mechanism and Agencies of Pollination, Pollen Pistil interactions and Self incompatibility.

UNIT – V Double Fertilization, Development and types of Endosperm and its morphological nature, Development of Embryo in Monocots and Dicots, Fruit development and maturation. Seed structure and dispersal, Vegetative Propagation.

PRACTICAL- BOTANY-IV

1- Cutting, staining and mounting of cross section of two materials of monocotyledons/dicotyledons root and stem and leaf like Sunflower and Maize or other available material. 15

2- Organisation of shoot Apex and Root Apex. 5

3- Study of Ovules and Anthers and their types 5

- Structure of stigma and style (Hibiscus, Maize, Ocimum, Citrus and Clitoria (Aprajita) or plant studied by you.

4-Spotting-

5-Viva- voce-

6-Practical Record-

ZOOLOGY-IV

ANIMAL PHYSIOLOGY

Unit I: Nutrition, Metabolism

1. Physiology of digestion in mammals

2. Protein Metabolism-Deamination, decarboxylation. Transamination of amino acids, and Ornithine cycle.

3. Carbohydrate metabolism- Glycogenesis, Glycogenolysis, glycolysis, The Citric acid cycle, Gluconeogenesis.

4. Lipid Metabolism-Beta oxidation of fatty acids.

Unit II: Respiration

1. Organs of respiration in mammals

2. Mechanism of respiration in mammals.

3. Physiology of respiration (transport of gases, chloride shift).

4. Properties and function of respiratory pigments.

Unit III: Regulatory Mechanisms and Enzymes

1. Osmoregulation.

2. Physiology of Excretion- urea and urine formation in mammals.

3. Thermoregulation.

4. Definition and nomenclature of enzymes, classification of enzymes.

5. Mechanism of enzyme action.

Unit IV: Neuromuscular Co- ordination

1. Structure and properties of nervous tissue.

2. Physiology of nerve impulse conduction.

3. Types of muscles and their properties.

4. Theory of muscle contraction and its biochemistry.

Unit V: Endocrine system

1. Structure and functions of Pituitary Gland.

2. Structure and functions of Thyroid Gland.

3. Structure and functions of Adrenal Gland.

4. Structure and functions of Parathyroid, Thymus and Islets of langerhan's.

PRACTICAL-ZOOLOGY-IV

1. Detection of protein, carbohydrate and lipid.

2. Study of Human salivary enzyme activity in relation to pH.

3. Detection of nitrogenous waste products – Ammonia & Urea

4. Use of Kymograph

5. Exercise on Haematology – Counting of RBC /WBC and Blood grouping in blood samples.

6. Estimation of Haemoglobin in blood samples.

7. Histological study of various endocrine glands –T. S. of Thyroid, T. S. of Pituitary gland , T. S. of Adrenal gland , T. S. of Testis, T. S. of Ovary.

8. Histological study of Alimentary canal & various digestive organs – T.S of Stomach , T.S of Intestine , T.S of Pancreas, and T. S. of liver.
9. Histological study of Visceral organs - T.S of Lungs, L.S. of Kidney
10. Histological study of Muscles – Striated, Unstriated & Cardiac muscle.

SEMESTER-V

5BSC1-HINDI LANGUAGE (BHASHA KAUSHAL AUR SANCHAR SADHAN)

भाषा कौशल एवं संचार साधन

इकाई - 1

1. भारतीय संस्कृति
2. भारतीय समाज व्यवस्था
3. सभ्यता एवं संस्कार
4. वैश्विक चेतना
5. समन्वयीकरण (भारतीय एवं अंतर्राष्ट्रीय संदर्भ में)

इकाई - 2

1. धर्म
2. न्याय
3. दर्शन
4. नीति
5. साहित्य

इकाई - 3

1. संचार साधन : सम्पर्क के नए क्षितिज
2. समाचार पत्र
3. भारतीय प्रेस परिषद्
4. रेडियो
5. दूरदर्शन

इकाई - 4

1. सिनेमा
2. रंगमंच
3. सर्गीत
4. चित्र, मूर्ति, स्थापत्य कला
5. शिल्प कला

इकाई - 5

1. कम्प्यूटर
2. दूरभाष: विज्ञान की सौगात
3. मंत्र (कहानी): प्रमे चंद्र
4. मातृभूमि (कविता): मैथिलीशरण गुप्त

6. साहित्यकार का दायित्व: डॉ. प्रेम भारती

संदर्भ पुस्तक – मध्यप्रदेश हिन्दी ग्रंथ अकादमी भोपाल द्वारा प्रकाशित पुस्तक

5BSC2-COMPUTER & INFORMATION TECHNOLOGY BASICS-I

Unit I :

INTRODUCTION TO COMPUTER ORGANIZATION –I

History of development of Computer system concepts. Characteristics, Capability and limitations.

Generation of computer. Types of PC's Desktop. Laptop, Notebook. Workstation & their Characteristics.

Unit II :

INTRODUCTION TO COMPUTER ORGANIZATION –II

basic components of a computer system Control Unit, ALU. Input/Output function and Characteristics, memory RAM, ROM, EPROM, PROM.

Unit III :

INPUT & OUTPUT DEVICES

Input Devices : Keyboard, Mouse, Trackball. Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen.

Output Devices: Monitors Characteristics and types of monitor, Video Standard VGA, SVGA, XGA,

LCD Screen etc. Printer, Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer. Plotter, Sound Card and Speakers.

Unit IV :

STORAGE DEVICES : Storage fundamental primary Vs Secondary. Various Storage Devices magnetic Tape. Cartridge Tape, Data Drives, Hard Drives, Floppy Disks, CD, VCD, CD-R, CD-RW, Zip Drive, DVD, DVD-RW.

Unit V :

INTRODUCTION TO OPERATING SYSTEM : Introduction to operating systems, its functioning and types. basic commands of dos & Windows operating System.

Disk Operating System (DOS) - Introduction, History and Versions of DOS.

DOS Basics - Physical Structure of disk, Drive name, FAT, file & directory structure and naming rules, booting process, DOS system files.

DOS Commands - **Internal** - DIR, MD, CD, RD, Copy, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE etc. **External** CHKDSK, SCOPE, PRINT DISKCOPY, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, MODE, ATTRIB HELP, SYS etc.

Practical/ CCE

Semester – V

DOS :

- DOS commands : Internal & External Commands.
- Special batch file : Autoexec, Bar Hard disk setup.

Windows 98:

- Desktop setting : New folder, rename bin operation, briefcase, function. Control panel utility.
- Display properties: Screen saver, background settings.

Ms-Word:

- Creating file: save, save as HTML, Save as Text, template, RTF Format.
- Page setup utility: Margin settings, paper size setting, paper source, layout.
- Editing: Cut, paste special, undo, redo, find, replace, goto etc.
- View file: page layout, Normal Outline, master document, ruler header, footer, footnote, full screen.
- Insert: break, page number, symbol, date & time, auto text, caption file, object, hyperlink, picture etc.
- Format: font, paragraph, bullets & numbering, border & shading, change case, columns.
- Table : Draw label, insert table, cell handling, table auto format, sort formula

CHEMISTRY-V

UNIT I

Spectroscopy - I

(a) Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

(b) Rotational spectrum of diatomic molecules. Energy levels of a rigid rotator (semi classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotator, isotope effect.

(c) Raman spectrum, concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, application of Raman spectrum.

UNIT II

Spectroscopy - II

(a) UV Spectroscopy : Electronic excitation, elementary idea of instrument used, Applications to structure determination of organic molecules. Woodward-Fieser rule for determining λ_{max} of α, β -unsaturated carbonyl compounds.

(b) Infrared Spectrum : Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force

constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

UNIT III

Bioinorganic Chemistry - I Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin, Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} . Nitrogen fixation.

Bioinorganic Chemistry - II Role of metal ions in biological process, Na/K pump, metal complexes as therapeutic agents anticancer agents, antiarthritits drugs and chelation therapy.

UNIT IV

Hard and Soft Acids and Bases (HSAB) Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Gravimetric Analysis Principles of gravimetric estimation, supersaturation, co-precipitation, post-precipitation and Ash treatment with respect to the estimation of Ba, Zn and Cu.

Water Analysis Hardness, types of hardness-Temporary, permanent and total hardness, acidity and alkalinity, BOD, COD and DO.

UNIT V

Carbohydrates - I Classification and nomenclature, monosaccharide, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharide, erythro and threo diastereoisomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters, determination of ring size of monosaccharide, cyclic structure of D(+) glucose, mechanism of mutarotation. Structures of ribose and deoxyribose.

Carbohydrates - II An introduction to glycosidic linkages in di- and poly-saccharides. Reducing and non reducing sugars. Structure determination of maltose, sucrose, starch and cellulose.

CHEMISTRY PRACTICAL - V

Time: 6 hour

Inorganic Chemistry 12 Marks

Analysis of inorganic mixture containing five radicals with at least one interfering radical (phosphate, borate, oxalate or fluoride).

Organic Chemistry 12 Marks

Preparation:

(i) Acetylation

(ii) Benzoylation

(iii) meta-Dinitrobenzene

(iv) Picric acid

Physical Chemistry 12 Marks

(i) Effluent Analysis

Identification of cations and anions in different water samples.

(ii) Water analysis

To determine the amount of dissolved oxygen in water samples in ppm units.

Viva 06 Marks

Sessional 08 Marks

BOTANY-V

PLANT PHYSIOLOGY AND BIOCHEMISTRY

UNIT – I Plant Water Relations: Properties of water, Importance of water in plant life, Diffusion, Osmosis & Osmotic relation to plant cell, Water Absorption, Ascent of Sap, Essential macro & micronutrients and their role. Transpiration: Structure & Physiology of Stomata, Mechanism of Transpiration, Factors affecting the rate of transpiration.

UNIT – II Photosynthesis: Chloroplast, Photosynthetic pigments, Red drop, Emerson's effect, Concept of two Photosystems, Light reaction, Dark reaction - Calvin cycle, Hatch-Slack cycle, CAM cycle, Factors affecting rate of photosynthesis & Photorespiration.

UNIT – III Respiration: Mitochondria, aerobic and anaerobic respiration, Respiratory coefficient, mechanism of respiration - Glycolysis, Krebs's cycle, Pentose phosphate pathway, Electron transport system, Factors affecting rate of respiration, Redox potential and theories of ATP synthesis.

UNIT – IV Definition, classification and chemical structure: monosaccharide, disaccharide, oligosaccharide and polysaccharides; Amino acids, essential and non essential amino acids; Lipids, saturated and non saturated fatty acids.

Classification, nomenclature and characteristics of Enzymes, Concept of holoenzyme, apoenzyme, co-enzyme and co-factors, mode & mechanism of enzyme action, Factors affecting enzyme activity. Plant Hormones, mode of action of Auxins, Gibberellins, Cytokinin and Abscissic acid.

UNIT – V Genetic Engineering: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; gene mapping and chromosome walking. Biotechnology: Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis biology of Agrobacterium; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.

PRACTICAL- BOTANY-V

- 1- Preparation of solution of specific Normality, Molal and Molar solutions.
- 2- Exercises related to osmosis and osmotic relation.
- 3- Exercises related to Transpiration.
- 4- To separate Plastidial pigments by Paper Chromatography.
- 5- To perform the exercise of Photosynthesis & Respiration.
- 6- To perform biochemical test for Carbohydrate, Lipid and Protein.
- 7- To extract Enzyme for any plant part and demonstrate its activity.

(In Exam Any two experiments from above mentioned list are asked)

Question 2 Comment on any technique related to Biotechnology

Spotting-

Viva- voce-

Practical Record-

ZOOLOGY-V

APPLIED ZOOLOGY

Unit –1 Aquaculture

- Definition and scope of aquaculture.
- Prawn culture –(Culture of fresh water prawn, Methods of prawn fishing, preservation and processing of prawns)
- Pearl culture and Pearl Industry.
- By products of fishing industry.
- Frog culture, Breeding and selection.

Unit –II Pisciculture

- General account of Edible fresh water fishes.
- Carp culture: Management of ponds, Preservation and processing of fishes.
- Maintenance of Aquarium
- Plankton and their role in Fisheries.
- Elementary knowledge of polyculture.

Unit –III Economic Entomology

- Sericulture: Species of silkworm, life history of *Bombyx mori*, Sericulture Industry in India.
- Apiculture –life cycle and species Methods of bee keeping, Products of bees, enemies of bees.
- Lac culture: Lifecycle, Host Plant cultivation.
- Common Pest: Stored Grains *Sitophilus oryzae* and *Tribolium Castanaeum*, Vegetable pest *Piers brassicae* and *Dacus cucurbitae*..
- Biological control of insect pests.

Unit –IV Toxicology

- Toxicology: Basic concepts,
- Heavy metal toxicity- Pb, Cd, Hg.
- Toxicity testing, LC 50, LD 50, acute and chronic toxicity.
- Pesticide and their toxicological effect.
- Occupational health hazards and their control

Unit-V Lab Techniques

- pH- Definition, Study of pH- meter, determination of pH.
- Chromatography: Principles & Types of chromatography (Paper Chromatography).
- Types of microtome and their uses.

- General ideas of some common fixatives, stains and reagents.
- Museum keeping, preservation and skeleton preparation, taxidermy(Bird)

PRACTICAL- ZOOLOGY-V

1. Study of museum specimen of fresh water edible fishes.
2. Study of pH of Water and soil.
3. Study of Chromatography (Paper Chromatography).
4. Study of working instrument : Microtome.
5. Study of different techniques for Museum Keeping..
6. Maintenance of aquarium.
7. Study of pests-
Stored grain pests- Sitophilus Oryzae & Tribolium castanaeum.
Vegetable pests- Pieris brassicae & Dacus cucurbitae
8. Study of Plankton – Euglena, Paramoecium, Cyclops, Mysis, Daphnia

SEMESTER-VI

6BSC1-ENGLISH LANGUAGE AND ASPECTS OF DEVELOPMENT

Unit 1

1. William Wordsworth : “The World is Too Much With Us”
2. K. Aludiapillai : “Communication Education and Information Technology”
3. “Democratic Decentralisation”
4. S. C. Dubey : “Basic Quality of Life”
5. Sister Nivedita : “The Judgment Seat of Vikramaditya”
6. Juliun Huxley : “War as a Biological Phenomenon”
7. Robert Frost : “Stopping by Woods on a Snowy Evening”
8. Ruskin Bond : “The Cherry Tree”

Unit II Short Essay of about 250-300 words

Unit III Translation of a short passage from Hindi to English

Unit IV Drafting CV, writing e-mail message for official purpose

Unit V Language Skills :

One-word substitution, homonyms, homophones, words that confuse, Punctuation, Idioms

Note : Scheme of Marks

Unit I

- This will include 5 objective type questions based on text and language skills. (1x5=5 marks)

- This will also include short-answer questions from text. One question will be asked from each lesson (total 8 questions) and 5 have to be attempted (3x5 = 15 marks)

6BSC2-COMPUTER & INFORMATION TECHNOLOGY BASICS-II

Unit I –

Word Processing : Word

Introduction to word Processing.

- MS Word: features, Creating, Saving and Operating Multi document windows, Editing Text selecting, Inserting, deleting moving text.
- Previewing documents, Printing document to file page. Reduce the number of pages by one.
- Formatting Documents: paragraph formats, aligning Text and Paragraph, Borders and shading, Headers and Footers, Multiple Columns.

Unit II

Introduction to Excel

Excel & Worksheet :

- Worksheet basic.
- Creating worksheet, entering data into worksheet, heading information, data text, dates, alphanumeric, values, saving & quitting worksheet.
- Opening and moving around in an existing worksheet.
- Toolbars and Menus, keyboard shortcuts.
- Working with single and multiple workbook coping, renaming, moving, adding and deleting. coping entries and moving between workbooks.
- Working with formulas & cell referencing.
- Autosum.
- Coping formulas
- Absolute & Relative addressing.

Unit III

INTRODUCTION TO POWER POINT

- Features and various versions.
- Creating presentation using Slide master and template in various colour scheme.
- Working with slides make new slide move, copy, delete, duplicate, lay outing of slide, zoom in or out of a slide.
- Editing and formatting text: Alignment, editing, inserting, deleting, selecting, formatting of text, find and replace text.

Unit IV

POWER POINT – II

- Bullets , footer, paragraph formatting, spell checking.
- Printing presentation Print slides, notes, handouts and outlines.

- Inserting objects Drawing and Inserting objects using Clip Arts picture and charts.
- Slide sorter, slide transition effect and animation effects.
- Presenting the show making stand alone presentation, Pack and go wizards.

Unit V

Evolution, Protocol, concept, Internet, Dial-up connectivity, leased line, VSAT, Broad band, URLs, Domain names, Portals. E-mail, Pop & web based Email. Basic of sending and receiving Emails, Email & Internet Ethics, Computer virus, Antivirus software wage, Web Browsers.

CHEMISTRY-VI

UNIT I

(a) Photochemistry Interaction of radiation with matter, difference between thermal and photochemical process. Law of photochemistry-Grotthus-Draper law, Stark-Einstein law, Beer-Lambert's law. Determination of rate constant of unimolecular reactions. Electronic transitions, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes .

(b) Physical properties and molecular structures Optical activity, polarization-(Clausius-Mossotti equation), orientations of dipoles in an electrical field, dipole moment, induced dipole moment, measurement of dipole moment temperature and refractivity method. Dipole moment and structure of molecules, magnetic properties- paramagnetism, diamagnetism and ferromagnetism.

UNIT II

(a) Solutions, dilute solutions and colligative properties-I Ideal and non ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solutions- colligative properties. Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurements, determination of molecular weight from osmotic pressure.

(b) Solutions, dilute solutions and colligative properties-II Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods of determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solute.

UNIT III

Inorganic polymers Introduction and scope of inorganic polymers, special characteristics, classification, homo and hetero atomic polymers and their applications. Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

UNIT IV

Organometallic chemistry

(a) Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti.

(b) A brief account of metal-ethylenic complexes and homogeneous hydrogenation; mononuclear carbonyls and the nature of bonding in metal carbonyls. Transition metal organometallic compounds with bonds to hydrogen and boron.

(c) Metal nitrosyls: modes of coordination, nature of bonding and probable applications.

UNIT V

(a) Organometallic compounds Organomagnesium compounds-the Grignard reagents-formation, structure and synthetic applications, organozinc compounds, formation and chemical reactions, Organolithium compounds-formation and chemical reactions.

(b) Organosulphur compounds Nomenclature, structural features, method of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine.

(c) Amino acids Classification, structure, stereochemistry of amino acids, acid base behaviour, isoelectric point, general methods of preparation and properties of α -amino acids

(d) Proteins and peptides Introduction to peptides linkage, synthesis and end group analysis of peptides, solid phase synthesis, classification, properties and structure of proteins (primary, secondary and tertiary).

CHEMISTRY PRACTICAL - VI

Time: 6 hour M.M: 50

Inorganic Chemistry 12 Marks

Complex Compound Preparation:

1. Diaquabis(methyl acetoacetato)nickel(II)
2. Diaquabis(ethyl acetoacetato)cobalt(II)
3. Bis(methyl acetoacetato)copper(II) monohydrate
4. Potassium chlorochromate(IV)
5. Tetraamminecopper(II) sulphate monohydrate
6. Mercury(II) tetrathiocyanatocobaltate(II)
7. Hexaamminenickel(II) chloride

Organic Chemistry 12 Marks

Binary mixture analysis containing two solids: Separation, identification and preparation of derivatives.

Physical Instrumentation 12 Marks

(iii) Job's method

(iv) Mole-ratio method.

Viva 06 Marks

Sessional 08 Marks

BOTANY-VI

PLANT ECOLOGY, BIODIVERSITY AND PHYTOGEOGRAPHY

UNIT – I Ecosystems: Structure and types, Biotic and Abiotic components, Trophic levels, Food chains, Food webs, Ecological pyramids, Energy flow; Biogeochemical cycles: Concept, Gaseous and Sedimentary cycles, Carbon, Nitrogen, Phosphorus and Sulfur cycle.

UNIT – II Ecological adaptations: Morphological, Anatomical and Physiological responses, Water adaptation (Hydrophytes, Xerophytes and Mesophytes), Temperature adaptation (Thermoperiodism and Vernalization), Light adaptation (Heliophytes and Sciophytes), Plant Succession: Causes, trends and processes, types of succession - Lithosere, Hydrosere and Xerosere.

UNIT – III Population Ecology: Distribution patterns, Density, Natality, Mortality, Growth curves, Ecotypes and Ecads; Community Ecology: Characteristics, Classification, Life forms. Biodiversity: Basic concept, definition, Importance, Biodiversity of India, Hotspots, In situ and ex situ conservation, Endangered and threatened species, Red data book.

UNIT – IV Soil: Physico-chemical properties, Soil formation, Development of Soil Profile, Soil classification, Soil composition, Soil factors; Pollution: Definition, Types & Causes; Global warming, Climate change and Ozone holes.

UNIT – V Phytogeography: Phytogeographical regions of India, Vegetation types of Madhya Pradesh, Biosphere reserves, Sanctuaries and National parks of Madhya Pradesh, Natural resources – definition and classification of natural resources, Conservation and management of natural resources, Land resources management, Water resources management, Wet land resource management.

PRACTICAL BOTANY-VI

1-To determine the minimum size of Quadrat by species area curve method.

- To conduct exercise on Frequency, Density and Abundance.

2- Study of soil with reference to soil texture, water holding capacity, pH and test for Carbonate and Nitrate.

3-Preparation of slides of Xerophytic, Hydrophytic and Mesophytic plants.

4-To comment upon Phytogeographic region (model/ charts) and National Parks (Photographs).

5-Spotting

6-Viva- voce

7-Practical Record

ZOOLOGY-VI

ENVIRONMENTAL BIOLOGY AND EVOLUTION

Unit –I

Concept of Ecology

- Abiotic and Biotic Factors
- Energy flow in ecosystem
- Food chain and Food web
- Biogeochemical cycle: CO₂, N and P
- Population Concept- Characteristics of population. Factors affecting population growth.

- Community Concept-Succession, Periodicity ,Indicators

Unit –II

Habitat Ecology

- Fresh water habitat – Factors and classification.
- Marine habitat- Factors and classification
- Terrestrial habitat – Factors and classification.
- Ecological divisions of India.
- Natural resources and their Conservation with special reference to forests

Unit –III

Man and Environment

- Wild life conservation (Laws, National Parks and Sanctuaries of MP)
- Environmental degradation and pollution.
- Thermal and Noise pollution
- Radiation Ecology ,Global Warming and Green House Effect
- Urbanisation and effect of human population on environment.

Unit –IV

Origin of life and evolution

- Origin of life- modern concept only
- Lamarckism, Darwinism.
- Modern Synthetic theory :Variations Mutations, Isolation & Speciation
- Adaptations and Mimicry
- Micro, macro Evolution and Mega evolution.

Unit –V

Palaeontology and distribution

- Fossils, Methods of fossilisation, Determination of age of Fossils.
- Study of Extinct forms: Dinosaurs and Archaeopteryx
- Zoogeographical distribution of animals
- Evolution of man.

PRACTICAL- ZOOLOGY-VI

1. Study of Fresh water, Marine and Terrestrial Fauna .
2. Water analysis – Oxygen, Chloride.
3. Pond ecosystem.
4. Wild life : Endangered and threatened species.
5. Study of specimen related with Micro , Mega evolution ,Commensalisms Symbiosis , Mimicry , Parasitism and colouration .
6. Study of various fossils: Living fossil, Limulus, Latimera, dinosaurs, Archaeopteryx,.

Scheme

Scheme of Practical Examination

Time 3 hrs M M 50 marks

1. Water analysis – Estimation of Oxygen, chloride 10 marks
2. Spotting 12. marks
3. Wild life : Endangered and threatened species. 08 marks
4. Pond ecosystem 05 marks
5. Viva. 05 marks
6. Practical record and Collection. 10 marks

Total 50 marks