NEW CURRICULUM OF B.Sc. PART I

CHEMISTRY

The new currlculam will comprise of Three theory papers of 33, 33 and 34 marks each and practical work of 50 marks. The curricuram is to be completed in 180 working days as per the UGC norms & conforming to the directives of the Govt. of Chhattisgarh.The theory papers are of 60 hrs each duration and the practical work of 180 hrs duration.

PAPER I

INORGANIC CHEMISTRY

M.M.33

UNIT-I

A. ATOMIC STRUCTURE

Bohr's theory, its limitation and atomic spectrum of hydrogen atom. General idea of de-Broglie matter-waves, Heisenberg uncertainty principle, Schrödinger wave equation, significance of Ψ and Ψ^2, radial & angular wave functions and probability distribution curves, quantum numbers, Atomic orbital and shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's Multiplicity rule, electronic configuration of the elements.

B. PERIODIC PROPERTIES

Detailed discussion of the following periodic properties of the elements, with reference to s and p-block. Trends in periodic table and applications in predicting and explaining the chemical behavior.

a) Atomic and ionic radii,
b) Ionization enthalpy,
c) Electron gain enthalpy,
d) Electronegativity, Pauling's, Mulliken's, Allred Rochow's scales.
e) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

UNIT-II

CHEMICAL BONDING I

Ionic bond: Ionic Solids - Ionic structures, radius ratio & co-ordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy Born- Haber cycle, Solvation

energy and solubility of ionic solids, polarising power & polarisabilitry of ions, Fajans rule, Ionic character in covalent compounds: Bond moment and dipole moment, Percentage ionic character from dipole moment and electronegatiity difference, Metallic bond-free electron, Valence bond & band theories.

UNIT-III

CHEMICALBONDING II

Covalent bond: Lewis structure, Valence bond theory and its limitations, Concept of hybridization, Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O, NH_3, PCl_3, PCl_5, SF_6. H_3O^+, SF_4, ClF_3, and ICl_2^- Molecular orbital theory. Bond order and bond strength, Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, F_2, CO, NO.

UNIT-IV

A. s-BLOCK ELEMENTS

General concepts on group relationships and gradation properties, Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals

B. p-BLOCK ELEMENTS

General concepts on group relationships and gradation properties. Halides, hydrides, oxides and oxyacids of Boron, Aluminum, Nitrogen and Phosphorus. Boranes, borazines, fullerenes, graphene and silicates, interhalogens and pseudohalogens.

UNIT-V

A CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure, bonding in xenon compounds

B. THEORETICAL PRINCIPLES IN QUALITATIVE ANALYSIS (H_2S SCHEME)

Basic principles involved in the analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.

REFERENCE BOOKS:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Puri, B. R., Sharma, L. R. and Kalia, K. C., Principles of Inorganic Chemistry, Milestone Publishers/ Vishal Publishing Co.; 33rd Edition 2016
7. Madan, R. D. Modern Inorganic Chemistry, S Chand Publishing, 1987.

PAPER: II

ORGANIC CHEMISTRY

UNIT-I BASICS OF ORGANIC CHEMISTRY

Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Electrophiles and Nucleophiles; Nucleophilicity and basicity; Homolytic and Heterolytic cleavage, Generation, shape and relative stability of Carbocations, Carbanions, Free radicals, Carbenes and Nitrenes. Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

UNIT-II INTRODUCTION TO STEREOCHEMISTRY

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Diastereoisomers, meso compounds, Relative and absolute configuration: Fischer, Newmann and Sawhorse Projection formulae and their interconversions; Erythrose and threose, D/L, d/l system of nomenclature, Cahn-Ingold-Prelog system of nomenclature (C.I.P rules), R/S nomenclature. Geometrical isomerism: cis–trans, syn-anti and E/Z notations.

UNIT-III CONFORMATIONAL ANALYSIS OF ALKANES

Conformational analysis of alkanes, ethane, butane, cyclohexane and sugars. Relative stability and Energy diagrams. Types of cycloalkanes and their relative stability, Baeyer strain theory: Theory of strainless rings, Chair, Boat and Twist boat conformation of cyclohexane with energy diagrams; Relative stability of mono-substituted cycloalkanes and disubstituted cyclohexane.

UNIT-IV CHEMISTRY OF ALIPHATIC HYDROCARBONS

A. Carbon-Carbon sigma (σ) bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reaction, Free radical substitutions: Halogenation-relative reactivity and selectivity.

B. Carbon-Carbon Pi (л) bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions and mechanisms (Markownikoff/ Anti - Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-V AROMATIC HYDROCARBONS

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.

REFERENCE BOOKS:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.

5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
6. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
7. Organic Chemistry, Paula Y. Bruice, 2nd Edition, Prentice-Hall, International Edition (1998).
8. A Guide Book of Reaction Mechanism by Peter Sykes.

PAPER - III

PHYSICAL CHEMISTRY M.M.34

UNIT-I

MATHEMATICAL CONCEPTS FOR CHEMIST

Basic Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs, Properties of straight line, slope and intercept, Functions, Differentiation of functions, maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; Permutation and combination and probability theory, Significant figures and their applications.

UNIT-II

GASEOUS STATE CHEMISTRY

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path; Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Joule Thompson effect, Liquification of Gases.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor (Z), and its variation with pressure and temperature for different gases. Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

UNIT-III

A. LIQUID STATE CHEMISTRY

Intermolecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension.

B. COLLOIDS and SURFACE CHEMISTRY

Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotrophy, Application of colloids.

Physical adsorption, chemisorption, adsorption isotherms (Langmuir and Freundlich). Nature of adsorbed state. Qualitative discussion of BET.

UNIT-IV

SOLID STATE CHEMISTRY

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Crystal defects.

UNIT-V

A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions.

Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of catalyst, Enzyme catatysed reactions, Micellar catatysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS:

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 10th Ed., Oxford University Press (2014).

2. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
4. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
5. Engel, T. & Reid, P. Physical Chemistry 3rd Ed. Pearson (2013).
6. Puri, B.R., Sharma, L. R. and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co., 47th Ed. (2016).
7. Bahl, A., Bahl, B.S. and Tuli, G.D. Essentials of Physical Chemistry, S Chand Publishers (2010).
8. Rakshit P.C., Physical Chemistry, Sarat Book House Ed. (2014).
9. Singh B., Mathematics for Chemist, Pragati Publications.

PAPER - IV
LABOBATORY COURSE

INORGANIC CHEMISTRY

A. Semi-micro qualitative analysis (using H_2S or other methods) of mixtures - not more than four ionic species (two anions and two cations, excluding interfering, insoluble salts) out of the following:
Cations : NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Na^+
Anions : CO_3^{2-} , S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, NO_2^-, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}

(Spot tests may be carried out wherever feasible)

B. Acid-Base Titrations

- Standardization of sodium hydroxide by oxalic acid solution.
- Determination of strength of HCl solution using sodium hydroxide as intermediate.
- Estimation of carbonate and hydroxide present together in mixture.
- Estimation of carbonate and bicarbonate present together in a mixture.
- Estimation of free alkali present in different soaps/detergents

C. Redox Titrations

- Standardization of $KMnO_4$ by oxalic acid solution.
- Estimation of Fe(II) using standardized $KMnO_4$ solution.
- Estimation of oxalic acid and sodium oxalate in a given mixture.
- Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

D. Iodo / Iodimetric Titrations

- Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution iodimetrically.
- Estimation of (a) arsenite and (b) antimony iodimetrically.

- Estimation of available chlorine in bleaching powder iodometrically.
- Estimation of Copper and Iron in mixture by standard solution of $K_2Cr_2O_7$ using sodium thiosulphate solution as titrants.

ORGANIC CHEMISTRY

1. Demonstration of laboratory Glasswares and Equipments.
2. Calibration of the thermometer. 80^o–82^o (Naphthalene), 113.5^o–114^o (Acetanilide), 132.5^o-133^o (Urea), 100^o (Distilled Water).)
3. Purification of organic compounds by crystallization using different solvents.
    - Phthalic acid from hot water (using fluted filter paper and stemless funnel).
    - Acetanilide from boiling water.
    - Naphthalene from ethanol.
    - Benzoic acid from water.
4. Determination of the melting points of organic compounds.

    Naphthalene 80^o–82^o, Benzoic acid 121.5^o–122^o, Urea 132.5^o–133^o Succinic acid 184.5^o–185^o, Cinnamic acid 132.5^o–133^o, Salicylic acid 157.5^o–158^o, Acetanilide 113.5^o–114^o, m-Dinitrobenzene 90^o, p-Dichlorobenzene 52^o, Aspirin 135^o.
5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
    - Urea – Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1).
6. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method).
    - Ethanol 78^o, Cyclohexane 81.4^o, Toluene 110.6^o, Benzene 80^o.

i. Distillation (Demonstration)
    - Simple distillation of ethanol-water mixture using water condenser.
    - Distillation of nitrobenzene and aniline using air condenser.

ii. Sublimation
    - Camphor, Naphthalene, Phthalic acid and Succinic acid.

iii. Decolorisation and crystallization using charcoal.
    - Decolorisation of brown sugar with animal charcoal using gravity filtrations crystallization and decolorisation of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo red using 1 g of decolorizing carbon) from ethanol.

7. Qualitative Analysis

Detection of elements (N, S and halogens) and functional groups (Phenolic, Carboxylic, CarbonyI, Esters, Carbohydrates, Amines, Amides, Nitro and Anilide) in simple organic compounds.

PHYSICAL CHEMISTRY

1. Surface tension measurements.
    - Determine the surface tension by (i) drop number (ii) drop weight method.
    - Surface tension composition curve for a binary liquid mixture.
2. Viscosity measurement using Ostwald's viscometer.
    - Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature.
    - Study of the variation of viscosity of sucrose solution with the concentration of solute.
    - Viscosity Composition curve for a binary liquid mixture.
3. Chemical Kinetics
    - To determine the specific rate of hydrolysis of methyl/ethyl acetate catalysed 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 & H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.
4. Colloids
    - To prepare colloidal solution of silver nanoparticles (reduction method) and other metal nanoparticles using capping agents.

Note: Experiments may be added/ deleted subject to availability of time and facilities

PRACTICAL EXAMINATION

05 Hrs.
M.M. 50

Three experiments are to be performed

1. Inorganic Mixture Analysis, four radicals two basic & two acid (excluding insoluble, Interfering & combination of acid radicals) OR Two Titrations (Acid-Bases,Redox and Iodo/Iodimetry)

12 marks

2. Detection of functional group in the given organic compound and determine its MPt/BPt.

8 marks

O R
Crystallization of any one compound as given in the prospectus along with the determination of mixed MPt.
O R
Decolorisation of brown sugar along with sublimation of camphor/ Naphthlene.

3. Any one physical experiment that can be completed in two hours including calculations.

14 marks

4. Viva **10 marks**
5. Sessionals **06 marks**

In case of Ex-Students two marks will be added to each of the experiments

REFERENCE TEXT:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Ahluwalia, V. K., Dhingra, S. and Gulati, A. College practical Chemistry, University Press.
3. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
4. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
6. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
7. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

NEW CURRICULUM OF B.Sc. PART II

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 and 34 marks each and practical work of 50 marks. The Curriculum is to be completed in 180 working days as per UGC norms and conforming to the directives of Govt. of Chhattisgarh. The theory papers are of 60 hrs. each duration and practical work of 180 hrs duration.

Paper – I
INORGANIC CHEMISTRY 60 Hrs., Max Marks 33

UNIT-I

CHEMISTRY OF TRANSITION SERIES ELEMENTS

Transition Elements: Position in periodic table, electronic configuration, General Characteristics, *viz*., atomic and ionic radii, variable oxidation states, ability to form complexes, formation of coloured ions, magnetic moment μ_{so} (spin only) and μ_{eff} and catalytic behaviour. General comparative treatment of 4d and 5d elements with their 3d analogues with respect to ionic radii, oxidation states and magnetic properties.

UNIT-II

A. Oxidation and Reduction: Redox potential, electrochemical series and its applications, Principles involved in extraction of the elements.

B. COORDINATION COMPOUNDS: Werner's theory and its experimental verification, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelates, polynuclear complexes.

UNIT-III

COORDINATION CHEMISTRY

Valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, Crystal field splitting and stabilization energy, measurement of 10 Dq (Δ_o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq (Δ_o, Δ_t). Octahedral vs. tetrahedral coordination.

UNIT-IV

A. CHEMISTRY OF LANTHANIDE ELEMENTS

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. CHEMISTRY OF ACTINIDES

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides

UNIT-V

A. ACIDS BASES : Arrhenius, Bronsted-Lowry, conjugate acids and bases, relative strengths of acids and bases, the Lux-flood, solvent system and Lewis concepts of acids and bases.

B. NON-AQUEOUS SOLVENTS

.Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide, HF, H_2SO_4 , Ionic liquids.

REFERENCE BOOKS

1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley
2. Concise Inorganic Chemistry, J. D. Lee, ELBS
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.
5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agarwal and Agarwal
10. Advanced Inorganic Chemistry, Puri, Sharma, S. Naginchand
11. Inorganic Chemistry, Madan, S. Chand
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub
13. Uchchattar Akarbanic Rasayan, satya Prakash & G. D. Tuli, Shyamal Prakashan
14. Uchchattar Akarbanic Rasayan, Puri & Sharma
15. Selected topic in Inorganic Chemistry by Madan Malik & Tuli, S. Chand.

Paper – II

ORGANIC CHEMISTRY 60 Hrs., Max Marks 33

UNIT-I

CHEMISTRY OF ORGANIC HALIDES

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_N^i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution, elimination reactions.

Aryl halides: Preparation, including preparation from diazonium salts, Nucleophilic Aromatic Substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

UNIT-II

ALCOHOLS

A. Alcohols: Nomenclature, preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction for the preparation of alcohols, Dihydric alcohols – methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.

B. Trihydric alcohols - Nomenclature, methods of formation, chemical reactions of glycerol.

PHENOLS

A. Structure and bonding in phenols, physical properties and acidic character, Comparative acidic strength of alcohols and phenols, acylation and carboxylation.

B. Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesh reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

ALDEHYDES AND KETONES

A. Nomenclature, structure and reactivity of carbonyl group. General methods of preparation of aldehydes and ketones.

Mechanism of nucleophilic addition to carbonyl groups: Benzoin, Aldol, Perkin and Knoevenagel condensation. Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Beckmann and Benzil- Benzilic rearrangement.

B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen reduction, Wolf-Kishner reaction, $LiAlH_4$ and $NaBH_4$ reduction. Halogenation of enolizable ketones, An introduction to α,β-unsaturated aldehydes and

ketones.

UNIT-IV

A. CARBOXYLIC ACIDS

Preparation, Structure and bonding, Physical and chemical properties including, acidity of carboxylic acids, effects of substituents on acid strength, Hell-Volhard Zeilinsky reaction. Reduction of carboxylic groups, Mechanism of decarboxylation.

Di carboxylic acids: Methods of formation and effect of heat and dehydrating agents, Hydroxyacids.

B. CARBOXYLIC ACID DERIVATIVES

Structure of acid chlorides, esters, amides and acid anhydrides, Relative stability of acyl derivatives. Physical properties, inter-conversion of acid derivatives by nucleophilic acyl substitution.

Mechanism of acid and base catalyzed esterification and hydrolysis.

UNIT-V

ORGANIC COMPOUNDS OF NITROGEN

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalimide reaction, Hofmann-Bromamide reaction, Reactions of amines, electrophilic aromatic substitution of aryl amines, Reaction of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, Azo coupling.

REFERENCE BOOKS

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Organic Chemistry, P. L. Soni.

8. Organic Chemistry, Bahl and Bahl.
9. Organic Chemistry, Joginder Singh.
10. Carbanic Rasayan, Bahl and Bahl.
11. Carbanic Rasayan, R. N. Singh, S. M. I. Gupta, M. M. Bakidia & S. K. Wadhwa.
12. Carbanic Rasayan, Joginder Singh.

Paper – III
PHYSICAL CHEMISTRY 60 Hrs., Max Marks 34

UNIT-I

A. THERMODYNAMICS-I

Intensive and extensive variables; state and path functions; isolated, closed and open systems; Zeroth law of thermodynamics. First law: Concept of heat, work, internal energy and statement of first law; enthalpy, Relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases under isothermal and adiabatic conditions. Joule-Thompson expansion, inversion temperature of gases, expansion of ideal gases under isothermal and adiabatic condition

B. THERMO CHEMISTRY

Thermochemistry, Laws of Thermochemistry, Heats of reactions, standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions, Adiabatic flame temperature, explosion temperature.

UNIT-II

A. THERMODYNAMICS-II

Second Law of Thermodynamics: Spontaneous process, Second law, Statement of Carnot cycle and efficiency of heat engine, Carnot's theorem, thermodynamic state of temperature.

Concept of entropy: Entropy change in a reversible and irreversible process, entropy change in isothermal reversible expansion of an ideal gas, entropy change in isothermal mixing of ideal gases, physical signification of entropy, Molecular and statistical interpretation of entropy.

B. Gibbs and Helmholtz free energy, variation of G and A with pressure, volume, temperature, Gibbs-Helmholtz equation, Maxwell relations, Elementary idea of Third law of Thermodynamics, concept of residual entropy, calculation of absolute entropy of molecule.

UNIT III

A CHEMICAL EQUILIBRIUM

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Concept of Fugacity, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exergonic and endergonic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Thermodynamic derivation of relations between the various equilibrium constants Kp, Kc and Kx. Le Chatelier principle (quantitative treatment). Equilibrium between ideal gas and a pure condensed phase.

B IONIC EQUILIBRIA

Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono protic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

UNIT-IV

PHASE EQUILIBRIUM

A. Phase rule, Phase, component and degree of freedom, derivation of Gibbs phase rule, Clausius-Claperon equation and its applications to Solid-Liquid, Liquid-Vapor and solid-Vapor, limitation of phase rule, applications of phase rule to one component system: Water system and sulphur system.

Application of phase rule to two component system: Pb-Ag system, desilverization of lead, Zn-Mg system Ferric chloride-water system, congruent and incongruent, melting point and eutectic point.

Three component system: Solid solution liquid pairs.

B. Nernst distribution law, Henry's law, application, solvent extraction

UNIT V

PHOTOCHEMISTRY

Characteristics of electromagnetic radiation, Interaction of radiation with matter, difference between thermal and photochemical processes, Lambert-Beer's law and its limitations, physical significance of absorption coefficients. Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law, quantum yield, actinometry, examples of low and high quantum yields, Photochemical equilibrium and the differential rate of photochemical reactions, Quenching, Role of photochemical reaction in biochemical process.

Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), photosensitized reactions, energy transfer processes {simple examples), photostationary states, Chemiluminescence.

REFERENCE BOOKS

1. Physical Chemistry, G. M. Barrow, International student edition, McGraw Hill.
2. University General Chemistry, C. N. R. Rao, Macmillan.
3. Physical Chemistry, R. A. Alberty, Wiley Eastern.
4. The elements of physical chemistry, Wiley Eastern.
5. Physical Chemistry through problems, S. K. Dogra & S. Dogra, Wiley Eastern.
6. Physical Chemistry, B. D. Khosla,.
7. Physical Chemistry, Puri & Sharma.
8. Bhautik Rasayan, Puri, Sharma and Pathania, Vishal Publishing Company.
9. Bhautik Rasayan, P. L. Soni.
10. Bhautik Rasayan, Bahl and Tuli.
11. Physical Chemistry, R. L. Kapoor, Vol I-IV **.**
12. Chemical kinetics, K. J. Laidler, Pearson Educations, New Delhi (2004).

Paper –IV

LABORATORY COURSE

INORGANIC CHEMISTRY

Qualitative semimicro analysis of mixtures containing 5 radicals. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO_3^{2-}, NO_2^- , S^{2-}, SO_3^{2-},$S_2O_3^{2-}$, CH_3COO^-, F^- ,Cl^- , Br^- , I^- , NO_3^- , BO_3^{3-}, $C_2O_4^{2-}$, PO_4^{3-}, NH_4^+ , K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}.

Mixtures should preferably contain one interfering anion, or insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or combination of anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^-, Br^-, and I^-.

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 permanganometry.

(d) Estimation of hardness of water by EDTA.

(e) Estimation of ferrous & ferric by dichromate method.

(f) Estimation of copper using thiosulphate.

- Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: i. Ni (II) and Co (II) ii. Fe (III) and Al (III)

ORGANIC CHEMISTRY

- Detection of elements (X, N, S).
- Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, nitro, amine, amide, and carbonyl compounds, carbohydrates)
- Preparation of Organic Compounds:
  (i) m-dinitrobenzene, (ii) Acetanilide, (iii) Bromo/Nitro-acetanilide, (iv) Oxidation of primary alcohols-Benzoic acid from benzylacohol, (v) azo dye.

PHYSICAL CHEMISTRY

Transition Temperature

- Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2.4H_2O/SrBr_2.2H_2O$).

Thermochemistry

- Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
- To determine the solubility of benzoic acid at different temperature and to determine ΔH of the dissolution process.
- To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid/ weak base.
- To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Phase Equilibrium

- To study the effect of a solute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system.
- To construct the phase diagram of two component system (e.g. diphenylamine–benzophenone) by cooling curve method.
- Distribution of acetic/ benzoic acid between water and cyclohexane.
- Study the equilibrium of at least one of the following reactions by the distribution method:

  (i) $I_2(aq) + I^- \rightarrow I^-_3(aq)^{2+}$

  (ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)n$

Molecular Weight Determination

Determination of molecular weight by Rast Camphor and Landsburger method.

Note: **Experiments may be added/ deleted subject to availability of time and facilities.**

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
3. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000). 22
4. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011). Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
6. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York

Hrs.5 PRACTICAL EXAMINATION M.M.50

Three Experiments are to be performed.

1. Inorganic – Qualitative semimicro analysis of mixtures. **12 marks**

OR

One experiment from synthesis and analysis by preparing the standard solution.

2. (a) Identification of the given organic compound & determine its M.Pt./B.Pt.

6 marks

(b) Determination of Rf value and identification of organic compounds by paper chromatography. **6 marks**

3. Any one physical experiment that can be completed in two hours including calculations.

12 marks

4. Viva **10 marks**

5. Sessional **04 marks**

In case of Ex-Students one marks will be added to each of the experiment.

NEW CURRICULUM OF B.Sc. PART III

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 and 34 marks each and practical work of 50 marks. The Curriculum is to be completed in 180 working days as per UGC norms and conforming to the directives of Govt. of Chhattisgarh. The theory papers are of 60 hrs. each duration and practical work of 180 hrs duration.

Paper – I
INORGANIC CHEMISTRY 60 Hrs., Max Marks 33

UNIT-I

METAL-LIGAND BONDING IN TRANSITION METAL COMPLEXES

(A) Limitations of valence bond theory, Limitation of Crystal Field Theory, Application of CFSE, tetragonal distortions from octahedral geometry, Jahn–Teller distortion, square planar geometry. Qualitative aspect of Ligand field and MO Theory.

(B) Thermodynamic and kinetic aspects of metal complexes. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes, Trans- effect, theories of trans effect. Mechanism of substitution reactions of square planar complexes.

UNIT-II

MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Types of magnetic behavior, methods of determining magnetic susceptibility, spin only formula, L-S coupling, correlation of $\mu_{so(spin\ only)}$ and $\mu_{eff.}$ values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Electronic spectra of Transition Metal Complexes.

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for d^1 and d^2 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

UNIT-III

ORGANOMETALLIC CHEMISTRY

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18-electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series.

Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behavior of CO (MO diagram of CO to be discussed), Zeise's salt: Preparation and structure.

Catalysis by Organometallic Compounds –

Study of the following industrial processes and their mechanism :

1. Alkene hydrogenation (Wilkinsons Catalyst)
2. Polymeration of ethane using Ziegler – Natta Catalyst

UNIT-IV

BIOINORGANIC CHEMISTRY

Essential and trace elements in biological processes, Excess and deficiency of some trace metals, Toxicity of some metal ions (Hg, Pb, Cd and As), metalloporphyrins with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metals with special reference to Ca^{2+} and Mg^{2+}, nitrogen fixation.

UNIT-V

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, Applications of HSAB principle.

INORGANIC POLYMERS

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones. Silicates, phosphazenes and polyphosphate.

REFERENCE BOOKS

1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley.
2. Concise Inorganic Chemistry, J. D. Lee, ELBS.
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.
5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agarwal and Agarwal.
10. Advanced Inorganic Chemistry, Puri, Sharma, S. Naginchand.
11. Inorganic Chemistry, Madan, S. Chand.
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub.
13. Uchchattar Akarbanic Rasayan, satya Prakash & G. D. Tuli, Shyamal Prakashan.
14. Uchchattar Akarbanic Rasayan, Puri & Sharma.
15. Selected topic in Inorganic Chemistry by Madan Malik & Tuli, S. Chand.

Paper – II
ORGANIC CHEMISTRY 60 Hrs. Max Marks 33

UNIT-I
HETEROCYCLIC COMPOUNDS

Classification and nomenclature, Structure, aromaticity in 5-membered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Indole (Fischer indole synthesis and Madelung synthesis), Quinoline and isoquinoline, (Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet- Spengler reaction, Pomeranz-Fritsch reaction).

UNIT II

A. ORGANOMETALLIC REAGENT

Organomagnesium compounds: Grignard reagents formation, structure and chemical reactions.

Organozinc compounds: formation and chemical reactions.

Organolithium compounds: formation and chemical reactions.

B. ORGANIC SYNTHESIS VIA ENOLATES

Active methylene group, alkylation of diethylmalonate and ethyl acetoacetate, Synthesis of ethyl acetoacetate: The Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Robbinson annulations reaction.

UNIT-III
BIOMOLECULES

A. CARBOHYDRATES

Occurrence, classification and their biological importance. Monosaccharides: relative and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani Fischer synthesis and Ruff degradation; Disaccharides – Structural comparison of maltose, lactose and sucrose. Polysaccharides – Elementary treatment of starch and cellulose.

B. AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS

Classification and Nomenclature of amino acids, Configuration and acid base properties of amino acids, Isoelectric Point, Peptide bonds, Protein structure, denaturation/ renaturation, Constituents of nucleic acid, DNA, RNA nucleoside, nucleotides, double helical structure of DNA.

UNIT-IV

SYNTHETIC POLYMERS

A. Addition or chain growth polymerization, Free radical vinyl polymerization, Ziegler-Natta polymerization, Condensation or Step growth polymerization, polyesters, polyamides, phenols- formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes, natural and synthetic rubbers.

B. SYNTHETIC DYES

Colour and constitution (Electronic Concept). Classification of Dyes. Chemistry of dyes. Chemistry and synthesis of Methyl Orange, Congo Red, Malachite Green, Crystal Violet, phenolphthalein, fluorescein, Alizarine and Indigo.

UNIT-V

A. INFRA-RED SPECTROSCOPY

Basic principle, IR absorption Band their position and intensity, IR spectra of organic compounds.

B. UV-VISIBLE SPECTROSCOPY

Beer Lambert's law, effect of Conjugation, Types of electronic transitions λ_{max}, Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption Visible spectrum and colour.

C. NMR SPECTROSCOPY

Basic principles of Proton Magnetic Resonance, Tetramethyl silane (TMS) as internal standard, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant (J); Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple organic compounds. ^{13}CMR spectroscopy: Principle and applications.

REFERENCE BOOKS

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Wiley & Sons (1976).
8. Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
9. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning IndiaEdition, 2013.
10. Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
11. Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.

Paper – III

PHYSICAL CHEMISTRY 60 Hrs., Max Marks 34

UNIT-I

QUANTUM MECHANICS–I

Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect. Operator: Hamiltonian operator, angular momentum operator, Laplacian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of ψ & ψ^2, application of Schrodinger wave equation to particle in a one dimensional box, hydrogen atom (separation into three equations) radial and angular wave functions.

UNIT-II

A. QUANTUM MECHANICS–II

Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. and A.O., LCAO approximation, formation of H_2^+ ion, calculation of energy levels from wave functions, bonding and antibonding wave functions, Concept of σ, σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals-sp,sp^2,sp^3 Calculation of coefficients of A.O.'s used in these hybrid orbitals.

Introduction to valence bond model of H_2, comparison of M.O. and V.B. models. Huckel theory, application of Huckel theory to ethene, propene, etc.

UNIT III

SPECTROSCOPY

Introduction: Characterization of Electromagnetic radiation, regions of the spectrum, representation of spectra, width and intensity of spectral transition, Rotational Spectrum of Diatomic molecules. Energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotator, isotopic effect.

Vibrational Spectroscopy: Fundamental vibration and their symmetry vibrating diatomic molecules, Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, determination of force constant, anharmonic oscillator

Raman spectrum: Concept of polarizability, quantum theory of Raman spectra, stokes and antistokes lines, pure rotational and pure vibrational Raman spectra. Applications of Raman Spectra.

Electronic Spectroscopy: Basic principles, Electronic Spectra of diatomic molecule, Franck-Condon principle, types of electronic transition, application of electronic spectra.

UNIT-IV

ELECTROCHEMISTRY-I

A. Electrolytic conductance: Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.

B. Theories of strong electrolyte: limitations of Ostwald's dilution law, weak and strong electrolytes, Elementary ideas of Debye-Huckel-Onsager's equation for strong electrolytes , relaxation and electrophoretic effects.

C. Migration of ions: Transport number, Determination by Hittorf method and moving boundary method, ionic strength.

UNIT-V

ELECTROCHEMISTRY-II

A. Electrochemical cell and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells, EMF of the cell and effect of temperature on EMF of the cell, Nernst equation Calculation of ΔG, ΔH and ΔS for cell reactions.

B. Single electrode potential : standard hydrogen electrode, calomel electrode, quinhydrone electrode, redox electrodes, electrochemical series

C. Concentration cell with and without transport, liquid - junction potential, application of concentration cells in determining of valency of ions , solubility product and activity coefficient

D. Corrosion-types , theories and prevention

REFERENCE BOOKS

1. Physical chemistry, G.M.Barrow. International Student Edition McGraw Hill.
2. University General Chemistry, CNR Rao, Macmillan.
3. Physical Chemistry R.A.Alberty, Wiley Eastrn.
4. The elements of Physical Chemistry P.W.Alkin,Oxford.
5. Physical Chemistry through problems, S.K.Dogra, Wiley Eastern.
6. Physical Chemistry B.D.Khosla.
7. Physical Chemistry, Puri & Sharma.
8. Bhoutic Rasayan, Puri & Sharma.
9. Bhoutic Rasayan, P.L.Soni.
10. Bhoutic Rasayan, Bahl & Tuli.
11. Physical Chemistry, R.L.Kapoor, Vol- I-IV.
12. Introduction to quantum chemistry,A.K.Chandra,Tata McGraw Hill.
13. Quantum Chemistry,Ira N.Levine, Prentice Hall.

B.Sc. Part- III

PRACTICAL

Max. Marks-50

INORGANIC CHEMISTRY

Gravimetric analysis:

- Estimation of nickel (II) using Dimethylglyoxime (DMG).
- Estimation of copper as CuSCN
- Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.
- Estimation of Al (III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminium oxinate).
- Estimation of Barium as $BaSO_4$

Inorganic Preparations:

- Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$
- Cis and trans $K[Cr(C_2O_4)_2.(H_2O)_2]$ Potassium dioxalatodiaquachromate(III)
- Tetraamminecarbonatocobalt (III) ion
- Potassium tris(oxalate)ferrate(III)/ Sodium tris(oxalate)ferrate(III)
- Cu(I) thiourea complex, Bis (2,4-pentanedionate) zinc hydrate; Double salts (Chrome alum/ Mohr's salt)

ORGANIC CHEMISTRY

1. Preparation of organic Compounds

- Acetylation of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-,m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid)
- Benzolyation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, panisidine) and one of the following phenols (β-naphthol, resorcinol, p cresol) by Schotten-Baumann reaction.
- Bromination of any one of the following: a. Acetanilide by conventional methods b.Acetanilide using green approach (Bromate-bromide method)
- Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).
- Reduction of p-nitrobenzaldehyde by sodium borohydride.
- Hydrolysis of amides and esters.
- Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.

- Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid, oxalic acid, phenyl acetic acid and phthalic acid).
- Aldol condensation using either conventional or green method.
- Benzil-Benzilic acid rearrangement.
- Preparation of sodium polyacrylate.
- Preparation of urea formaldehyde.
- Preparation of methyl orange.

The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC.

2. Qualitative Analysis Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives.
3. Extraction of caffeine from tea leaves.
4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
5. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy. (Spectra to be provided).
6. Estimation of glycine by Sorenson's formalin method.
7. Study of the titration curve of glycine.
8. Estimation of proteins by Lowry's method.
9. Study of the action of salivary amylase on starch at optimum conditions.
10. Effect of temperature on the action of salivary amylase.

PHYSICAL CHEMISTRY

Conductometry

- Determination of cell constant
- Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- Perform the following conductometric titrations:
    i. Strong acid vs. strong base
    ii. Weak acid vs. strong base
    iii. Mixture of strong acid and weak acid vs. strong base
    iv. Strong acid vs. weak base
- To determine the strength of the given acid conductometrically using standard alkali solution.
- To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically
- To study the saponification of ethyl acetate conductometrically.

Potentiometry/pH metry

Perform the following potentio/pH metric titrations:

i. Strong acid vs. strong base

ii. Weak acid vs. strong base

iii. Dibasic acid vs. strong base

iv. Potassium dichromate vs. Mohr's salt

v. Determination of pKa of monobasic acid

UV/ Visible spectroscopy

- Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration
- Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
- Study the kinetics of iodination of propanone in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenathroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acelaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine λ_{max} values.

Note: **Experiments may be added/deleted subject to availability of time and facilities**

REFERENCE BOOKS:

1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000)
6. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.

8 Hrs. **PRACTICAL EXAMINATION** **M.M.50**

Five experiments are to be performed.

1. **Inorganic** - Two experiments to be performed. Gravimetric estimation compulsory **08 marks**. (Manipulation 3 marks)

   Anyone experiment from synthesis and analysis **04 marks**.

2. **Organic** - Two experiments to be performed. Qualitative analysis of organic mixture containing two solid components. compulsory carrying **08 marks** (03 marks for each compound and two marks for separation).

One experiment from synthesis of organic compound (Single step) **04 marks**.

3. Physical-One physical experiment **12 marks**.

4. Sessional **04 marks**.

5. Viva Voce **10 marks**.

In case of Ex-Students one mark each will be added to Gravimetric analysis and Qualitative analysis of organic mixture and two marks in Physical experiment.

B.Sc. (Home-Science) PART- I

MARKING SCHEME

S.No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Total	Theory M. Mark	Practical M.Mark
Group **I**	(A) (B) (A) (B)	Environmental Studies Field work **Foundation Course** Hindi Language-I English Language-II	75 25 75 75	-	100 75 75	33 26 26	
Group **II**	(A) (B)	Basic Nutrition Introduction to Resource Management	50 50	25 25	75 75	33	09 09
Group **III**	(A) (B)	Introduction to Human Development Textile and Clothing	50 50	25 25	75 75	33	09 09
Group **IV**	(A) (B)	Community Development Personal Empowerment and Computer Basics	50 50	25 25	75 75	33	09 09
		Total	**700**				

DISTRIBUTION OF MARKS IN VARIOUS PRACTICALS

S.No.	Name of the Practical	Total M.	Sessional	Viva	Practical	Marks
1	BASIC NUTRITION	**25**	**05**	**05**	**A. Preparation &Presentation) any one Recipe** **B. Taste**	**10** **05**
2	INTRODUCTION TO RESOURCE MENAGEMENT	**25**	**05**	**05**	**-**	**15**
3	INTRODUCTION TO HUMAN DEVELOPMENT	**25**	**05**	**-**	**A. Preparation of any one article of Baby kit** **B. Toy or wearing Food of Imm. Chart**	**10** **10**
4	TEXTILE & CLOTHING	**25**	**05**		**A. Drafting** **B. Stitching** **C. Weave**	**05** **10** **05**
5	COMMUNITYDEVELOPMENT	**25**	**10**	**05**	**Preparation of Audio-Visual aids**	**10**
6	PERSONAL EMPOWERMENT & COMPUTER BASIC	**25**	**05**	**05**	**Computer Practical**	**15**

B.Sc. (Home Science) PART- I
Group – II
Paper –A
BASIC NUTRITION

M.M.50

OBJECTIVE:

- This course will enable the student to understand the functions of food and the role of various nutrients, their requirements and the effects of deficiency and excess (in brief).
- Learn about the structure, composition, nutritional contribution and selection of different foodstuffs,
- Be familiar with the different methods of cooking, their advantages and disadvantages, Develop an ability to improve the nutritional-quality of food.

THEORY

UNIT-I

Concept of Nutrition – Food, Nutrition, Under and Over Nutrition, Health

1. Functions of Food
2. Basic Terminology (Blanching, Marination, in cookery- Caramalization, Seasoning)
3. Methods of Cooking

UNIT-II Nutrients: Macro nutrients

Classification, sources, functions
Recommended Dietary-Allowances
Deficiency and excess (in brief)
Water
Carbohydrates
Fats
Protein
Fiber

UNIT-III Nutrients: Micro nutrients

Calcium
Iron
Magnesium
Zinc
Fluorine
Iodine, Selenium, Copper, Manganese
Fat-soluble vitamins (A,D,E,K)
Water soluble Vitamins (Thiamine, Riboflavin, Niacin, Vitamin C, Folic Acid ,Pyridoxine, Pantothenic acid and vitamin B12)

UNIT-IV Food, Structure Composition Classification and Functions.

- Cereals, Millets and their products
- Pulses, Legumes and their products
- Fruits and Vegetables
- Milk and Milk Products
- Nuts and oil Seeds
- Meat, Fish, Poultry and Eggs
- Tea, Coffee, Cocoa, Chocolate and other beverages
- Condiments and spices.

UNIT-V Improving Nutritional quality of Foods:

- Germination
- Fermentation
- Substitution
- Fortification and Enrichments

REFERENCES:

Robinson, C.H., Lawler, M.R. Chenoweth,W.L and Garwick'A.E. (1986) : Normal and therapeutic Nutrition, 17th Ed., Macmillan Publishing Co.

Swaminathan, M.S. (1985) : Essentials of Food and Nutrition VI : Fundamentals Aspects VII: Applied Aspects.

Hughes, O.Behnion, M. (1970) : Introductory Foods, 5th Edn., MacMillan Company.

Williams, S.R. (198-9) -.Nutrition and Diet Therapy, 4th Edn., C.V. Mosby Co.

PRACTICAL

OBJECTIVES:

1. To acqure skills in food preparation techniques.
2. To use appropriate methods of cooking for preparation of specific food products.

I

1. Weights and Measures standard and household measures for raw and cooked food.
2. Preparation of two recipes using cooking methods Boiling, Steaming, Baking, Roasting, Frying and Grill

II **Vegetables**

a. Simple salads and sprouting
b. Curries

III **Fruits**

Fruit preparations using fresh and dried fruits.

IV **Milk**

a. Porridges
b. Curds, paneer and their commonly made preparation.
c. Milk based simple desserts and puddings – custards, kheer, ice-cream

V **Soups**

Basic, clear and cream soups

VI **Peanut chikki, Paushitik ladoo**

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B.Sc. (HOME SCIENCE) PART- I

Group – II
Paper-B

INTRODUCTION TO RESOURCE MANAGEMENT

M.M.50

FOCUS :

This course deals with the management of resources in-the family with particular reference to mobilising all the resources for achieving the family goals. It also deals with the factors motivating management and management applied to specific resources. The course intends to create awareness, appreciation and understanding of environment. The major environmental issues and problems are to be critically analysed for inculcating environmental consciousness among the learners and to help them take individual/ household/community level decision for making the physical environment condcive for . family living. The course content has to be taught at an elementary level.

OBJECTIVES :

1. To create an awareness among the students about, management in the family as well as the other systems.
2. To recognize the importance' of wise use of resources in order to achieve goals.
3. The physical environment and its components and the major issues.
4. The impact of human, activities on environment
5. The action needed for checking environmental threats

THEORY

Unit – I

1- Introduction to Resource Management Definitions
2- Types of Management
3- Advantages of Management Limitation in Management

Unit – II Factors Motivating Management

1- Goals – Definition, Types and Utility
2- values – Importance, Sources, Classification, Characteristics, Changing values.
3- Standards – Conventional and non conventional – qualitative, quantitative, conventional and non conventional.
4- Relation between values, goods and standard

Unit – III (1) Resource

(a) Types of Resources
(b) Characteristics of Resource
(c) Factors affecting use of Resources
(d) Relation to Resources to Management

(2) Decision Making –

(a) Definitions and Importance
(b) Steps of Decision
(c) Factors affecting decision
(d) Resolving conflicts.

Unit – IV Management Process -

1- Meaning, Definition and element of Management process – Planning, Controlling, Organising and evaluation.
2- Planning – Importance, Techniques and Types Organisation.
3- Controlling – Phases of Controlling, Factory in success of the control steps – suitability, promptness, New decisions, Flexibility
4- Supervision – Types of Supervision – Direction and Guidance
5- Evaluation – Importance, Types, Techniques of Self evaluation, Evaluation of whole process and management.

Unit – V Management of Resources -

(1) Time Management – Tools – Time patterns, Time Cost, Peak Load, Work Curve, Rest Period, Time Norm.
(2) Energy Management –
  (a) Introduction, Types, Causes, Symptoms, of fatigue Measures to Relives. Process of energy management.
(3) Work Simplification Definition Importance, Techniques – Forma and informal pen and pencil techniques.

PRACTICAL (any six)

1 Identify and formulate various types of standard that student can have .
2 Identify and formulate five goals that a student will have.
3 Identify and formulate various types of decision, write process of decision making.
4 To work out minimum and maximum working approach. (Vertical and horizontal)
5 Take up a situation trip/function/picnic/party and manage that situation. Write the process of management implementing and report.
6 Making time plan for a student (at least for a week) and explain it.
7 To develop simplify methods of any work.
8 Visit to energy garden.

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B.Sc. (HOME SCIENCE) PART- I

Group – III

Paper- A

INTRODUCTION TO HUMAN DEVELOPMENT

M.M.50

FOCUS:

This is an attempt to guide undergraduate students in understanding of the field of Human Development in a basic way.

A Concious deviation is taken from the stage-wise approach to. the life span so as to make the course more meaningful and to allow for flexibility in understanding human development, as a continuous process. All topics are given a cross-cultural orientation. The major topics covered are : An overview of the field ; factors important for growth and development; different dimensions of development across the life-span namely, physical and motor, cognition, language, socio-emotional and personality and finally relevant issues in human development and social change.

Techers are encouraged to use the points of emphasis mentioned and culturally relevant examples to stimulate throught and participatroy discussion. The use of Video-films is also recommended to suppliement course content and facilitate discussions. This course purports to create awareness and appreciation for the role and functions of marriage and family as basic institutions. The changing trends, the dynamics of adjustment and contemporary problems and issues are to be critically analysed for developing better understanding of needs, adjustment areas and intervention strategies.

OBJECTIVES:

The student will –

1. Acquire knowledge and insights about the dynamics of contemporary marriage and family systems in India.
2. Become acquainted with the concept, goals and areas of adjustment, relationship within the family.
3. Become aware of her changing roles and relationships with the family.
4. Understand the dynamics of families in distress and crisis.
5. To introduce student to the field of human development-concept, dimensions and interrelations
6. To sensitize students to social and cross-culture contexts in human development.
7. To sensitize students to interventions in the field of human development

THEORY

Unit –I An overview on the field of HD

i what is human development? Why do we need to studyit? defenition of development,ie. family and society, variations across cultures and individual differences inHuman development.

ii family and child welfare ;**a**. family welfare programme, **b**. childwelfare programme,

iii Growth and Development

a. Understanding growth and development (Definitions)
b. General Principles of development.
c. Constraints and facilitators in growth and development (influences of heredity and environment)

- Genetic inheritance: (i) fertilization (ii) Number of chromosomes. (iii) the uniqe third pair determines sex, (iv) genotype and phenotype, (v) sex linked genetic effects.
- Environmental per-requisites: (i) Nutrition, (ii) opportunities.
- Interaction between environment and inheritance: (i) genes provide the predisposition, range and direction of development, (ii) environment determines the extent or limit.
- The beginning of a new life
- Prenatal development
- Prenatal influences on the child: biological risks, age of mother, physical characteristics, illness, diet and nutrition, stress and emotional strains environmental hazards.

UNIT-II **Physical Development**

- The new born physical appearance: size, weight, bodily proportions, sensory capacities i.e. hearing, vision, taste, smell,, touch, temperature and position.
- Changes in size, shape, muscles and bones, and brain as it continues through : infancy end of infancy,
- Linking physical and motor development.

Motor development: reflexes in infancy; major milestones through end of infancy,

- Physical and motor development can be influenced through : (i) Maturation, (ii) nutrition, (iii) monitoring and healthcare, (iv) stimulation, (v) practice.

UNIT-III **Cognitive Development Across the Life Span**

a. Cognitive development

- The concept of intelligence
- (A brief introduction to Piaget's theory)introduce stages withour much elaboration : sensorimotor stage in infancy concrete operational stage in childhood changes in remembering the reasoning in middle childhood, formal operations in adolescence, fluid and crystallized intelligence in adulthood, declining cognitive abilities in late adulthood and old age.).

The Developmet of Language Across the Life Span

Language as a form of communication

- Functions of language : expressing wishes, controlling others, interacting with others, expressing individuality, exploring the world, pretending, using language to communicate/share information, understanding our society and culture, reasoning.
- Communicating before language development i.e. the stages of vocalization : undifferentiated crying, differentiated crying, babbling, Imitation of sound, patterned speech.
- Beginning to use language : one or two word utterances; early sentences; telegraphic speech; understanding metaphors, smiles, irony, reflecting on superficial and deeper level meanings of sentences.
- Uses of language; conversational acts (non-verbal) conversational conventions, learning to listen.
- Language development can be influenced through : (i) maturation, (ii) stimulation
- Deviations in language development : in language development : Possible decline of language in the aged, (speech- impairment and disorders to be introduced briefly).

UNIT-IV Socio-emotional Development Across the Life Span

a. Understanding social and emotional development

b. Social development :

- Introduce socialization as an important part of the process of becoming human.
- Social milestones : beginning with the emergence of the social smile; attachment, separation, anxiety, acquiring sex roles in childhood, induction into occupational roles by adulthood, social isolation and consequences in late adulthood and in the elderly.
- Patterns and role of parent-child interactions, interactions with siblings and peers; social and cultural interactions through infancy to old age.

c. Emotional development

- Emotions serve two adaptive functions : (i) motivating and (ii) communication.
- Basic emotional reactions (joy, fear, jealousy, anger, sadness, aggressions)
- Components of emotion : (i) emotions are elicited by the context, (ii) include bodily activity, (iii) emotional expressions are made through facial expressions, bodily movements, vocationalization, (iv) labelling emotions. Emotions may be acquired as a result of/by the Influence of - (i) internal and external sources, (ii) cognition, (iii) learning and (iv) social reinforcement.
- Milestones of emotional development through infancy and childhood emotional confusions and adolescence, stability of emotions in adulthood and old age.
- Emotional problems : (i) depression, (ii) over-activity, (iii) aggression.

Personality Development Across the Life Span

a. Personality Development

b. Personality may be influenced by : (a) heredity, (b) environment (parenting styles, peer groups, social interactions, early childhood experiences, life events, support available in a community etc.)

c. The role of social norms in personality development. Deviant personalities : (juvenile delinquency in childhood and anti-social personalities in adulthood)

UNIT-V **Marriage**

a. Marriage as an institution : goals, rituals, functions, changes and challenges.

b. Mate selection : factors influencing, considerations of exogamy and endogamy, changing trends, arranged and personal choice of mates.

c. Preparation for marriage, social emotional issues, financial concerns and exchanges, guidance and counseling.

d. Marital adjustment, areas and factors influencing: planned parenthood.

Families with Problems

a. Families with marital disharmony and disruption, dimension, casual factors.

b. Families in distress, violence and abuse, dowry victimization, violence against women.

Interventions for Families in Trouble

a. Counseling premarital and marital

b. Public awareness and education programmes

PRACTICAL

Production to Human Development and Family Dynamics

1. Visit to a pediatric ward to observe a new born body and a premature baby.
2. Preparing a growth average height weight chart of five (5) children from one to (1 -3) years.
3. Study of immunization schedule.
4. Survey of parent's regulative awareness about weaning food, toys; clothes.
5. Preparation of body Kit- Baby carry bag, bib, Jhabla.

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B.Sc. (HOME SCIENCE) PART- I

Group – III
Paper- B
TEXTILE AND CLOTHING

M. Marks: 50

FOCUS:

(A) Variety in clothing depends on variety of textiles. Though very few textiles were known to man earlier, presently, he is seeing newer textiles each one superseding to other. Their performance is also varying. It is essential for a student to have some basic knowledge of these textiles to select the right kind of fabric for specific use.

(**B**) Clothing is important for protection, comfort,personality and growth in relevant age groups .the course should dealt with ,keeping in view the activities of concerned age group with consideration for safety, ease of care and comfort.

OBJECTIVES:

To enable students to-

1. To acquaint with proper notion regarding choice of fabrics
2. To develop skills in clothing construction
3. To acquaint with different textiles and their performances
4. Impart knowledge on different textiles finishes

THEORY

Unit – I

1. Introduction of the Subject
2. Common Terminologies used in Textile
3. Properties of Textile Fibers

   Classification of the textile fibres : History, composition, types, production & properties
   - Natural Fiber – Cotton, Linen, Silk, Wool
   - Man-Made Fiber – Rayon
   - Thermoplastic Fiber – Nylon

Unit – II

1. Study of Yarn
   - Meaning, Yarn Making : Mechanical & Chemical
   - Types – Simple, Complex, Novelty and Textured yarn
   - number , yarn count ,Yarn Twist
2. Methods of fabric construction
   - Weaving : Handloom and its parts.
   - Different types of weaves- Plain weaves, Floting weaves, Pile, Jaquard and Leno weaves.
3. Other methods of fabric construction : Felting, Knitting, Crocheting, Braiding & Lacing

Unit – III

1. Finishes : Meaning and purpose
   - Physical finishes : Singeing , Napping ,Brushing ,Shearing, sizing , shrinking , tentaring, Calendaring etc.
   - Chemical finishes : Bleaching & mercerizing

- Special purpose finishes : wrinkle resistance , water resistant & water repellent , Flame retardant , crease resistance , soil resistant etc.

2. Identification of Fabric
   - Appearance test / Microscopic test
   - Burning test / Creasing test
   - Breaking test / Tearing test & Chemical test

3. Importance of Clothing

Unit – IV

1. Dyes
   - Definition and Classification
   - Different types of dyes : Natural & Synthetic dyes
   - Suitability of various dyes to different fibres
2. Dyeing methods of different stages of processing :
   - Fiber , yarn , piece , union & cross
3. Household method of dyeing
4. Colour fastness
   - Characteristics of colour fastness
   - Fastness to sunlight ,crocking ,perspiration

Unit – V

1. Printing
   - Its significance
   - Methods of printing : Block, Stencil, Screen & Roller printing
   - Advantages and disadvantages of various methods of printing
   - Faults in different printing methods
   - Preparation of printing paste
   - Preparation of cloth for printing
   - After treatment of printed goods
   - Resist dyed - Bandhej of Gujrat and Rajasthan

PRACTICAL

1. Identification of yarn
2. Identification of textile fibres :
   - Visual test / Microscopic test
   - Burning test /Chemical test

3. weaves and their variations :
   - Plain weave / Twill weave
   - Satin & Sateen weave
   - Honeycomb & Birdseye weave

4. Printing
   - Block printing / Screen printing / Stencil printing

5. Tie & dye

6. Simple dyeing of different fabrics
7. Finishing of fabric before dyeing & printing
   - Scouring
   - Bleaching
   - Designing

8. Bleaching & whitening
9. Starching
10. Laundering of cotton, silk, wool and synthetic fabric
10. Batik

B.Sc. (HOME SCIENCE) PART- I

Group – IV
Paper-A
COMMUNITY DEVELOPMENT

M. Marks: 50

FOCUS

The focus of the course is on the evaluation of approaches to community development in general and in our country in particular. The course focuses on the structure of rural and urban communities, the systems comprising of interacting structures and interlocking of these to form the existing society. It will also indicate the relationship of social change to changes in the structures and systems that exist. It is expected to help students to orient themselves to be part of the development process.

OBJECTIVES: To enable students to

1. Be aware of the approaches to development
2. Develop faith in the capacity of the people, to take responsibility for their own development.
3. Understand the existing support structures for development efforts.
4. Understand the role of non Govt organizations in community development.
5. Understand the socio - economic structures and systems that make up the rural and urban communities.
6. Understand the meaning of social change through development plans and programs in the context of the exiting socio-economic structures and systems.
7. Recognise one's own role in the development process.

THEORY

UNIT-I **Development:**

a. Definitions, types - large scale and centrally planned and small scale and locally planned.
b. Goals, the purpose of developmet - processes of development - the input process and social action process.

Historical Perspective of Development Approaches:

a. The Capitalistic approach.
b. The welfare approach
c. The Gandhian approach
d. The modernisation approach
e. The institutional and social justice approach

Critical Development Issues :

a. Massive poverty
b. Food security

Community Development in India :

a. Evolution of community development programme in India since Independence.

UNIT-II **Support structures and their Functions** :

a. Central Social Welfare Board
b. State Social Welfare Board
c. National Level Voluntary Agencies such as CAPART, KVIC.
d. Elected Panchayats.

Community Development Programme Approaches :

a. Multi-purpose
b. Target group
c. Growth centred
d. Area
e. Minimum needs
f. Antyodaya
g. Integrated

Home Science and Community Development :

Scope of Home Science Extension for meaningful participation in community development in India

UNIT-III **(a) Analysis of Social Relations of Groups Social Stratification -Caste System (Micro/Macro)**

Differential ranking of groups as superior and inferio caste-groups; changes that have taken place/expected; abolition of untouchability, inter-caste collaboration, fusion of sub-castes; impact of reservations; social inequalities - extent of acceptance or opposition.

(4) Community development organization.

(5) Role of audio visual aids in community development.

UNIT-IV Poverty Analysis (Micro/Macro) causes of poverty and The number and proportion of poor (in general and with reference to gender in particular) prevalence of hunger and malnutrition, availability and accessibility to drinking water and sanitation facilities, health facilities, clothing and housing facilities, education facilities. Unemployment pattern and indebtedness; causes of poverty and inequalities; programs for poverty alleviation. Poverty line.

Social Relations in Religion and Culture (Micro/Macro)

a. Religions represented - the role of religion in the lives of people.
b. Popular expression of beliefs and attitudes that promote fatalism or confidence in themselves.
c. Religious and cultural customs and organisational opatterns that oppose the values of social justice, equality, liberty and solidarity.

UNIT-V **Analysis of Social Relation to Environment (Micro/Macro)~**

a. Customs, mores, rules, regulations that are eco-friendly and that are not eco-friendly.
b. Changing patterns of production and consumption-organic farming, soil and water conservation measures, recycling of wastes, use of bio-degradable articles etc., impact of these in the communities

Gender Analysis –

a. The concept of Gender as distinct from sex.
b. The division of labour.
c. Access and control of resource.
d. Changes in the means of gaining access to resources

Approaches and Methods of Socio-Economic Analysis-

a. Rapid Rural Appraisal
b. Participatory Rural Appraisal
c. Surveys, case studies, observation
d. Participant observations.

PRACTICAL

Field Experience in Village(s) / Urban Slums

a. Practical use of RRA / P R A Methods
b. Reporting on Socio-economic analysis of the rural / urban community
c. To select, Plan, preparation .& use of different-audio visual aids., aids, i.e.
Chart - Educational, Tree Chart, Flow.
Chart., Suspense Chart.-
Posters - Cartoons Pemphlets Puppets.
d. Conduct of survey based on Unit IV & V of Theory Papers, (any two)
e. Organising group demonstration.

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B.Sc. (HOME- SCIENCE) PART- I
Group – IV
Paper-B
PERSONAL EMPOWERMENT AND COMPUTER BASICS

M. Marks: 50

FOCUS:

This course is designed to create awareness and understanding of the need for empowerment and motivating the student towards higher goals and challenges of self-improvement. The focus is on the adolescent moving towards making choices, developing competencies and skills for handling responsibilities of self-growth and^ interpersonal relationships in personal and professional spheres. The thrust of this course must be in the Indian context, creating pride in and respect for cultural heritage and values. The teaching approach should be truly a "facilitator"- convinced and committed to the cause of empowerment of youth.

The Purpose of inclusion of this course must be viewed as "offering opportunities, motivation, information and skills" for enhancing the total outlook (perspectives) of the young student particularly girls. Hence the thrust is on development, women and the concept of Home Science education as holistic education with interface (and intergration) of professionalism and qualitative development of individuals and families. The teacher (facilitator) for this course must share such an- outlook and be oriented towards the same to be really effective. Also the typical examination oriented approach should be replaced by promoting dynamism, visionary zeal and motivational ethos in the classroom.

This course is designed to give basic inputs to students on Computers and their functioning and hands-on experience.

The awareness of the basic applications of computers as the tool for education, information and research is to be created and emphasized. The teaching learning process should include demonstrations and hands-on experience for all the students. Individuals, families and community.

OBJECTIVES:

The student will

1. become aware of the need, competencies and skils to be developed **for** empowerment and be motivated for self improvement/self -enhancement.
2. become aware of the role of empowerment of women from the perspectives of personal and national development;
3. become aware of the interdiscipiinarity of Home Science education and its potential for personal and professional enhancement.
4. become sensitized to some pertinent contemporary issues that affect the quality of life of individuals, families and community.
5. know the basics of computers;
6. to be able to use computers for education, information and research.

NOTE :

Practical based and participatory teaching-learning methodology to be utilized : not conventional lectures. Dynamism on the part of the teacher is essential for successful outcome of the course.

THEORY

UNIT-I **Personal Growth and Personality Development**
(Through exercises, role play, discussions)

a. The challenge : understanding and managing oneself : being aware of one's strenghts and weaknesses.
b. Personality Development: Factors and influences : emotional and motivational aspects; assertion vs. aggression.
c. Peer pressures : Issues and management; group conformity and individualism as co-existing aspects.
d. Conflicts and stresses, simple coping strategies.
e. Adjustment amd readjustment to changing needs and conditions of contempo rary society (technological changes, social changes, changes in values)

UNIT-II **Empowerment of Women**

a. Women and Development : The personal, familial, societal and national perspectives.
b. Capacity building for women : Education, decision-making abilities and opportunities, awareness and information on legal and political issues.
c. Women's organizations and collective strength : Women's action groups, women's participation in development initiatives.
d. Study and discussion of life histories, case studies of illustrious Indian women from different walks of life (eg. Indira Gandhi, Jhansi ki Rani, Medha Patkar, Kiran Bedi,' Vijayalaxmi Pandit, Sudha Chandran, Anutai Wagh, Ha Bhat, Bhanvari Devi)

Brief sketches/ profiles of women's organization and collective and activist efforts to improve the quality of life or tackle issues of concern (e.g. SEWA, Women's co-operaatives, WIT).

Note : Students must be sensitized and made aware through assignments to identify and study the contributions of women in their own regional areas as also in the context of national perspectives. Cases of individual and collective / organized women's strengths must be discussed with examples from local / regional / levels. Each student may prepare profiles of one individual and one collective group.

UNIT-III **Home Science Education as Empowerment**

1. The interdiscipiinarity of Home Science Education.
2. The role of Home Science Education for personal growth and professional development.
3. Home Science as holistic education with integration of goals for persons, enhancement and community development.

UNIT-IV **Some Significant Contemporary Issues of Concern**

a. Gender issues: inequities and discriminations, biases and stereotypes; myths and facts.
b. Substance abuse : Why and how to say no.
c. Healthy Habits : In relation to physique, to studies, to heterosexual interests.
d. AIDS : Awareness and education.

Note: Teachers/facilitators must be knowledgeable and equip themselves sufficiently; orientations/training sossions for tacilitatory .....

UNIT-V **Computer Fundamentals** :

a. Overview about computers
b. Components of a computer
c. Input/output devices

d. Secondary storage devices
e. Number Systems : Decimal, Binary, Octal, Hexadecimal
f. Representation of information : BCD, EBCDIC, ASCII
g. Representation of Data : Files, Records, Files
h. File organization and access
i. Security and safely of data.
j. Introduction to Operating Systems.

PRACTICAL

COMPUTER BASICS

1. a. Introduction
   b. Exploring the Desktop
   c. Running multiple programmes
   d. Accessories
   e. Control Panel
   f Managing Documents and Folders

2. MS Word

   a. Starting MS-WORD
   b. Creating and Formatting a document
   c. Changing Fonts and Point Size
   d. Table Creation and operations
   e. Autocorrect, Auto Text, Spell Check, Thesaurus
   f. Word Art, inserting objects
   g. Mail merge, letter, label, envelope
   h. Page set-up, Page preview
   i. Printing a document

3. MS-Excel

   a. Starting Excel
   b. Work Sheet, Cell, Inserting Data into Rows/Columns
   c. Alignment,Text-wrapping
   d. Sorting data, Auto sum
   e. Use of functions, referencing formula cells in other formulae
   f. Naming cells and ranges, Goal seek
   g. Generating graphs
   h. integrating Worksheet, data and charts with WORD
   i. Creating Hyperlink to **a** WORD document
   j. Page set-up, Print Preview, Printing Worksheets.

4 Internet

   a. Genesis and use of Internet
   b. Software and hardware tequirments for Internet
   c. Accessing the Internet, Web Page, Unsing a Search Engine, Accessing the Internet from MS-Office applications

REFERENCES:

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B.Sc. (Home Science) PART- II
MARKING SCHEME

S.No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Total	Theory M. Mark	Practical M.Mark
Group **I**	(A) (B)	**Foundation Course** Hindi Language-I English Language-II	 75 75		 75 75	 26 26	
Group **II**	(A) (B)	Clinical Nutrition & Dietetics Textiles and Fiber Science	50 50	25 25	75 75	33	09 09
Group **III**	(A) (B)	Human Physiology & Community Nutrition Communication Process	50 50	25 25	75 75	33	09 09
Group **IV**	(A) (B)	Life Span Development Consumer Economics	50 50	25 25	75 75	33	09 09

DISTRIBUTION OF MARKS IN VARIOUS PRACTICALS

No.	**Name of the Practical**	**Total Marks**	**Distribution**			**Marks**
			Session	**Viva**	**Practical**	
Group – II A	Clinical Nutrition & Dietetics	**25**	**05**	**05**	Planning Cooking + Presentation	**08** **07**
Group – II B	Textiles and Fiber Science	**25**	**05**	**05**	Stain Removal Tie & Dye Printing	**05** **05** **05**
Group – III A	Human Physiology &Community Nutrition	**25**	**05**	**05**	Spotting Blood Practicals	**10** **05**
Group – III B	Communication Process	**25**	**05**	**05**	Preparation of Audio Visual Aids - 2	**15**
Group – IV A	Life Span Development	**25**	**05**	**05**	Practical	**15**
Group – IV **B**	Consumer Economics	**25**	**05**	**05**	Practical	**15**

B.Sc. (HOME-SCIENCE) PART II
Group –II
Paper - A
CLINICAL NUTRITION & DIETETIES

M. Marks: 50

Focus : The course encompasses the various stages of the life cycle and how nutrition is critical at various stages. It briefly familiarizes students with the role of nutrition in common elements.

Objectives: This course will enable to students to -

1. Understand the concept of an adequate diet and the importance of meal planning.
2. Know the factors affecting the nutrient needs during the life cycle and the RDA-for various age groups.
3. Grain knowledge about dietary management in common ailments.

THEORY

UNIT-I Definition of Health & Nutrition

Dimensions of Health (Physical, Psychological emotional & Spiritual)

Energy Requirements - Factors affecting energy requirements-BMR, Activity, age, climate, diet - induced thermogensis (SDA physiological conditions.

Concept of nutritionally adequate diet and meal planning

(a) Importance of meal planning
(b) Factors affecting meal planning-Nutritional, Socio-cultural, Religious, Geographic, Economic Availability of time.

UNIT-II

Nutrition through the life cycle –

(At different activity and Social economic levels) requirements, nutritional problems, food selection.

(a) Adulthood
(b) Pregnancy
(c) Lactation
(d) Infancy
(e) Pre-School . -
(f) Adolescence
(g) Old age

UNIT-III Principles of diet therapy

(A) Modification of normal diet for therapeutic purposes, full diet, soft diet, Fluid diet, Bland diet.
(B) Energy modification and Nutrition for weight management- Identifying the overweight and obese etiological factors contributing to. Obesity Prevention & treatment, low energy diets.
(C) Under weight - etiology and assessment.
(D) High energy diet, Diet for febrile (fever) conditions & surgical condition. Nutritional Anemia
(E) Fevers – Typhoid

UNIT-IV

Etiology, Symptoms & diet management of the following -Diarrhea, Constipation, Peptic ulcer, Jaundice, Viral Hepatitis, Cirrhosis, musculoskeletal disease ,Arthritis, Gout.

UNIT-V

Diet in disease of the endocrine –

Pancreas - Diabetes mellitus - classification, symptoms, diagnosis, Dietary care & Nutritional, management of diabetes mellitus. Insulin therapy, Oral Hypoglycemic agents, special dietetic food, sweeteners & sugar substitutes, Diabetic coma, Juvenile Diabetes.

Diseases of the Cardio Vascular system –

Atherosclerosis Etiology & Risk Factors.

Hypertension - Etiology, prevalence Nutritional management & prevention.

Renal diseases - Etiology, characteristic, Symptoms & Dietary management of Glomerulonephritis- Acute & Chronic

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2. Passmore, R. and Davidson, S. 1986 : Human Nutrition and Dietetics, Livingstone Publishers.
3. Robinson, OH., Laer, M.R. Chenoweth, W.L. Ganwick, A.E. 1986 : Normal and Therapeutic Nutrition, MacMillan publishing Company, New York.
4. Williams, S.R. 1989 : Nutrition and Diet Therapy, 4th Ed., C.V. Mosby Co.
5. Shils, M.E. Olson, J. A. Shike, M. Eds. 1994 : Modern Nutrition in Health and Disease, 8th edn., Lea and Febiger a Waverly Company.

Group-II, Practical-A

1. Planning- Preparation of Normal and Therapeutic diet in relation to special and nutrient requirements (Any 15)

1 Adult
2 Pregnancy
3 Lactation
4 Constipation
5 Diarrhea
6 Obesity
7 Underweight
8 Peptic Ulcer
9 Jaundice
10 Viral Hepatitis
11 Cirrhosis
12 Acute glomerulenephritis
13 Chronic glomerule nephritis
14 Diabetes mellitus **(using food exchange list)**
   (i) With Insulin
   (ii) Without insulin
15 Hypertension(Atherosclerosis)
16 Anemia

2. Standardization of recipes

B.Sc. (HOME-SCIENCE) PART II
Group –II
Paper - B
TEXTILE AND FIBRE SCIENCE

M. Marks : 50

THEORY

Unit – I

1. Principles of laundry and its methods
2. Equipment for washing :
    - Washing equipment
    - Drying equipment
    - Finishing equipment
    - Storage equipment
3. Cleaning materials and Detergents :
    - Soap and detergent
    - Other cleaning agents
4. Water : Composition, Classification, Hardness of water, Methods of removal of hardness

Unit – II

1. Useful suggestions for laundering
2. Washing of different kinds of fabrics : Cotton ,wool ,silk & synthetic
3. Bleach agents and other reagents used in laundry
4. Starch : types and uses
5. Blue : types and uses

Unit – III

1. Dry Cleaning
2. Stain removal : classification and technique of stain removal
3. Disinfection of cloths
4. Care and Storage of fabrics
5. Consumer problems and protections

Unit – IV

1. Equipment and supplies used in clothing construction :
    - Measuring equipment
    - Cutting equipment
    - Stitching equipment
    - Finishing equipment
2. Sewing machine: its parts & function, maintenance of machine , problems faced and remedies.
3. Selection of fabric for dress according to Climate, Age, Occupation, Personality, Occasion, Figure Type, Fashion etc.
4. Wardrobe Planning

Unit – V

1. Tailoring
    - General Principles of clothing construction
    - Taking body measurement for different type of garments

- Interrelationship Of Needles, Thread, Stitch Length, & Fabric
- Cloth Estimation For Different Garments
- Drafting & Draping

2. Pattern Making
   - General Instructions For Pattern Making
   - Method
   - Types & Layout
3. Fitting
   - Fundamentals Of Fitting
   - Problems Area In Fitting
   - Factors Affecting Good Fit

Group-II, Practical-B

Printing - Block, screen, tie & die, stencil printing. -.

1. Stain Removal
2. Laundering of cotton, rayon silk wool & synthetics etc.
3. Bleaching & whitening
4. Starching
5. Care of household linen
6. Simple dyeing of different fabric.
7. Tie and Dye techniques
8. Batik
9. Finishing of fabric before dyeing & printing, Scoring, bleaching, Desizing.

REFERENCES:

Course: Introduction to Fashion Illustration

1. Tate, S.L**.,** Edwards, M.S. 1987 : The complete Book of Fashion Illustration, New York, Harper & Row Publications, 2nd Edn.
2. Allen, Anne & Seaman, Julian : Fashion drawing : basic principles, B.T. Batsford, London, 1993, 108p.
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B.Sc. (HOME -SCIENCE) PART -II
Group –III
Paper - A
HUMAN PHYSIOLOGY & COMMUNITY NUTRITION

M. Marks: 50

THEORY

Unit – I An introduction of Physiology and Anatomy

1. Cell – Structure and functions of human cell.
2. Tissues – Classification and structure
3. Cardiovascular System –
   (a) Blood – Composition & Functions
   (b) Heart – Structure and Functions
   (c) Vessles – Structure and Functions of Artery, Veins and Capillaries.

Unit – II Gastrointestional System :

1. Structure and Functions of various organs of the gastrointestinal tract.
2. Digestion and absorption of food.

Nervous System :

(a) Elementary Anatomy of Nervous System
(b) Functions of different part of the brain and spinal card.
(c) Autonomic, sympathenic & parasympathetic nervous system.

Unit – III Excretory System :

1. Structure and functions of kidney, bladder, formation of urine.
2. Structure and functions of spin.
3. Regulation of temperature of the body.

Respiratory System :

1. Structure of Lungs.
2. Mechanism of respiration and its regulation.
3. Transportation of Gases

Special Sense Organs :

1. Structure and functions of eye, Ear, Nose, Skin & tongue.

Unit – IV Musculo Skeletal System

1. Types of Muscles and its functions.
2. Skeletal System – Types of Bones.

Reproductive System –
Structure and functions of male & female reproductive organs.

Unit – V Concept and Scope of Community Nutrition :

1. Nutritional problems of the community & implications for public health.

   Common Problems in India – Causes (Nutritional and Non Nutritional Problems)

   Incidence of Nutritional problems, sigh, symptoms & Treatment.

   Protein-Energy Malnutrition (PEM)

2. Prophylaxis Programmes to Combat Nutritional Problems in India.

3. Food born disease-
    - Food Poisoning
    - Food Infections

REFERENCES:

1. Guyton, A.C. Hall, J.E. 1996, Text book of Medical Physiology, 9th Ed. Prism Books (Pvt.) Ltd., Bangalore.
2. Winwood 1988 : Sear's Anatomy and Physiology for nurses, London, Edward Arnold.
3. Wilson 1989 : Anatomy and Physiology in Health and Illness, Edinburgh, Churchill Livingstone.
4. Chatterjee Chandi Charan 1988 : Text book of Medical physiology, London, W.B.
5. Saunder's Co. Verma, V. 1986 : A text book of Practical Botany, Vc;. I to IV, Rastogy Publication.
6. Anderson, D.B. and Mayer, B.S. 1970 : Plant physilogy, Van Nostrand Reinhold Company', East West Press Edition.
7. Kochhar, P.L. 1994 : A text book of plant physiology, Atma Ram & Sons, Delhi..
8. Dhami, P.S. 1987 : A text book of Zoology, S. Nagin & Company, Julundhar.
9. K.S. Gopalaswamy iyengar 1991 : Complete Gardening in India, Bangalore, Gapalaswamy Parthasarthy.
10. Kochar, S.L. 1981 : Economic. Botany in tropics, Macmillan, India.
11. Hartmann, H. and Kester, D.E. 1993 : Plant Propagation principles and Practice, New Delhi, Prentice Hall of India (Pvt.) Ltd.

Group-III, Practical-A

1. Recording pulse rate.

2. Measurement of Blood Pressure.

3. Preparation of temperature chart.

4. Study of Histological slides of different organs.

5. Visit to one Anaganwadi centre and record the activities conducted by Anaganwadi.

6. Testing of adulterants in common foods (any five).

7. Making report of midday meal programme running at nearby school.

B.Sc. (HOME-SCIENCE) PART- II
Group –III
Paper - B
COMMUNICATION PROCESS

M. Marks: 50

Focus:
The course focuses on the process of communication, especially in development work in rural and urban areas.

Objectives: To enable students to –

1. Understand the process .of communication in development work ;
2. Develop skirls in the use of methods and media ; and
3. Be sensitive to the interests and needs of the people and the power of the media and methods.in catering to these needs and interests.

THEORY

UNIT-I Concept of development communication
- Meaning and importance of communication in development
- The purpose of communication
- Existing patterns of communication
- Factors that help or hinder communication

UNIT-II Communication Precess
- One-way and two-way or interactive communication
- Gaps in communication or distortions in transmission of message and their causes
- Importance of two way communication
- Basis for effective, interactice communication.
- Attitude of 'respect for others

UNIT-III Methods of communication in Development Methods to reach individuals
- Personal conference
- Interviews
- House visits
- Exhibits
- Methods to reach small groups
- Illustrated lecture
- Group discussions
- Co-operation

UNIT-IV Role Plays
- Demonstrations
- Workshop
- Camps
- Radio announcements/programs
- Newspaper stories
- Posters
- Videos, films
- Television programmes
- Letters, folders or pamphlets
- Public meetings

UNIT-V Media for development communication

- Folk media Songs Stories Street-theatre
- Games Arts
- Puppet play Print media
- Posters Pamphlets, leaflets
- Newspapers - articles, stories
- Periodicals - articles, stories, songs
- Books
- Cartoons
- Audio/Visuals, Audio-Visual Media
- Audio-tapes, radio broadcasts
- Slides, pictures, drawings, photographs etc.
- Videos, telecasts
- Films-documentary, feature

Group-III, Practical-B

(ANY SIX)

1. Organising group discussion.
2. Organising group demonstration.
3. Preparation & Presentation of Audio visual aids, i.e. Posters, Charts, Cartoons, Models Puppets.
4. Problem/need identification "of a community.
5. Planning an educational programme.
6. Evaluation of the effectiveness of methods and media.
7. Visit to Radio Station/T.V. Centre/Printing Press.
8. Preparation of Drama based on Social Development

B.Sc. (HOME-SCIENCE) PART- II
Group –IV
Paper - A
LIFE SPON DEVELOPMENT

M. Marks: 50

Focus :

This course covers the entire life span and traces the various developmental stages. Its encompasses in scope development in utero, infancy up to senesence identifying critical concerns in Socio-cultural perspectives.
To develop understanding of various methods and materials, which can be used-while working with children. The emphasis is on promoting creativity and use of different materials *to* allow for optimum development.

Objectives :
To become acquainted with developmental stages trom birth to old age.

1. To develop awareness of important aspects of development during the whole life span.
2. To know the reqDon Welers (1974): uirement of infants and fodders and develop skills to create play materials and designing learning experiences.
3. To understand the significance of various creative activities and teachers role in implementry them.

Note : For each of the following stages of development, the-influence and inter-actions of sociocultural and environmental factors needs to be discussed.

THEORY

UNIT-I

1. Life Span development and need to study development through the life cycle. Inter-relationship between the aspects of development.
2. Childhood period (2 to 12 years) - Definition, Characteristics and Developmental tasks. "Review (2-6 yrs to 6-12 yrs) of different developmental areas (Physical, motor, Social, emotional, intellectual.

UNIT-II

Adolescence (13 to 18 years)

1. Definition, Developmental tasks.
2. Physical Development - Puberty, growth, spurts, Primary and Secondary sex characteristics, early and late maturing adolescents.
3. Identity - Definition, body image, positive and negative outcomes (Role confusion, ego-identity)
4. Heightened emotionality- Meaning causes, expression characteristics of emotional maturity, conflict with, authority coping up strategies.
5. Problems - Drug and alcohol abuse, psychological breakdown (Behaviour) STD and AIDS.

UNIT-III

Adulthood (19 to 60 years) and ageing- (Early adulthood 19 to 40 years) Definition and characteristics Development tasks, significance of the period, reponsibilities and adjustment - New family, parenthood, independence, financial matters.

1. Middle Adulthood (41 to 60' years), Definition, physical changes (senses, diseases-Transitation Period.
2. Menopause- Health issues.

3. Stresses in middle age, coping with stress to family.
4. Preparation for retirement.

Late Adulthood and Ageing – Definition.

1. Physiological changes, and health problems.
2. Retirement-effect of retirement on self family, society financial problems faced.
3. Recreational interest of the aged.
4. Issues- Old age homes, loneliness, living in joint family, prolonged illness. (Plan visit to old age homes.)

UNIT-IV

Infancy and Toddlerhood (Emotional Aspect)

1. Importance and ways of meeting child psychological needs to promote feeling of security, trust and acceptance.

Activities according to developments for various age groups

(A) 0-6 months - Activities for simulating and sessions motor experiences with emphasis on seen, hearing, touching, feeling sensation and movements.

(B) 7 to 12 months - Integration of experiences involving more than one sense to deeper sensory motor experiences promotic manipulation, concept formation, communication and perceptual divtiminsyion.

(C) 13 to 24 months - Promotion of co-ordination and control of body movements, gross and fine motor skills. Strengthening concept formation, imagination and communication through language promotion of problem solving, environment to explore and satisfy curiosity and develop confidence.

(D) 25-36 months - Improvement in body movement and communication skills, social skills concept formation.

UNIT-V

Creativity

- Concept of creativity and highlights of the role of creative expressions in overall development of children.
- Creative expressions, Meaning and definition of creativity expressions.
- Role of teacher in planning and fostering creative expressions.
- Creative expressions.
-

Art Activities

- Painting and graphics
  (a) Painting with brush, drawing with crayons, chalk, rangoli on floor, finger painting. (Some special characteristics of this medium)
  (b) Values, materials required, use of substituler from indeigenous materials.
  (c) Teacher's role in conducting activities.
  (d) Stages in child art.
- Tearing, cutting, pasting and collage, mural
  (a) Values, materials requried and Teacher's role in conducting activities.
  (b) Development stages.
- Printing
  (a) Types of printing i.e. block, vegetables, string, leaf, stencils, spray, crumpled paper, different textured surfaces.
  (b) Values, materials required techniques.

BLOCKS :

(a) Some special features of this medium.
(b) Types of blocks : hollow large blocks, unit blocks and small blocks.
(c) Stages in block play.
(d) Values, materials and accessories for block play.
(e) Teacher's role

Other materials

- Sand
  - (a) Characteristics of the medium.
  - (b) Values, materials required and teacher's role.
- Water.
  - (a) Characteristics of the medium.
  - (b) Values, materials required and teacher's role.

Group-IV, Practical-A (ANY TEN)

1. Infancy and Toddlerhood
   1. A file to be prepared to list activities appropriate for age groups - 0-6 months, 7-12 months, 13 to 20 months and 25 to 36 months.
   2. Students be encouraged to observe materials available in the locality, Different types of shops, tailor.
   3. Develop play materials suitable for each age group.
   4. List activities, which can be used for working with different age groups.

(a) 0 to 6 months.

5. Prepare materials and design activities for seeing, hearing touching and feeling.
6. Sensation and movement for soothing movements and exercises.

(b) 7 to 12 months.

7. Prepare materials and design activities for touching and feeling sensation and movement, and manipulation.

(c) 13 to 14 months.

8. Identify activities for gross motor development and prepare play materials available in the locality.
9. Prepare play materials and list activities promote manipulation sensory experiences, concepts and language.

   Art Activity

10. Visit to old age homes.

Art Activities

11. A few suggestions are given under each category as guideline students be encouraged to explore experiment with each media and understand the characteristics of each medium.

    Samples of each be included in the resource file which each student is expected to maintain along with description of values materials and technique used.

12. Difficulty level of each activity be considered and decide its suitability for different age groups.
    - Painting and graphics
    - Prepare a variety of brushes from different types of brooms, cotton, wool, strips of cloth, feather etc

Tearing cutting and pasting

13. 3-5 years

    Tearing with all fingers, tearing with thump and two fingers as used in holding pencil, tearing on straight line, curved line.

14. 6-8 years

    Tearing circular rings starting from one corner of the page till centre of page, Making designs.

15. 3-5 cutting and pasting

    Cutting a design, pasting, please of paper, cloth, sticks leaves college, mosaic Printing

Printing

16. Printing with strings, leaf, vegetable blocks, stencil printing, thumb," finger, spray painting
17. Keeping coins, leaves with veins below paper and gently colouring with crayon.

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1. Berk, L.E. 1996 : Child Development, New Delhi : Prentice Hail.
2. Craig, G. 1999 : Human Development, N.J. : Prentice Hall
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5. Rice, F.P. 1965 : Human Development : A life. Span Approach, NJ : Prentice Hall.
6. Santrock, J.W. 1997 : Life Span Development, NY Brown & Bench mark.

B.Sc. (HOME-SCIENCE) PART- II
Group –IV
Paper - B
Consumer Economics

M. Marks: 50

THEORY

Unit – I Consumer

1- Definition of consumer
2- Consumer rights and responsibility
3- Consumer buying habits convenience goods
4- Factors affecting consumer decision

Unit – II Personal income

(1) Types of income – real, money, psychic, national income, disposable income.
(2) Saving and investment
(3) Sources of investment
(4) Factors affecting savings
(5) Ways of selecting investment

Unit – III Consumer in the market

(1) Market- Definition, types of market, functions, channels of distribution.
(2) Buying motives – Primary selective, rational emotional and totranages.
Types of Products
Advertisement, Sales, Promotion packing
(3) Consumer Buying Problems
(1) Adulteration- kinds and identification of adulteration.
(2) Faculty weights and measure
(3) Pricing
(4) Legal – guarantee and warrantee contracts, installment buying
(4) Buying process

Unit – IV Consumer Protection services

(1) Organisations
(2) Legislation – import laws for consumer protection
(3) Consumer representation
Consumer and consumers problems- choice and buying problems of consumer
(4) Consumer protective services
(1) Indian Standard Institution
(2) Educational Institution
(3) Consumer Co-operatives
(4) Government Agencies Municipality

Unit – V

(1) Consumer Decision making
(2) Factors effecting consumer decision in the market
(3) Good buy man ship
(4) Consumer aides for decision making

Group-IV, Practical- B

1- Test for adulteration
2- Filling of different types of form to protect consumer
3- Filling of form of investment services
4- Activity of educate consumer
5- Collection of samples of different symbols for helping consumer buying .
6- Project preparation in any relevant area.

References:

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- Seetha raman p and sethi m2001 Consumerism,strength and tactics, new delhi CBS publishers.
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- Don Welers (1974) : Who Buys - A study of consumer, (Unit I, IV, VI)
- Sherlekar, S.A. 1984 : Trade Practices and Consumerism, Himalaya Publishing House, (Unit I, VI)
- Sales Management, 5th Edu., Cunliffe Boiling, (Unit II, IV)
- Kotler Philip, Armstrong Gary (Principles of Marketing, 5 Edu. Prentice Hall of India, New Delhi, (Unit IV)
- David H. Bangs, Jr. : The Market Planning Guide, 3rd Edu,, Galgotra Publications, (Unit IV, VII)
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- Sarkar, A : Problems of Consumers in Modern India, Discovery Publishing House. (Unit Vll-X)
- Beckman, T.R. Moyard.H.H. and Davidson, W.R. 1957 : Principles of Marketing, Ronald Press,. (Unit IV, VI)
- Gordon, L.J. and Lee. S.M. 1972 : Economics of Consumers, Dvan Vostrand, (Unit I, II. Ill
- Cochrane, W.W. and Bell, C.S. 1.958 : The Economics of Consumption, McGraw Hill.
- Conoyer, H.C. and Vailes, R.S. 1951 : Economics of Income and Consumption, Ronald Press.

B.Sc. (HOME-SCIENCE) PART III
MARKING SCHEME

Group No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Theory M. Mark	Practical M. Mark
I	**(A)** **(B)**	**Foundation Course** Hindi Language English Language	 75 75		 26 26	
II	**(A)** **(B)**	Nutritional Biochemistry Food Preservation	50 50	25 25	33	09 09
III	**(A)** **(B)**	Early Childhood Education Extension Education	50 50	25 25	33	09 09
IV	**(A)** **(B)**	Foundation of Art and Design Apparel Making & Fashion Designing	50 50	25 25	33	09 09

DISTRIBUTION OF MARKS IN VARIOUS PRACTICAL

S.No.	Name of the Practical	Total Mark	Distribution			
			Sessi.	Viva		Marks
1	Nutritional Biochemistry	25	5	5	Titration, Identification of CHO, Blood	10 05
2	Food Preservation	25	5	5	Preparation Presentation	10 05
3	Early Childhood Education	25	5	5	Preparation Teaching	05 10
4	Extension Education	25	5	5	Practical – (2)	15
5	Foundation of Art & Design	25	5	5	Practical – (2)	15
6	Apparel Making	25	5	-	Stitching or Designing	10

B.Sc. (HOME-SCIENCE) PART- III
Group –II
Paper - A
NUTRITIONAL BIOCHEMISTRY

M. Marks: 50

THEORY

UNIT-I

(A) Introduction to Biochemistry - definition, objectives, scope and interrelationship between Biochemistry and other biological sciences.

(B) Carbohydrates - Definition, classifications functions and properties of

- Monosaccharides - Glucose, Fructose, Galactose
- Disaccharides - Maltose, Lactose, Sucrose
- Polysaccharides - Dextrin, Starch, Glycogen

Glycolysis, Gluconeogenesis, Glycogenesis
Glycogenolysis, Citric acid Cycle.
Blood sugar regulation.

UNIT-II

(A) Lipids – Definition, composition, importance and classification
Fatty acids - Functions, properties ,classification of MUFA and PUFA.
Significance of Acid value, Iodine value and saponification value.
Chemistry and function of Phospholipids, Glycolipids and sterols.
Metabolism - Beta Oxidation

(B) Aspects of transport – Passive diffusion, Facilitated diffusion, Active transport

UNIT-III

(A) Proteins - Definition composition function, and classification.
Amino acids - Essential and Nonessential
Metabolism - Urea cycle, Nitrogen balance, Amino acid pool

(B) Enzymes - Definition, properties, classification, Mode of action of enzymes, factors affecting velocity of enzyme catalyzed reactions, coenzymes.

UNIT- IV

(A) Harmones - Biological roles of harmones of Pituitary, Adreral cortex and medull, Thyroid, Parathyroid, Pancreas, Sex glands.

(B) Urine - Formation and Composition

UNIT-V

(A) Blood – Blood composition & its Function, Blood Coagulation, Blood Groups

(B) Nucleic Acid and Nucleoproteins – Chemistry, composition, structure, functions

Practical

Nutritional biochemistry

1. Identification of Glucose, Fructose, Maltose, Lactose, Sucrose, Starch.
2. Colour and precipitation reactions of Protein.
3. Estimation of Glueose by Benedict's method.
4. Estimation'of Haemoglobin by acid hanmotion method.
5. Estimation of Glycine by Titration.
6. Estimation of ascorbic acid by idometric method.
7. Visit to pathological lab (**compulsory**) to study the
   - Method of collection of sample
   - Application of latest techniques
   - Processing of sample
   - Use of reference values of blood and urine

B.Sc. (HOME-SCIENCE) PART -III
Group –II
Paper - B

FOOD PRESERVATION

M. Marks: 50

THEORY

UNIT- I

Food and it's preservation.
Home and community level including commercial operations.
Principles of food Preservation
Causes of spoilage of food.

Unit - II

- Food Storage – Principles and Methods
- Fresh Foods – Fruits & Vegetables
- Dried Foods – Rice, Wheat & Pulses

Canning of Foods

- Definition and Principles of Canning
- Nutritive value of Canned Foods

UNIT-III

Pasteurisation
Effect on food quality.
Storage of pasteurised food.
Drying & **Dehydration**
Methods used and effect on food quality. Types of driers. Storage and deterioration of dehydrated food products.

UNIT-IV

Use of low temperature
Refrigeration and freezing methods, principles and applications. Preparation of foods for freezing influence on food components and structure. Self life of frozen foods
Pickling and Fermentation
Pickles, chutneys, ketchups sauces. Fermentation - Types, products and method use
Establishment of a small scale industry / cottage industry.

UNIT-V

Chemical Preservatives
Preparation of Fruit, Juices, Squashes, Fruite Syrups, Cordials, Jam Jelly.
High Acid & High Sugar Products –
common defects, Preservation of crystalized and glazed fruits.

Nutritional Implications of food processing
Causes for loss of vitamins and minerals, Enrichment, Restoration and Fortification

REFERENCES :

1. Oser, B.L. 1965 : 14 Ed. Hawk's Physiologycal chemistry, Mc Graw Hill Book Co.
2. William, S. : 16th Ed. JAOAC, Official methods of Analysis, Part I to XI, Manak Bhawan, New Delhi.
3. West E.S., Todd W.R., Mason, H.S. and Van Braggen J.T. 1974 : 4th Ed. Textbook of Biochemistry, Amerind Publishing Co. -Pyt. Ltd.
4. White A. Handlar, P. Smith E.L. Stelten, D.W. 1959 : 2nd Ed. Principles of Biochemistry, CBS Publishers and distributors.
5. Lehminger, A.L. Nelson, D.L. and cox, M.M. 1993 : 2nd Ed. Principles of Biochemistry,. CBS Publishers and distributors.
6. Stryer, L. '1995 : Biochemistgry, Freeman WH and Co.
7. Devlin, T.M. 1986 : 2nd Ed. Textbook of Biochemistry with clinical Correlations John witey and sons.
8. Murray, R.K. Granner, D.K. Mayes, P.A. Nd Rodwell V.W. 1993 : 23rd Ed. Harper's Biochemistry, Large Medical Book.

Practical

1. Preparation of Jam, Jellies marmalades.
2. Preparation of Pickles & chutneys.
3. Dehydration of Vegetables & Fruits.
4. Preparation of Papad, Badi, Chips
5. Preparation of synthetic syrups & squashes.
6. Survey of market products and packaging

B.Sc. (HOME-SCIENCE) PART- III
Group –III
Paper - A
EARLY CHILDHOOD EDUCATION

M. Marks: 50

FOCUS-

The course focuses on need to provide various early childhood care and educational facilities through different programmes, for early childhood eduction. Types and present status of ECCE programmes are covered in this course. The recent policies affectionary young children are also included.

The course introduces students to the concept of curriculum for all round development of children. The main emphasis is on various components of curriculum to be included in daily program through medium of play. Method of learning by doing which forms the basis for understanding and knowledge is extended to the first two years of primary school.

OBJECTIVES :-

1. To know importance of early childhood care and significance of intervention programmes for early child development.
2. To understand major theoretical approaches and implication for early child development.
3. To become acquainted with current policies and programs in ECCE.
4. To meaning of curriculum and various components to be included in the daily programmes to promote all round development of children.
5. To recognize role of play in children's development.
6. To understand goals, principles, factors and approaches used in programme planning.
7. To recognize the advantages of project method and learn to use integrated approach in the development of daily programme.

THEORY

UNIT-I

Significance and objectives of early childhood care and education.

1. Significance of early childhood years in individuals development.
2. Meaning and need for intervention programmes for better growth and development.
3. Objectives of ECCE.
4. Different types of programs currently offered. Objectives of the program routine and target group covered by each of the following. ECE programme - Balwadi, anganwadi, Nursery school, Kindergarten, Montessori, laboratory nursery school ECCE Program - ICDS and mobile cretch. Play group : day care.

UNIT-II

Current Status and Expansion of Scope of ECE to ECCE

- Expansion from ECE to ECCE.
- Current Status of ECCE programme.
- Admission tests and effects on children.
- Effects of pressures on young children due to formal education.
- Need for ECCE programmes to provide quality care where mothers are at work.
- Global perspective - views of educationists - Froebel, Mac Millan sister, Deweu and Montessori,
- ECE in India : Overview of pre.and post independence period.
- Contributions of Ravindranath Tagore, Mohandas Gandhi, Gijubhai Bodheka, Tarabai Modak, Anutai Wagh.

Recent Developments : Policies, Institutions and contributions of NGOs

- National policy on children.

- National policy on education 1986.
- Role of Indian Association of Preschool Education, National Institute of Public Cooperation and Child Development, National Council for Educational Research and Training, SCERT and NGOs.

UNIT-III

- Meaning of curriculum, Foundation of curriculum development.
- Impact of play as means of development and learning.
- Developmental stages of play.
- Types of Play - Solitary play, parallel play, associative play and coopertives play.
- Functions of play - play as a means of assessing children's development.
- Teachers Role in creating environment and Promoting play.
- Classical theories of play - Surplus energy theory relaxation theory, Pre-exercise & recapitulation theory.

Programme Planning

- Approaches to learning : Incidental and planned learning.
- Principles of programme planning :
- from known to unknown, simple to complex, concrete to abstract.
- Balance between individual and group activity, indoor and outdoor play, quiet and active plays, guided and free activities.
- Factors influencing programme planning.
- Formal versus non-formal approach in education : advantages and disadvantages.

UNIT-IV Languages

- Goals of language teaching.
- Readiness for reading and writing. Meaning of readiness.
- Factor to be considered for readiness : Age, Vision, Hearing, Physical, emotional, social, experiential background, attention span, finer motor coordination, eye hand coordination, reading from left to right and top to bottom.

Mathematics

- Importance of number and mathematics.
- Number as a language and history of its development.
- Abstract nature of number.
- Mathematical readiness.
- Analysis of prerequisite skill for'number classification, comparing, seriation, patterning, counting, shape and space, measurement fractions, vocabulary, numeral operations.
- Operations and relevant rules and properties; subtraction, multiplication and division.
- Two and three dimension shapes, properties, characteristics.

Environmental studies

- Scope of environmental studies.
- Importance and goals of environmental studies.

UNIT-V Project method

- Introduction
- Meaning and advantages of using project method.
- Planning .

Alternative to Home Work

- Disadvantages of learning by role.
- Suitable alternatives such as observations, exploration, experimentation and reporting orally, picture or at. Something related to the concepts covered in class.

Evaluation

- Need for evaluation.
- Formative and summative evaluation.
- Methods of evaluation : Observations.
- Evaluation of daly work, tools for evaluation
- Reporting to parents.

Practical (any four)

1. Plan three activities for children : list objectives, analyst tasks to achieve goals, select and organize instructional and learning materials, teacher's role, preparation of evaluation sheets i.e. chick list, rating scale.
2. Prewriting activities.
3. (a) Mathematics
   (b) Readiness
   (c) Materials for classifying, comparing, seriations, patterning, counting shapes, fractions, list vovabulary related to mathematical concepts.
   (d) Material for addition, subtraction, multiplication and divisions.
   (e) Graphs.
   (f) Experiences for understanding time distance weight, capacity and money.
4. Prepare a lesson for early childhood education.
5. Plan a project based on lessons of first and second standard, plan activities which children can do at home.
6. Visit to nursery school (**compulsory**).

PRFERENCES:

1. Alder, S., Farrar, C. 1983 : A Curriculum for developing communications skills in the preschool child. Illinois : Thomas Publications.
2. Anderson, P. Lapp, D. : Language skills in elementary education. New York, Mac Millan.
3. Armstrong, D., Savage, T. '1987 : Effective teaching elementary education. New York, Mac Millan.
4. Gelman, R., Gallistel, C.1986 : The child's understanding of numbers. Cambridge : Harward University Press.
5. Harlan, J. 1984 : Science experiences for the early childhood years. Columbus : Charles Merrill.
6. Jarolimek, J. Foster, C. 1985 : Teaching and learning in the elementary school, New York: Mac Millan.
7. Kaul, V. 1984 :.PIay as an instrument of-child growth. In play and child development, New Delhi, NIPCCD.
8. Khanna, S. 1992 : Khel Khoj : Ahmedabad : National Institute of Design.
9. Liebeck, P. How children learn mathematics. London : Penguin.
10. Lioyd L, Rechardson, K. 1980 : A mathematics activity curriculum for early childhood and special education, New York : Mac Millan.
11. Maxim, G. 1985 : The very young. Belmount, California : Wadsworth Publishing Company.
12. Neumann, E. 1971 : The elements of play. In D. Sponseller, ed. Play as a learning medium Washngton, DC, NAEYC..
13. Robinson, H. 1983 : Exploring teaching London : Allyn amd Bacon.
14. Tarapore, F., Kettis, G., Benninger, C. 1993 ; Child's Right to play. Pune : SNDT College of Home Science.

B.Sc. (HOME-SCIENCE) PART III
Group –III
Paper - B
EXTENSION EDUCATION

M. Marks: 50

THEORY

UNIT-I

1. Concept of Education
   (a) Meaning of Extension
   (b) Origin of Extension
2. Extension Education Process
   (a) Environment for learning
   (b) Role of educator
   (c) Role of the people participants
3. Home science extension and community development

UNIT-II

4. Concept of adult / non formal education
   (a) Meaning
   (b) Purpose
5. Five Year Plans
   (a) History of planning in India.
   (b) Five year plans and their focus.
6. Planning at different levels- National to Grass roots.

UNIT-III

7. Programmes to enhance food production
   (a) national food production programmes.
8. Poverty alleviation efforts and food security
   (a) Programmes for poverty alleviation for rural and urban areas.
   (b) Current programmes for rural and urban poor

UNIT-IV

9 Programmes for women and childrenWomen as target groups - specific measures for women and children such as DWCRA, ICDS, IMY. Current programmes for women as initiated and implemented by the different ministeries and departments.

10 PMKVY (Pradhan Mantri Kaushal Vikas Yojana).

11 Role of NGOs

Need for participation of Non-Governmental organizations in developmental efforts. Encouragement given NGO's.

UNIT-V

Advertising Media

12. Different media for advertising.
13. Methods of Extension Education
14. Non-media advertising
15. Outdoor advertisement - Hoardings, Posters, Billboards, Bulletin Boards, Electronic sings, Letterbins, Aerial methods.
16. Transportation media (Mobile Vehicles)
17. Exhibition and Trade fair.

Practical

1. Visits to Radio / T.V. stations.
2. Script writing for Radio.
3. Visit to Extension Education Unit.
4. Write slogan about Adult-Education.
5. Designing an Advertisement for any product with relevant slogan at least two.
6. Study of programme for women as target group and children.

B.Sc. (HOME-SCIENCE) PART -III
Group –IV
Paper - A

Foundation of Art and Design

M. Marks: 50

THEORY

Unit – I Introduction to foundation of art

1. Design, Definition and types : Structural and Decorative
2. Elements of Design :-

1.	Line	2.	Size
3.	Form	4.	Structure
5.	Space	6.	Pattern
7.	Shape		

8. Light – Characteristics and Classifications
9. Study of Colour – Classifications, Dimensions, Colour Schemes and effect.

3. Principles of design – definition and their characteristics and types :-

1.	Balance	2.	Harmony
3.	Scale	4.	Proporation
5.	Rhythm	6.	Emphasis

Unit – II **1. Indian, regional, traditional and contemporary arts and their use in :-**

1. Floor decoration
2. Home decoration
3. Accessories

2. Appreciation of art

1. In terms of principles of art and design
2. In terms of composition and aesthetic appeal
3. Flower arrangement material and principles.

Unit – III 1. Family's Housing Needs

1. Protective, economic, affectional, social, standard of living, housing goals, style, function occupation.
2. Factors influencing selection and purchase of site to house building
   1- Legal aspects, location, physical feature, soil conditions, cost, services

3. House planning-
   1- Reading house plants
   2- Planning principles
   Grouping of rooms, orientation, circulation, flexibility, privacy spacious, ness, services, aestheriucs, economy, light and ventilation.
   3- Planning different rooms: living room, bedrooms, kitchen, store room, toilet, passage, staircase.
   4- Landscape planning-Principles and application.

UNIT-IV

1. Financial Considerations :

1. Availability of funds for housing
2. Housing Development finance corporation
3. Cooperative Housing Society
4. Life Insurance corporation
5. Cooperative Banks
6. Loan from provident fund
7. Finance corporation of India

2. Disability of owning versus renting.

1. Housing problems, causes and remedial measures.

UNIT-V

1**. Furniture**

1. Styles of furniture - traditional contemporary and modern.
2. Selection of furniture for comfort, rest and relaxation for work, for storage
3. Arrangement of furniture for living. Sleeping, dining and multipurpose rooms.
4. Uphosltered furniture materials, techniques and designs.

2. **Furnishing fabrics**

1. Types of curtains, draperies, floor coverings rugs and carpets, cushion covers

2. Selection and use.

1. Accessories and their role in interiors.

Practical (Any Eight)

1. Freehand drawing : Memory drawing and sketching.
2. Scale drawing, solid geometry, orthographic.
3. Preparation of colour wheel and colour schemes.
4. Elements of design laws of field size, proportion, types of shadows.
5. Residential space planning - scale, lines, abbreviations, metric projections, defining space by shades, shadows.
6. Lettering.
7. Use of colour for wall/floor decoration and making accessories.
8. Application of design principles in flower arrangement, styles of flower ar rangement, innovation of new styles.
9. Gift wrapping and preparing decorative articles of sibre, fabric, coir, bamboo, clay, metal etc.
10. Drawing houseplans with standard specifcation.
11. Furniture layout of living, dining. Kitchen and bedroom designs presentation with furniture layout, sectional elevation, views.
12. Development of designs and construction of any five of the under mentioned items -'. cushions, certains, carpets, doormats, rugs, table mates.
13. Wall paintings, picture frame design.
14. Graphic designs.
15. Visit to Art and Craft exhibition

B.Sc. (HOME-SCIENCE) PART- III
Group –IV
Paper - B
APPAREL MAKING & FASHION DESIGNING

Marks : 50

THEORY

Unit – I

1. Anatomy Of Human Body
    - Skeleton & Muscular System
    - Joints Of Human Body
    1. Normal Body
    2. Abnormal Body
1. Figure Problems & Different Types Of Figure Defects
    - Erect, Stooping, Low Shoulder, Square Shoulder, Thin Waist, Stout Waist, Long Body, Short Body, Full Back, Flat Back, Cylindrical, Corpulent, Head Forward, Head Backward

2. Deformity
    1. Natural & Accidental
3. Principle of Figure Drawing
4. Sketching of Different Body Features

Unit – II

1. Drawing Of Human Form In Different Angles
    - Front
    - Back
    - Side
2. Figure Head Theories
    - 8 ½ (Average Figure)
    - 12 ½ (Fashion Figure)
3. Introduction to Elements of Design
    - Color / Line
    - Texture
    - Shapes / forms
4. Principles of Design
    - Proportion
    - Balance
    - Harmony
    - Rhythm
    - Emphasis
5. Different types of Textile design
    - Structural / Decorative
    - Realistic / Abstract
    - Stylized / Geometrical

- Scrawly / Traditional

Unit – III

1. study of colour
    - Definition,
    - characteristics and
    - colour schemes
2. Color Theories
    - Prang's Color Theory
    - Munshell's Color Theory
3. Fashion
    - Definition
    - Theories
    - Fashion Trends In India
    - Terms Related To Fashion Industry
    - Factors Affecting Fashion
4. Necklines
    - Study of Different types of Necklines
    - Variations of Necklines
5. Collars
    - Study of Different types of Collars
    - Collars above the Necklines (Band Collars)
    - Collars below the Necklines (Flat Collars)

Unit – IV

1. Tucks : Different types of Tucks (Pin, Diagonal, Blind, Cross, Spaced, Diamond, Shell, Corded)
2. Pleats : Different types of Pleats (Simple, Knife, Box, Accordian, Kick, Reverse, Inverted Box)
3. Seam & seam finishes
4. Frills & Gathers
5. Yoke : Different types of Yokes (Body, Waist, Hip, Shoulder)
6. Sleeves : Different types of Sleeves (Plain, Puff, Raglan, Kimono, Dolman
7. Silhouettes

Unit – V

1. Embroidery
    - Fundamentals / Techniques
    - Design / Color Combination
    - Use Of Different Threads / Different Types f Stitches
2. Traditional Embroidery Of India
    - Kashida Of Kashmir & Bihar
    - Kantha If Bengal
    - Phulkari Of Punjab
    - Chikenkari Of Lucknow
    - Kasuti Of Karnataka

- Kutch & Kathiyawar Of Gujrat
- Zari Embroidery
- Applique Work

3. Entrepreneurship
- Meaning, Definition, Nature & Types
- Qualities of a Successful Entrepreneur
- Factors Affecting the Development of Entrepreneurship

4. Channels of Distribution : Meaning, Definition, Types & Functions
5. Salesmanship : Duties & Main Qualities of Successful Salesmanship, Salesmanship & Advertisement.

REFERENCES -

1. Bane, A. 1974 ; Railoring, Magraw Hill.
2. Bane, A. 1979 : Flat pattern Design, Mcgraw Hill.
3. Brary Nathalie 1978 : Dress Pattern Designing London, Crossby Lockwood & Staples.
4. Gilelle, D.A. Berte, B. : Figure Types & Size Ranges, Fairchild Publication.
5. Goublourn M. 1971 : Introduction pattern cutting, Grading and Modelling, London, B.T. Batsford Lts.
6. Goldsworthy 1980 : Simple Dressmaking, Londown, Mills and Boon.altd.
7. Littman Connie 1977 : Pattern Making Design, Litton Educational Publishing Inc.
8. Muka A. 1979 : French Touch, Pittsburgh, Wolfson Publishing Co., Inc.

Practical

1. Average Figure (8 ½ Head Length)
2. Fashion Figure (12 ½ Head Length)
3. Sketching of different Body Features & Different Hair Styles
4. Preparation of Samples of different types of Necklines
5. Preparation of Samples of different types of Collars
6. Preparation of Samples of different types of Sleeves
7. Preparation of Samples of different types of Yokes
8. Preparation of Samples of different tucks and pleats
9. Construction of Ladies Garment With Different Patterns
   - Frock : A line / short body / long body
   - Petticoat / Blouse,
   - A-Line Kurti / Fitted Kurti / Flared Kurti
   - Simple Salwar / Salwar With Belt / Patiyala / Churidar
10. All samples of traditional embroidery fix in the file
11. Draw design with different colour schemes
12. Reducing and Enlarging a design
13. Draw an objects involving various Elements of design

प्रपत्र

विषय / संकाय / प्रश्न–पत्र का नाम– **B.Sc. Information Technology**

क्रमांक	कक्षा का नाम	वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
1.	1st Year	FUNDAMENTAL OF I.T. COMPUTERS & PC SOFTWARE	FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE	Updation Required
2.	1st Year	PROGRAMMING CONCEPT USING C LANGUAGE	PROGRAMMING IN 'C' LANGUAGE	Updation Required
3.	1st Year	PRACTICAL	PRACTICAL	Updation Required
4.	2nd Year	DIGITAL CIRCUITS & COMPUTER H/W	DIGITAL CIRCUITS & COMPUTER H/W	No Change
5.	2nd Year	PAPER-II (PAPER CODE - 0875)	PAPER-II (PAPER CODE - 0875)	No Change
6.	2nd Year	PRACTICAL	PRACTICAL	No Change
7.	3rd Year	AMPLIFIERS AND OSCILLATORS	AMPLIFIERS AND OSCILLATORS	No Change
8.	3rd Year	FUNDAMENTAL DATA STRUCTURE	FUNDAMENTAL DATA STRUCTURE	No Change
9.	3rd Year	PRACTICAL	PRACTICAL	No Change

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

S.N.	Name	Designation/University/College	Signature with Date
1.	Dr. Sanjay Kumar	Head, S.o.S. in Computer Science & I.T., Pt. R.S. University, Raipur	11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	11-06-18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	11/6/18

B.Sc. IT
I year

B.Sc. Part – I
INFORMATION TECHNOLOGY
PAPER - I
FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE
(PAPER CODE - 0824)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I INFORMATION TECHNOLOGY

Concepts of IT and Information System, Application of IT (in Business, Education, Medicine, Science, Governance and Agriculture), Impact of IT on society and industry, Legal and Ethical aspect of IT, Security and Threats in IT, M-Commerce, Virtual reality, Latest trend in IT, Future of IT.

UNIT - II COMPUTER NETWORK

BASIC CONCEPTS OF COMPUTER NETWORK: Internet concepts, LAN, MAN, WAN, Topology, Protocol, Transmission mode, communication process, Required elements of Data Communication.

WIRELESSCOMMUNICATION: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, infrared, radio frequency, microwave.

SOCIAL NETWORKING: Evolution of social network sites (YouTube, Facebook, LinkedIn, Twitter), Advantages and Disadvantages of social networking sites.

UNIT - III MS-WORD

Introduction, Word Processing (MS-WORD), Advantage of word processing, Introduction and Installation, Editing a file, using paragraph styles. Newspaper style columns, Using macros, Advance word processing, Headers and footers, Finding text, Setting up printer. Mail merge and other applications, Mathematical calculator, Table handling.

UNIT - IV MS-EXCEL

Introduction to spreadsheet (MS-EXCEL), Definition and advantage of electronic worksheet, Working on spread sheets, Range and related operations, Setting saving and retrieving worksheets, Inserting, Deleting, Coping and Moving of data cells, Inserting and deleting rows and column, Protecting cells, Printing a worksheet, Erasing a worksheet in Graphs creation, Types of graphs, Creating a chart sheet 3D, Columns charts, Moving and changing the size of chart, Printing the chart.

UNIT - V MS-POWER POINT AND MS-ACCESS

MS-POWER POINT: Presenting with Power point: Creating presentation, Working with slides, Different types of slides, Setting page layout, Selecting background and applying design, Adding graphics to slide, Adding sound and movie, Creating chart and graph, Playing a slide show, Slide transition, Advancing slides, Setting time, Rehearsing timing, Animating slide, Animating objects, Running the show from window.

MS-ACCESS: Creating tables in access, Defining data types, Manipulating records.

TEXT BOOKS:

1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
2. Introduction to Information Technology, V. Rajaraman, PHI, Second Edition.
3. Computer Networks, Forouzan, Tata McGraw-Hill, Second, Edition.
4. Microsoft Office 2007 fundamentals, L Story, D Walls.
5. MS Office, S. S. Shrivastava, Firewall Media

11-06-2018
(Dr. Sanjeev Kumar)

11/6/18
(Dr. A.K. Dwivedi)

11/06/18
(L.K. Gaur)

11/6/18
(Dr. J. Durga Pd. Rao)

11.06.18

B. Sc. PART - I
INFORMATION TECHNOLOGY
PAPER II
PROGRAMMING IN 'C' LANGUAGE

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I

Fundamentals of C Programming: Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().

UNIT- II

Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function.

Functions: Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III

Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays.

String: String declaration, initialization, string manipulation with/without using library function.

Structure, Union and Enum - Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure, passing structure to function, function returning structure. **Union**: basics, declaring union and union variable, **Enum**: declaring enum and enum variable.

UNIT- IV

Pointer: Definition of pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions – malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V

File Handling and Miscellaneous Features: File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, feof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives: #if, #else, #elif, #endif, #ifndef etc.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, YashwantKanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopal,Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, Second Edition.
5. Applications Programming in ANSI C, R. Johnsonbaugh , Martin Kalin, Macmillan, Second Edition.
6. The Spirit of C, Mullish Cooper, Jaico publishing House.
7. How to solve it by Computer, R.G.Dromey, Pearson Education.

11-06-2018 (Dr. Sanjay Kumar)

11/6/18 (Dr. A.K. Dwivedi)

11/06/18 (L.K. Gavel)

11/6/18 (Dr. J. Durga Prasad Rao)

Practical

- At least 20 Practical based on Syllabus of Paper-I and Paper-II.

11-06-2018
(Dr. Sanjay Kumar)

11/6/2018
(Dr. A.K. Dwivedi)

11/6/18
(L.K. Gavel)

11/6/18
(Dr. J. Durga Prasad Rao)

11-06-18
Hari Shanker Prasad Pandey

B. Sc.(I T)
II Year

INFORMATION TECHNOLOGY

PAPER - I

DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

UNIT-I (A) Number Systems :

Octal and hexadecimal number, decimal rep., complements, addition, subtraction, multiplication, division, fixed point rep, floating point rep., other binary code-gray code, excess 3 gray, excess-3, 2421, etc. error detection code.

(B) Boolean Algebra :

Laws, demorgan's theorm, Simplification boolean expression & logic diagram, positive & negative logic, K-map and simplification of K-map.

UNIT-II Combinational circuits :

Half adder, full adder, flip-flop : SR, JK, D,T, sequential circuits : encoder, decoder, multiplexer, shift resister, binary counters, BCD adder.

UNIT-III Multivibrator circuits :

Monostable, astable, bistable, smitt trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch.

Intergrated circuits :

RTL, DITL, TTL, CMOS, MOS.

UNIT-IV (A) Central Processing Unit :

Introduction, register organisation, stack organisation, Instruction formats, Addressing modes.

(B) I/O organisatin :

I/O interfaces, Data transfer, types and modes, interrupts, DMA, IOP.

UNIT-V Memory organisation :

Memory hierarcy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques.

REFERENCE TAXT BOOK :

1.	Integrated Electronics	-	Millman & Halkias
2.	Principle of Electronics	-	V.K. Mehta
3.	Digital Electronics	-	R.P. Jain
4.	Computer System Architecture	-	Morris Mano
5.	Digital Electronics & Computer Hardware	-	Morris Mano

PAPER - II

(Paper Code - 0875)

UNIT-I Ingroduction to OPP : Advantages of OPP, the Object oriented approach, characteristics of object oriented languages : object, classes, inheritance, reusability, polymorphism and C++.

11-06-2018 (Dr Sanjay Kumar) 11/6/18 (Dr. A.K. Dwivedi) 11/06/18 (L.K. Gavel) 11/6/18 (Dr. J. Durga Pd. Rao) 11.06.18 Hari Shankar Prasad Tandle

UNIT-II Function : function declaration, calling function, function definition, passing arguments to function, passing constant, passing value, fegerence argument, returning by reference, inline function, function overloading, default arguments in function.

UNIT-III Object and olasses, using the olasses, olass construotor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data, static member functions, friend function, friend class, operator overloading, type of inheritance, bass class derive class, access percifier, protectedc, member function.

UNIT-IV Pointers : & and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management, new and delete, pointer to object, this pointer, virtual function : virtual function, virtual member function, accesses with pointer, pure virtual function.

UNIT-V File and stream : C++ steams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.

REFERENCE TEXT BOOKS :

1. Programming in C++ - E. Balaguruswami
2. Mastering in C++ - Venu Gopal
3. Object Oriented Programming in C++ - Robert Lafore
4. Let us C++ - Y. Kanetkar

PRACTICAL WORK

1. The sufficient Practical work should be done for understanding the paper 2.
2. At least five programs on each unit from unit 2 to unit 5 be prepared.
3. All practical works should be prepared in form of print outs and be valuated while practical examination.

11-06-2018 (Dr. Sanjay Kumar)

11/6/18 (Dr. A.K. Dwivedi)

11/06/18 (L.K. Gavel)

11/6/18 (Dr. J. Durga Prasad Rao)

11.06.18 Hari Mohan Prasad Tank

B.Sc.(I.T.)
III Year

INFORMATION TECHNOLOGIES

PAPER - I

(Paper Code-0928)

AMPLIFIERS AND OSCILLATORS

UNIT-I **POWER AMPLIFIER** : Classification of power amplifiers, requirement of power amplifiers, single ended class A power amplifier, and its efficiency, transformer coupled power amplifier, power dissipation curve, harmonic dissipation curve, harmonic distortion in pushpull power amplifier, power and efficiency calculation for pushpull for pushpull power amplifier, Distortion in pushpull power amplifier, Advantages of pushpull power amplifier.

UNIT-II **FEEDBACK AMPLIFIERS AND OSCILLATORS** : Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance in voltage and current series feedback. Advantages of negative feedback. Positive feedback. Berkhauson criteria for sustained oscillator. RF oscillators-Hartley oscillatot, Colpetts oscillators (Qualitative study) relaxation osillators, Multivibrators-Astable, Monostable.

UNIT-III **OPERATIONAL AMPLIFIER AND POWER CONTROL DEVICES** : Differential amplifier, operational amplifier, Characteristics of an ideal OPAMP, definition of input bias current input offset current, current driff, impout offset, common mode rejection ratio, slew rate, universal biasing technique, Application of OP-Amp, as inverting, non-inverting amplifiers, differentiation, Integratior, scal charger and voltage follower, Silicon controlled rectifier (SCR), Diac, Traic and UJT (Only qualitative study).

UNIT-IV **THE INTEL 8080/8085 MICROPROCESSOR** : Introcution, the 8085 pin diagram and functions, The 8085 architecture, addressing modes, the 8080/8085 instruction set, the 8080/8085 data transfer instructions, the 8080/8085 arithmetic instructions, the 8080/8085 logical instructions the 8080/8085 stack, I/O and machine controlled instructions.

UNIT-V **PROGRAMMING THE MICROPROCESSOR** : Machine and assembling languages simplified instruction set, Instruction set, arithmetic poeration, Instructions set logical operations, instruction set data transfer operations, instruction set branch operations, instructuion set-subroutine all and return operations, instruction set miscellaneous operations, writing a program, addressing modes, program branching, program looping using subroutines.

Programming the 8080/8085 microprocessor : Introduction straight-line programs looping programs, mathematical programs.

PAPER - II

(Paper Code-0929)

FUNDAMENTAL DATA STRUCTURE

UNIT-I **Introduction to Data STructure** : The concept of data structure, Abstract data structure, Analysis of Algorithm, The concept of list.

11-06-2018 (Dr. Sanjay Kumar) 11/6/2018 (Dr. A.K. Dwivedi) 11/06/18 (L.K. Gavel) 11/6/18 (Dr. J. Durga Prasad Rao) 11-06-18 Hari Shankar Prasad

Stacks and Queues : Introduction to stack & primitive operation on stack, Stack as an abstract data type, Multiple Stack, Stacks application : infix, post fix, and Recursion, Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular Queue, Dequeue, Priority Queue.

UNIT-II **Linked List :** Introduction to the linked list of stacks, The linked list of queues, Header nodes, Doubly linked list, Circular linked list, Stacks & Queues as a Circular linked list, Application of linked list.

UNIT-III Trees: Basic Terminology, Binary Trees, Tree Representations as Array & Linked list, Binary tree representation, Traversal of binary trees : In order, Preorder & post order.

Application of Binary tree, Threaded binary tree, B-Tree & Height balanced tree, representation of B^+ & B* trees, Binary tree representation of trees, Counting binary trees, 2-3 Trees algorithm or manipulating 2-3 Trees.

UNIT-IV Searching & Sorting : Sequential Searching, Binary search, Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.

UNIT-V Tables & Graphs : Hash Table, Collision resolution Techniques, Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs. Graph Traversal Depth first & Breadth first search, Spanning Trees, minimum spanning Tree, The basic, Greedy Strategy for computing Algorithm of Kruskal and prims.

TEXT & REFERENCE BOOK :

Fundamentals of Data structure : By S. Sawhney & Horowith

Data Structure : By Trembley & Sorrenson.

Data Structure Using Pascal : By Tannenbaum & Alugenstein

Data Structure : By lipschuists (Schaume's Outline Series Mcgraw Hill Publication)

Fundamentals of Computer Algorithm : By Ellis Horowitz and Sartaj Sawhney.

PRACTICAL WORK

1. The sufficient practical work should be done for understanding the date structure with C++.
2. The sufficient practical work must be performed on stacks queues linked list, trees etc.
3. All practical works should prepared in form of print outs and voluated while practical examination.

11-06-2018
(Dr. Sanjay Kumar)

Anuj 11/6/2018
(Dr. A.K. Dwivedi)

11/06/18
(L.K. Gavel)

11/6/18
(Dr. J. Durga Rao)

11.06.18
Hari Shankar Prasad Tandi

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-I (Algebra and Trigonometry)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-I Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	**Unit-I** ~~Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices~~. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	पाठ्यक्रम का वह भाग जो कक्षा–11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak **Prof.B.S.Thakur** **Prof.M.A.Siddiqui** **Dr.S.K.Bhatt** **Dr.R.K.Mishra** **Dr.A.K.Mishra** **S.K.Gupta** **Sangeeta Pandey**

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-II (Calculus)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-III Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	**Unit-III** Integration of ~~irrational algebraic functions and~~ transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	पाठ्यक्रम का वह भाग जो कक्षा–11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
Unit-IV Degree an order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	**Unit-IV** Degree an order of a differential equation. ~~Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and~~ equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak Prof.B.S.Thakur Prof.M.A.Siddiqui Dr.S.K.Bhatt Dr.R.K.Mishra Dr.A.K.Mishra S.K.Gupta Sangeeta Pandey

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-III (VECTOR ANALYSIS AND GEOMETRY)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-IV Plane the Straight line and the plane. Sphere. Cone. Cylinder.	**Unit-IV** ~~Plane the Straight line and the plane.~~ Sphere. Cone. Cylinder.	कक्षा–11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
प्रश्नपत्र का शेष भाग यथावत है।		

Prof.H.K.Pathak **Prof.B.S.Thakur** **Prof.M.A.Siddiqui** **Dr.S.K.Bhatt** **Dr.R.K.Mishra** **Dr.A.K.Mishra** **S.K.Gupta** **Sangeeta Pandey**

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-II (Mathematics)**

Paper-I (ADVANCED CALCULUS)

प्रश्नपत्र का पाठ्यक्रम यथावत है।

Paper-II (DIFFERENTIAL EQUATIONS)

प्रश्नपत्र का पाठ्यक्रम यथावत है।

Paper-III (MECHANICS)

प्रश्नपत्र का पाठ्यक्रम यथावत है।

Prof.H.K.Pathak **Prof.B.S.Thakur** **Prof.M.A.Siddiqui** **Dr.S.K.Bhatt** **Dr.R.K.Mishra** **Dr.A.K.Mishra** **S.K.Gupta** **Sangeeta Pandey**

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-III (Mathematics)**

Paper-III (Optional Papers)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
(I) PRINCIPLES OF COMPUTER SCIENCE (II) DISCRETE MATHEMATICS (III) APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE (IV) PROGRAMMING IN C AND NUMERICAL ANALYSIS (V) MATHEMATICAL MODELLING	(I) PRINCIPLES OF COMPUTER SCIENCE (II) DISCRETE MATHEMATICS ~~APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE~~ (III) PROGRAMMING IN C AND NUMERICAL ANALYSIS ~~MATHEMATICAL MODELLING~~	पूर्व में प्रचलित 5 वैकल्पिक प्रश्नपत्रों में से दो को अलोकप्रिय होने के कारण विलोपित किया गया है। विगत 10 वर्षो में किसी भी छात्र / छात्रा द्वारा उक्त प्रश्नपत्रों का चयन नहीं किया गया है।
प्रश्नपत्र का पाठ्यक्रम यथावत है।		

Prof.H.K.Pathak **Prof.B.S.Thakur** **Prof.M.A.Siddiqui** **Dr.S.K.Bhatt** **Dr.R.K.Mishra** **Dr.A.K.Mishra** **S.K.Gupta** **Sangeeta Pandey**

MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-I
MATHEMATICS
PAPER - I
ALGEBRA AND TRIGONOMETRY

UNIT-I Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigenvalues, eigenvectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.

UNIT-II Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations. Theorems on consistency of a system of linear equations. Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardons method), Biquadratic equation.

UNIT-III Mappings, Equivalence relations and partitions. Congruence modulo n. Definition of a group with examples and simple properties. Subgroups, generation of groups, cyclic groups, coset decomposition, Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Normal subgroups. Quotient group, Permutation groups. Even and odd permutations. The alternating groups An. Cayley's theorem.

UNIT-IV Homomorphism and Isomorphism of groups. The fundamental theorems of homomorphism. Introduction, properties and examples of rings, Subrings, Integral domain and fields Characteristic of a ring and Field.

TRIGONOMETRY :

UNIT-V De-Moivre's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrical functions. Gregory's series. Summation of series.

TEXT BOOK :

1. I.N. Herstein, Topies in Algebra, Wiley Eastern Ltd., New Delhi, 1975
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd.New Delhi, 2000.
3. Chandrika Prasad, Text-Book on Algebra and Theory of equations, Pothishala Private Ltd., Allahabad.
4. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.

REFERENCES :

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, First Course in linear Algebra, Wiley Eastern, New Delhi, 1983.
2. P.B. Bhattacharya, S.K.Jain and S.R. Nagpaul, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
3. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
4. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
5. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala Pvt. Ltd., Allahabad.

B.Sc. Part-I
MATHEMATICS
PAPER - II
CALCULUS

DIFFERENTIAL CALCULUS :

UNIT-I $\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuties. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

UNIT-II Asymptotes. Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in cartesian and polar coordinates.

INTEGRAL CALCULUS:

UNIT-III Integration of transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

ORDINARY DIFFERENTIAL EQUATIONS :

UNIT-IV Degree and order of a differential equation. Equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.

UNIT-V Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.

TEXT BOOK :

1. Gorakh Prasad, Differential Calculaus, Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd. Allahabad.
3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co. New York.
3. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
5. G.F. Simmons, Differential Equations, Tata Mc Graw Hill, 1972.
6. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentics Hall of India, 1961.
7. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishe & Distributors, Dehli, 1985.
8. W.E. Boyce and P.O. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.

12. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley and Sons, 1999.

B.Sc. Part-I

MATHEMATICS

PAPER - III

VECTOR ANALYSIS AND GEOMETRY

VECTOR ANALYSIS :

UNIT-I Scalar and vector product of three vectors. Product of four vectors. Reciprocal Vectors. Vector differentiation. Gradient, divergence and curl.

UNIT-II Vector integration. Theorems of Gauss, Green, Stokes and problems based on these.

UNIT-III General equation of second degree. Tracing of conics. System of conics. Confocal conics. Polar equation of a conic.

UNIT-IV Sphere. Cone. Cylinder.

UNIT-V Central Conicoids. Paraboloids. Plane sections of conicoids. Generating lines. Confocal Conicoids. Reduction of second degree equations.

TEXT BOOKS :

1. N. Saran and S.N. Nigam, Introduction to vector Analysis, Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.
3. R.J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Machmillan India Ltd. 1994.

REFERENCES :

1. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.
2. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
3. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.
4. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co., New Delhi.
5. S.L. Loney, The Elements of Coordinate Geometry, Macmillan and Company, london.
6. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd., 1994.
7. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wiley Eastern Ltd., 1999.
8. N. Saran and R.S. Gupta, Analytical Geometry of three Dimensions, Pothishala Pvt. Ltd. Allahabad.

MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-II
Paper-I
ADVANCED CALCULUS

UNIT-I Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests, Cauchy's integral test, Ratio tests, Raabe's, Logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem. Absolute and conditional convergence.

UNIT-II Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders.

UNIT-III Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

UNIT-IV Envelopes, evolutes. Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.

UNIT-V Beta and Gamma functions, Double and triple integrals, Dirichlet's integrals, Change of order of integration in double integrals.

REFERENCES :

1. Gabriel Klaumber, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. R.R. Goldberg, Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970.
4. D. Soma Sundaram and B. Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
6. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
7. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York.
8. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
9. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., New Delhi.
10. O.E. Stanaitis, An Introduction to Sequences, Series and Improper Integrals, Holden-Dey, Inc., San Francisco, California.
11. Earl D. Rainville, Infinite Series, The Macmillan Company, New York.
12. Chandrika Prasad, Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd., Allahabad.
13. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
14. Shanti Narayan, A Course of Mathematical Analysis, S.Chand and Company, New Delhi.

B.Sc. Part-II
Paper-II
DIFFERENTIAL EQUATIONS

UNIT-I Series solutions of differential equations- Power series method, Bessel and Legendre functions and their properties-convergence, recurrence and generating relations, Orthogonality of functions, Sturm-Liouville problem, Orthogonality of eigen-functions, Reality of eigen values, Orthogonality of Bessel functions and Legendre polynomials.

UNIT-II Laplace Transformation- Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation.

UNIT-III Partial differential equations of the first order. Lagrange's solution, Some special types of equations which can be solved easily by methods other than the general method, Charpit's general method of solution.

UNIT-IV Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.

UNIT-V Calculus of Variations- Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Extemals, Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable, Variational problems in parametric form, invariance of Euler's equation under coordinates transformation.

Variational Problems with Moving Boundaries- Functionals dependent on one and two functions, One sided variations.

Sufficient conditions for an Extremum- Jacobi and Legendre conditions, Second Variation. Variational principle of least action.

REFERENCES :

1. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999.
2. D.A. Murray, Introductory Course on Differential Equations, Orient Longman, (India), 1967.
3. A.R. Forsyth, A Treatise on Differential Equations, Macmillan and Co. Ltd., London.
4. Lan N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill Book Company, 1988.
5. Francis B. Hilderbrand, Advanced Calculus for Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6. Jane Cronin, Differential equations, Marcel Dekkar, 1994.
7. Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Company, 1972.
8. Richard Bronson, Theory and Problems of Differential Equations, McGraw-Hill, Inc., 1973.
9. A.S. Gupta, Calculus of variations with-Applications, Prentice-Hall of India, 1997.
10. R. Courant and D. Hilbert, Methods of Mathematical Physics, Vots. I & II, Wiley-Interscience, 1953.
11. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice-Hill, Englewood Cliffs (New Jersey), 1963.
12. A.M. Arthurs, Complementary Variational Principles, Clarendon Press, Oxford, 1970.
13. V. Kornkov, Variational Principles of Continuum Mechanics with Engineering Applications, Vol. I, Reidel Publ. : Dordrecht, Holland, 1985.
14. T. Oden and J.N. Reddy, Variational Methods in Theoretical Mechanics, Springer-Verlag, 1976.

B.Sc. Part-II
Paper-III
MECHANICS

STATICS

UNIT-I Analytical conditions of Equilibrium, Stable and unstable equilibrium. Virtual work, Catenary.

UNIT-II Forces in three dimensions, Poinsot's central axis, Null lines and planes.

DYNAMICS

UNIT-III Simple harmonic motion. Elastic strings. Velocities and accelerations along radial and transverse directions, Projectile, Central orbits.

UNIT-IV Kepler's laws of motion, velocities and acceleration in tangential and normal directions, motion on smooth and rough plane curves.

UNIT-V Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions, acceleration in terms of different co-ordinate systems.

REFERENCES :

1. S.L. Loney, Statics, Macmillan and Company, London.
2. R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.
3. S.L. Loney, An Elementary Treatise on the Dynamics of a particle and of rigid bodies, Cambridge University Press, 1956.

MATHEMATICS

There shall be three theory papers. Two compulsory and one optional. Each paper carrying 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-III
PAPER - I
ANALYSIS

REAL ANALYSIS

UNIT-I Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions.

UNIT-II Riemann integral. Intergrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence. Comparison tests. Abel's and Dirichlet' tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.

COMPLEX ANALYSIS

UNIT-III Complex numbers as ordered pairs. Geometrical representation of complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Elementary functions. Mapping by elementary functions. Mobius transformations. Fixed points, Cross ratio. Inverse points and critical mappings. Conformal mappings.

METRIC SPACES

UNIT-IV Definition and examples of metric spaces. Neighbourhoods, Limit points, Interior points, Open and Closed sets, Closure and interior. Boundary points, Sub-space of a metric space. Cauchy sequences, Completeness, Cantor's intersection theorem. Contraction principle, construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

UNIT-V Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, isometry and homeomorphism. Equivalent metrics. Compactness, sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and Compact sets, Connectedness, Components, Continuous functions and Connected sets.

REFERENCES :

1. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
2. R.R. Goldberg, Real Analysis, Oxford & IBH publishing Co., New Delhi, 1970.
3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. D. Somasundaram and B. Choudhary, A First Coarse in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co. New Delhi.
6. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
7. R.V. Churchill and J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw- Hill, NewYork, 1990.
8. Mark J. Ablowitz and A.S. Fokas, Complex Variables : Introduction and Applications, Cambridge University Press, South Asian Edition, 1998.
9. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.
10. E.T. Copson, Metric Spaces, Cambridge University Press, 1968.
11. P.K. Jain and K. Ahmad, Metric Spaces, Narosa Publishing House, New Delhi, 1996.
12. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 1963.

B.Sc. Part-III
PART - II
ABSTRACT ALGEBRA

UNIT-I Group-Automorphisms, inner automorphism. Automorphism of groups and their computations, Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite Abelian groups.

UNIT-II Ring theory-Ring homomorphism. Ideals and quotient rings. Field of quotients of an integral domain, Euclidean rings, polynomial rings, Polynomials over the rational field. The Eisenstien criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorisation domain implies so is $R[x_1, x_2 ..... x_n]$. Modules, Submodules, Quotient modules, Homomorphism and Isomorphism theorems.

UNIT-III Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

UNIT-IV Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigenvalues and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms.

UNIT-V Inner Product Spaces-Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal Complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

REFERENCES :

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. N. Jacobson, Basic Algebra, Vols. I & II. W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
3. Shanti Narayan, A Text Book of Modern Abstract Algebra, S.Chand & Co. New Delhi.
4. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
5. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal, Basic Abstract Algebra (2"" Edition) Cambridge University Press, Indian Edition, 1997.
6. K. Hoffman and R. Kunze, Linear Algebra, (2nd Edition), Prentice Hall. Englewood Cliffs, New Jersey, 1971.
7. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic Linear Algebra with MATLAB. Key College Publishing (Springer-Verlag) 2001.
8. S. Kumaresan, Linear Algebra, A Geometric Approach, Prentice-Hall of India, 2000.
9. Vivek Sahai and Vikas Bist, Algebra, Norosa Publishing House, 1997.
10. I.S. Luther and I.B.S.Passi, Algebra, Vol. I-Groups, Vol. II-Rings. Narosa Publishing House (Vol. I-1996, Vol. II-1999)
11. D.S. Malik, J.N. Mordeson, and M.K. Sen, Fundamentals of Abstract Algebra, McGraw- Hill International Edition, 1997.

B.Sc. Part-III
PAPER - III - (OPTIONAL)
(I) PRINCIPLES OF COMPUTER SCIENCE

UNIT-I **Data Storage** - Storage of bits. Main Memory. Mass Storage. Coding Information of Storage. The Binary System. Storing integers, storing fractions, communication errors.
Data Manipulation - The Central Processing Unit. The Stored-Program Concept. Programme Execution. Other Architectures. Arithmetic/Logic Instructions. Computer- Peripheral Communication.

UNIT-II **Operating System and Networks** - The Evolution of Operating System. Operating System Architecture. Coordinating the Machine's Activities. Handling Competition Among Process. Networks. Networks Protocol.
Software Engineering - The Software Engineering Discipline. The Software Life Cycle. Modularity. Development Tools and Techniques. Documentation. Software Ownership and Liability.

UNIT-III **Algorithms** - The Concept of an Algorithm, Algorithm Representation. Algorithm Discovery. Iterative Structures. Recursive Structures. Efficiency and Correctness. (Algorithms to be implemented in C++).
Programming Languages - Historical Perspective. Traditional Programming Concepts, Program Units. Language Implementation. Parallel Computing. Declarative Computing.

UNIT-IV **Data Structures** - Arrays. Lists. Stacks. Queues. Trees. Customised Data Types. Object Oriented Programming.
File Structure - Sequential Files. Text Files. Indexed Files. Hashed Files. The Role of the Operating System.
Database Structure - General Issues. The Layered Approach to Database Implementation. The Relational Model. Object-Oriented Database. Maintaining Database Integrity. E-R models

UNIT-V **Artifical Intelligence** - Some Philosophical Issues. Image Analysis. Reasoning, Control System Activities. Using Heuristics. Artificial Neural Networks. Application of Artificial Intelligence.
Theory of Computation - Turning Machines. Computable functions. A Non computable Function. Complexity and its Measures. Problem Classification.

REFERENCES :

1. J. Glen Brookshear, Computer Science : An Overview, Addition -Wesley.
2. Stanley B. Lippman, Josee Lojoie, C++ Primer (3rd Edition), Addison-Wesley.

B.Sc. Part-III
PAPER - III - (OPTIONAL)
(II) DISCRETE MATHEMATICS

UNIT-I **Sets and Propositions -** Cardinality. Mathematical Induction, Principle of inclusion and exclusion. **Computability and Formal Languages -** Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars and Languages. Permutations. Combinations and Discrete Probability.

UNIT-II **Relations and Functions -** Binary Relations, Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle.

Graphs and Planar Graphs - Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planner Graphs. Trees.

UNIT-III **Finite State Machines -** Equivalent Machines. Finite State Machines as Language Recognizers. **Analysis of Algorithms -** Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions.

UNIT-IV **Recurrence Relations and Recursive Algorithms -** Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions. Brief review of Groups and Rings.

UNIT-V **Boolean Algebras -** Lattices and Algebraic Structures. Duality, Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Prepositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

REFERENCES :

1. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986

B.Sc. Part-III
PAPER - III - (OPTIONAL)
(III) PROGRAMMING IN C AND NUMERICAL ANALYSIS
(Theory & Practical)
Theory component will have maximum marks 30.
Practical component will have maximum marks 20.

UNIT-I Programmer's model of a computer. Algorithms. Flow Charts. Data Types. Arithmetic and input/output instructions. Decisions control structures. Decision statements. Logical and Conditional operators. Loop. Case control structures. Functions. Recursions. Preprocessors. Arrays. Puppetting of strings. Structures. Pointers. File formatting.

Numerical Analysis

UNIT-II **Solution of Equations:** Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials. **Interpolation:** Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Differences. Numerical Differentiation. Numerical Quadrature: Newton-Cote's Formulas. Gauss Quadrature Formulas, Chebychev's Formulas.

UNIT-III **Linear Equations:** Direct Methods for Solving Systems of Linear Equations (Guass Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, GaussSeidel, Relaxation Methods).
The Algebraic Eigenvalue problem: Jacobi's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanczos' Method.

UNIT-IV **Ordinary Differential Equations:** Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method, Methods Based on Numerical Integration, Methods Based on Numerical Differentiation, Boundary Value Problems, Eigenvalue Problems.
Approximation: Different Types of Approximation, Least Square Polynomial Approximation, Polynomial Approximation using Orthogonal Polynomials, Approximation with Trigonometric Functions, Exponential Functions, Chebychev Polynomials, Rational Functions.

Monte Carlo Methods

Unit-V Random number generation, congruential generators, statistical tests of pseudo-random numbers. Random variate generation, inverse transform method, composition method, acceptance rejection method, generation of exponential, normal variates, binomial and Poisson variates.
Monte Carlo integration, hit or miss Monte Carlo integration, Monte Carlo integration for improper integrals, error analysis for Monte Carlo integration.

REFERENCES :

1. Henry Mullish and Herbert L. Cooper, Spirit of C: An Introduction to Modern Programming, Jaico Publishers, Bombay.
2. B.W. Kernighan and D.M. Ritchie. The C Programming Language 2nd Edition, (ANSI features) Prentice Hall, 1989.
3. Peter A Darnel and Philip E. Margolis, C : A Software Engineering Approach, Narosa Publishing House, 1993.
4. Robert C. Hutehisonand Steven B. Just, Programming using C Language, McGraw Hill, 1988.
5. Les Hancock and Morris Krieger, The C Primer, McGraw Hill, 1988.
6. V. Rajaraman, Programming in C, Prentice Hall of India, 1994.
7. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 1998.
8. C.E. Froberg, Introduction to Numerical Analysis, (Second Edition), Addison-Wesley, 1979.
9. James B. Scarborough, Numerical Mathematical Analysis, Oxford and IBHPublishing Co. Pvt. Ltd. 1966.

10. Melvin J. Maron, Numerical Analysis A Practical Approach, Macmillan publishing Co., Inc. New York, 1982.
11. M.K. Jain, S.R.K. lyengar, R.K. Jain, Numerical Methods Problems and Solutions, New Age International (P) Ltd., 1996.
12. M.K. Jain, S.R.K. lyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd., 1999.
13. R.Y. Rubistein, Simulation and the Monte Carlo Methods, John Wiley, 1981.
14. D.J. Yakowitz, Computational Probability and Simulation, Addison-Wesley, 1977.

PAPER - III - (OPTIONAL)
(IV) PRACTICAL
PROGRAMMING IN C AND NUMERICAL ANALYSIS

LIST OF PRACTICAL TO BE CONDUCTED...

1. Write a program in C to find out the largest number of three integer numbers.
2. Write a program in C to accept monthly salary from the user, find and display income tax with the help of following rules :

Monthly Salary	Income Tax
9000 or more	40% of monthly salary
7500 or more	30% of monthly salary
7499 or less	20% of monthly salary

3. Write a program in C that reads a year and determine whether it is a leap year or not.
4. Write a program in C to calculate and print the first n terms of fibonacci series using looping statement.
5. Write a program in C that reads in a number and single digit. It determines whether the first number contains the digit or not.
6. Write a program in C to computes the roots of a quadratic equation using case statement.
7. Write a program in C to find out the largest number of four numbers using function.
8. Write a program in C to find the sum of all the digits of a given number using recursion.
9. Write a program in C to calculate the factorial of a given number using recursion.
10. Write a program in C to calculate and print the multiplication of given 2D matrices.
11. Write a program in C to check that whether given string palindrome or not.
12. Write a Program in C to calculate the sum of series:

$$1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \ \ldots\ldots + \frac{1}{n!}x^n$$

13. Write a program in C to determine the grade of all students in the class using Structure. Where structure having following members - name, age, roll, sub1, sub2, sub3, sub4 and total.
14. Write a program in C to copy one string to another using pointer. (Without using standard library functions).
15. Write a program in C to store the data of five students permanently in a data file using file handling.

Zoology
B.Sc. Part I 2018-19
Paper I
(Cell Biology and Non-chordata)

Unit:I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear
   Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit:II

1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit:III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.

2. Protozoa: Type study - Paramecium,
2. Porifera: Type study - Sycon.
3. Coelenterata: Type study - Obelia

.

Unit: IV

- General characters and classification of Phylum Platyhelminthes, Nemathelminthes, Annelida and Arthropoda up to order.

2. Platyhelminthes and Nemathelminthes: Type Study – Fasciola, Ascaris
3. Annelida: Type Study - Pheretima.
4. Arthropoda: Type Study - Palaemone.

Unit:V

- General characters and classification of Phylum Mollusca and Echinodermata up to order.

2. Mollusca: Type Study - Pila.
3. Echinodermata- Type Study- Asterias (Starfish).

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Zoology
B.Sc. Part I 2018-19
Paper II
(Chordata and Embryology)

Unit:I

1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit-:III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV

1. **Fertilization**
2. Gametogenesis, Structure of gamete and Typesof eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

Zoology
B.Sc. Part I 2018-19
Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-

- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)

- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam	**Time: 3hrs**
1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Excersice based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

Zoology
B.Sc. Part – II 2018-19
Paper – I
(Anatomy and Physiology)

Comparative Anatomy of various organ systems of vertebrates:

Unit: I

- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

Unit: II

- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton Limbs and girdles
- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

Unit: III

- Nervous System: General plan of brain and spinal cord
- Ear and Eye: structure and function
- Gonads and genital ducts

Unit: IV

- Digestion and absorption of dietary components
- Physiology of heart, cardiac cycle and ECG
- Blood Coagulation
- Respiration: mechanism and control of breathing

Unit: V

- Excretion: Physiology of excretion, osmoregulation
- Physiology of muscle contraction
- Physiology of nerve impulse, Synaptic transmission

Zoology
B.Sc. Part – II 2018-19

Paper-II

VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

Unit: I

- Structure and function of Endocrine glands
- Hormone receptor
- Biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones
- Endocrine disorder of pituitary, thyroid, adrenal and pancreas

Unit:II

- Reproductive cycle in vertebrates
- Menstruation, lactation and pregnancy
- Mechanism of parturition
- Hormonal regulation of gametogenesis

Unit: III

- Evidences of organic evolution.
- Theories of organic evolution.
- Variation, Mutation, Isolation and Natural selection.
- Evolution of Horse

Unit:IV

- Introduction to Ethology: Branches and concept of ethology.
- Patterns of Behaviour, Taxes, Reflexes, Drives and Stereotyped behaviour.
- Reproductive behavioural patterns.
- Drugs and behavior, Hormones and behaviour

Unit:V

- Prawn Culture
- Sericulture
- Apiculture
- Pisciculture
- Poultry keeping
- Elements of Pest Control: Chemical & Biological Control

Zoology
B.Sc. Part II 2018-19
Practical

The practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:

- Study of the representative examples of the different chordates (Classified characters).
- Dissection of various systems of scoliodon-Afferent and Efferent branchial cranial nerves, internal ear.

Alternative methods: By Clay/Thermacol/ Drawing/ Model etc.)

- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behavior.

Scheme of Practical Exam **Time: 3:30hrs**

• Major dissection (Cranial nerves/efferent branchial vessel)	10
• Exercise based on evolution	05
• Exercise based on applied zoology	05
• Exercise based on animal behavior	04
• Spotting-8 (slides-4,bones-2,specimen-2)	16
• Viva	05
• Sessional marks.	05

Zoology

B.Sc. Part III **2018-19**

Paper-I

ECOLOGY, ENVIRONMENTAL BIOLOGY: TOXICOLOGY, MICROBIOLOGY AND MEDICAL ZOOLOGY

Unit: I (Ecology)

- Aims and scopes of ecology
- Major ecosystems of the world-Brief introduction
- Population- Characteristics and regulation of densities
- Communities and ecosystem
- Bio-geo chemical cycles
- Air & water pollution
- Ecological succession

Unit: II (Environmental Biology)

- Laws of limiting factor
- Food chain in fresh water ecosystem
- Energy flow in ecosystem- Trophic levels
- Conservation of natural resources
- Environmental impact assessment

Unit: III (Toxicology)

- Definition and classification of Toxicants
- Basic Concept of toxicology
- Principal of systematic toxicology
- Heavy metal Toxicity (Arsenic, Murcury, Lead, Cadmium)
- Animal poisons- snake venom, scorpion & bee poisoning
- Food poisoning

Unit: IV (Microbiology)

- General and applied microbiology
- Microbiology of domestic water and sewage
- Microbiology of milk & milk products
- Industrial microbiology: fermentation process, production of penicillin, alcoholic breverages, bioleaching.

Unit:V (Medical Zoology)

- Brief introduction to pathogenic microorganisms, Ricketssia, Spirochaetes, AIDS and Typhoid
- Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Entamoeba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schistosoma
- Nematode pathogenic parasites of man
- Vector insects

Zoology
B.Sc. Part III 2018-19
Paper II

GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES

Unit: I (Genetics)

- Linkage & linkage maps, Sex Determination and Sex Linkage
- Gene interaction- Incomplete dominance & Codominance, Supplementary gene, Complementary gene, Epistasis Lethal gene, Pleiotropic gene and multiple alleles.
- Mutation: Gene and chromosomal mutation
- Human genetics: chromosomal alteration: Down, Edward, Patau, Turner and Klinefelter Syndrome Single gene disorders: Alkaptonuria, Phenylketonuria, Sickle cell anemia, albinism and colour blindness

Unit: II (Cell Physiology)

- General idea about pH & buffer
- Transport across membrane: Diffusion and Osmosis
- Active transport in mitochondria & endoplasmic reticulum
- Enzymes-classification and Action

Unit: III (Biochemistry)

- Amino acids & peptides- Basic structure & biological function
- Carbohydrates & its metabolism- Glycogenesis; Gluconeogenesis; Glycolysis; Glycogenolysis; Cosi-cycle
- Lipid metabolism- Oxidation of glycerol; Oxidation of fatty acids
- Protein Catabolism- Deamination, transamination, transmethylation

Unit: IV (Biotechnology)

- Application of Biotechnology
- Recombinant DNA & Gene cloning
- Cloned genes & other tools of biotechnology (Tissue culture, Hybridoma, Trasgenic Animals and Gene library)

Unit: V (Biotechniques)

1. Principles & techniques about the faollowing:
   (i) pH meter
   (ii) Colorimeter
   (iii) Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
   (iv) Centrifuge
   (v) Separation of biomolecules by chromatography & electrophoresis

B. Sc. Part III 2018-19
Zoology
Practical

The practical work in general shall be based on syllabus prescribed in theory.
The candidates will be required to show knowledge of the following:

- Estimation of population density, percentage frequency, relative density.
- Analysis of producers and consumers in grassland.
- Detection of gram-negative and gram-positive bacteria.
- Blood group detection (A,B,AB,O)
- R. B. C. and W.B.C count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

Scheme of marks distribution **Time: 3:30hrs**

• Hematological Experiment	08
• Ecological Experiment: Grassland Ecosystem/ Population Density/Frequency/relative density	06
• Bacterial staining	05
• Biochemical experiment	06
• Practical based on Instrumentation (Chromatography/ pH meter/microscope/centrifuge.	05
• Spotting (5 spots)	10
7 Viva	05
8. Sessional	05

Proposed Syllabus and Structure

For

B.Sc. with Botany

Pt. Ravishankar Shukla University,

Raipur

B.Sc.– I (BOTANY) PAPER-I

BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

UNIT-I

VIRUSES: General characteristics, types of viruses based on structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle. Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages. Mycorrhiza-Types and Significance.

UNIT –II

BACTERIA: General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and Gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, *Rhizobium, Azatobactor, Anabena.*

UNIT-III

FUNGI: General account of habit and habitat, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi. Heterothallism and Parasexuality. Outlines of classification of fungi. Economic importance of fungi. Life cycles of *Saprolegnia, Albugo,, Aspergillus, Peziza, Agaricus, Ustilago, Puccinia, Alternaria and Cercospora*. VAM Fungi

UNIT-IV

ALGAE: Algae: General characters, range of thallus organization, Gaidukov phenomenon, reproduction, life cycle patterns and economic importance.Classification, Systematic position, occurrence, structure and life cycle of following genera : *Nostoc, Gloeocaspsa, Volvox,, Oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia.*

UNIT –V

Lichens- General account, types, structure, nutrition, reproduction and economic importance. Mycoplasma: Structure and importance. Blue Green Algae (BGA) in nitrogen economy of soil and reclamation of Ushar land.Mushroom Biotechnology

Books Recommended:

Dubey R.C. and Maheshwari D.K. ***A text book of Microbiology,*** S. Chand Publishing, New Delhi

Presscott, L. Harley, J.and Klein, D. ***Microbiology***, 7th edition, Tata Mc Graw-Hill Co.New Delhi.

Sharma P.D., ***Microbiology and Plant pathology,*** Rastogi Publication. New Delhi.

Alexopolous, C.J. Mims, C.W. and Blackwell, MM. ***Introduction to Mycology,*** John Wiley & Sons.

Dubey H.C. ***An Introduction to Fungi,*** Vikas Publishing, New Delhi

Mehrotra R.S. & Agrawal A., ***Plant Pathology,*** Tata McGraw, New Delhi

Sharma P.D. ***Plant Pathology***, Rastogi Publishers, Meruth.

Sristava, H.N. ***Fungi***, Pradeep Publications, Jalandhar

Webster, J. & Weber, R. ***Introduction to Fungi***, Cambridge University Press, Cambridge

Kumar H.D. ***Introduction to phycology***, Aff. East-west Press, New Delhi

Lee RE, ***Phycology***, Cambridge University Press U.K.

Srivastava, H.N., ***Algae***, Pradeep Publications, Jalandhar

Pandey S.K. Quick ***Concept of Botany***, Lambert Academic publishing, Germany

Pandey S.N., Mishra S,P. & Trivedi P.S. ***A Text Book of Botany*** (Vol.-I), Vikas Publishing, New Delhi

Singh, Pandey and Jain, ***A Text book of Botany,*** Rastogi Publication, Meerut.

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(Mr Sudheer Tiwari)

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B.Sc.-I (BOTANY) PAPER –II

(BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY)

UNIT –I

BRYOPHYTA: General characteristics, affinities, range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in *Riccia, Marchantia, Pellia, Anthoceros, Funaria.* Vegetative reproduction in Bryophytes, Evolution of sporophytes.

UNIT-II

PTERIDOPHYTES: General characteristics, affinities, economic importance and classification, Heterospory and seed habit, stellar system in Pteridophytes, Aposory and apogamy, Telome theory, *Azolla* as Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of *Psilotum, Lycopodium, selaginella, Equisetum, Marsilea.*

UNIT-IV

Gymnosperm: General characteristics, affinities, economic importance and classification, Morphology, anatomy and reproduction in *Cycas, Pinus* and *Ephedra.*

UNIT-V

PALAEOBOTANY: Geological time scale, types of fossils and fossilization, Rhynia, study of some fossil gymnosperms. *Lygenopteris*

Books Recommended:

Parihar, N.S. ***The Biology and Morphology of Pteridophytes,*** Central Book Depot, Allahabad.

Parihar,N.S. ***An introduction to Bryophyta Vol.I:Bryophytes*** Central Book Depot, Allahabad.

Sambamurty,AVSS, ***A textbook of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany,*** IK International Publishers.

Pandey SN, Mishra SP and Trivedi PS ***A text Book of Botany (Vol.II)***, Vikas Publishing, New Delhi

Bhatanagar, SP and Moitra, A. ***Gymnosperm***, New Age International (P) Ltd., Publishers, New Delhi

Biswas C. and Johri BM, ***The Gymnosperms***, Springer-Verlag, Germany.

Srivastava, HN, ***Palaeobotany***, Pradeep Publications Jalandhar

Srivastava, HN, Bryophyta, Pradeep Publications Jalandhar

Singh, Pandey and Jain, ***A Text Book of Botany***, Rastogi Publication, Meerut

Sristava, HN, ***Fundamentals of Pteridophytes,*** Pradeep Publications, Jalandhar

B.Sc. I (BOTANY)

PRACTICAL

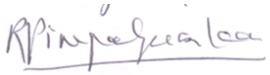
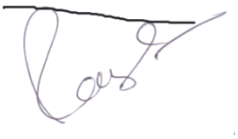
Study of external (Morphorgical) and internal (microscopic/anatomical) features of representative gerera given in the theory.

1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachosperrmum
2. Gram staining
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria
5. Pteridophyta: Lycopodium, Selaginella, Equsetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Epherda.

PRACTICAL SCHEME

TIME: 4 Hrs. **M.M. : 50**

1.	Algae/Fungi/Gram Staining	10
2.	Bryophyta/Pteridophyta	10
3.	Gymnosperm	10
4.	Spotting	10
5.	Viva-Voce	05
6.	Sessional	05

(Dr. J.N. Verma) (Dr. Rekha Pimpalgaonkar) (Dr.Ranjana Shristava)

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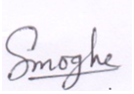
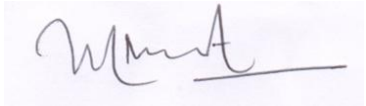
Govt. D.B. Girls PG College Govt. N PG Science College Govt. VYTPG Science College

Raipur, (C.G.) Raipur, (C.G.) Raipur, (C.G.)

(Mrs. Sanchal Moghe) (Mr. Shivakant Mishra) (Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

B.Sc.–II (BOTANY) PAPER-I

(PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY)

UNIT-I

Bentham and Hooker system of classification.Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of Plant material and Herbarium techniques.Important botanical gardens and herbaria of India, Kew Botanical garden, England.

UNIT-II

Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaeae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

UNIT-III

Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants; Cotton, jute, sun, hemp, coir.Timber yielding plants: Sal, Teak, Shisham and Pine.Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy, Brahmi, sarpgandha, ---of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato.Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages : Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia Ethnobotany in context of Chhattisgarh.

UNIT-IV

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.

UNIT-V

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self incompatibility, fertilization, endosperm, embryo, polyembryonoy, apomixes and parthenocarpy.

Books Recommended:

Singh, Pandey,Jain. ***Diversity and Systematics of Seed Plants***, Rastogi Publications Merrut

Sharma OP, ***Plant Taxonomy,*** Tata Mc Graw Hill, New Delhi

Pandey BP, ***Taxonomy of Angiosperms,*** S. Chand Publishing, New Delhi

Pandey, BP, ***Plant Anatomy,*** S.Chand Publishing, New Delhi

Pandey, BP, ***Economic Botany,*** S.Chand Publishing, New Delhi

Bhojwani, SS and Bhatanagar SP, ***Embryology of Angiosperm***, Vikas Publication House, New Delhi

Singh, Pandey, Jain, ***Embryology of Angiosperms***, Rastogi Publication, Meerut

Sharma, V, Alum, A. ***Ethnobotany***, Rastogi Publications, Meerut

Tayal, MS ***Plant Anatomy***, Rastogi Publication, Meerut

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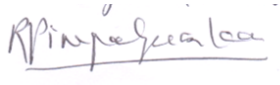

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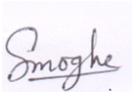

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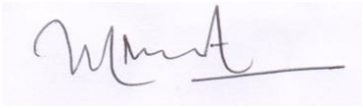

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B.Sc.-II (BOTANY) PAPER-II

(ECOLOGY AND PLANT PHYSIOLOGY)

UNIT-I

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adapataions in hydrophytes, xerophytes and epiphytes.

UNIT-II

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species

Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids

Biogeochemical cycles:carbon cycle, nitrogen cycle and phosphorus cycle

UNIT-III

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

UNIT-IV

Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C3, C4 CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis.

Respiration: Aerobic and anaerobic respiration, Glycolysis, Kreb's cycle, factors affecting respiration, R.Q.

UNIT-V

Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

Books Recommended:

Koromondy, EJ. ***Concepts of Ecology,*** Prentice Hall, USA

Singh, JS Singh SP and Gupta SR. ***Ecology and Environmental Science and Conservation***, S. Chand Publishing, New Delhi

Sharma, PD. ***Ecology and Environment,*** Rastogi Publications, Merrut

Hopkins, WG and Huner, PA. ***Introduction to Plant Physiology,*** John Wiley and Sons.

Pandey SN and Sinha BK, ***Plant Physiology,*** Vikas Publishing, New Delhi

Taiz, L and Zeiger. E. ***Plant Physiology,*** 5th edition, Sinauer Associates Inc. M.A, USA

Srivastava, HS ***Plant Physiology and Biotechnology***, Rastogi Publications, Meerut

B.Sc. II (BOTANY)

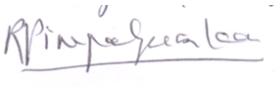
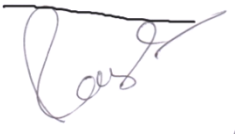
Practical

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O_2 in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.

PRACTICAL SCHEME

TIME: 4 Hrs. **M.M. : 50**

1.	Anatomy	08
2.	Economic Botany	04
3.	Physiology	08
4.	Ecology	10
5.	Spotting	10
6.	Viva-Voce	05
7.	Project Work/ Field Study	10

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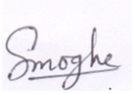
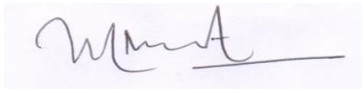

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B.SC.-III (BOTANY) PAPER –I

(ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL EMBRYOLOGY, ELEMENTARY BIOSTATISTICS, ENVIRONMENTAL POLLUTION AND CONSERVATION)

UNIT-I

Structure, Principle and applications of analytical instrumentation.

Chromatography technique, Oven, Incubator, Autoclave, Centrifuge, Spectrophotometere

UNIT-II

Plant Tissue culture techniques, growth media, totipotency, protoplast culture, somatic hybrids and cybrids, micropropagation , somaclonal variations, haploid culture.

Analytical techniques: Microscopy-Light microscope, Electron microscope

UNIT-III

General principles of plant pathology, general symptoms of fungal, bacterial and viral diseases, mode of infection, diseases resistance and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases.

Rust diseases of wheat, Tikka diseases of groung nut, Red rot of sugar can, Bacterial blight of rice, Yellow vein mosaic of b hindi, Little leaf of brinjal.

UNIT-IV

Introduction to pollution, green house gases, Ozone depletion, Dissolve oxygen, B.O.D., C.O.D.

Bio magnification, Eutrophication, Acid precipitation, Phytoremediation, Plant indicators,. Biogeographical Zones of India, Concept of biodiversity, CBD, MAB, National parks and

biodiversity Hot spots, Conservation strategies, Red Data Book, IUCN threat categories, invasive species, endemic species, concept of sustainable development.

UNIT-V

ELEMENTARY BIOSTATISTICS:

Introduction and application of Biostatics, measure of central tendency-Mean, Median, Mode, measures of dispersal-Standard deviation, standard error.

Books Recommended:

Singh, RS, ***Plant Diseases,*** Oxford & IBH, New Delhi.

Pandey, BP, ***Plant Pathology,*** S.Chand Publishing, New Delhi

Sharma, PD, ***Microbiology and Plant pathology***, Rastogi Publications, Meerut

Sharma PD, ***Mycology and Phytopathology***, Rastogi Publications, Meerut

Singh JS, Singh SP and Gupta, SR, ***Ecology Environmental Science and Conservation,*** S. Chand Publishing, New Delhi

Sharma, PD. ***Ecology and Environment,*** Rastogi Publiications, Meerut

Bhojwani, SS and Razdan, MK, ***Plant Tissue Culture:Theory and Practices,*** Elsevier

Sharma AK, ***Text book of Biostatistics,*** Discovery Publishing House Pvt. Ltd.

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B.Sc.-III (BOTANY) PAPER –II

(GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY)

UNIT-I

Cell and cell organelles, organization and morphology of chromosomes, giant chromosomes, cell division, Mendel's laws, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytoplasmic inheritance, gene concept: cistron, muton, recon.

UNIT-II

Nucleic acids, structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, Operon model.

UNIT-III

Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors (Plasmid, Bacteriophages, Cosmids, Phagemids), gene cloning, PCR, Application of Biotechnology; G.M.Plants, Monoclonal antibodies, DNA finger printing

UNIT-IV

Protein: Chemical composition, primary, secondary and tertiary structure of Proteins.

Carbohydrate: general account of monosaccharides, disaccharids and Polysaccharides

Fat: Structure and properties of fats and fatty acids, synthesis and breakdown.

UNIT-V

ENZYMES: Nomenclature and classifaction, components of enzyme, theories of enzyme action, enzyme kinetics (Michaelis-Menten constant), allosteric enzymes, isozymes, Abzymes. Ribozymes, factors affecting enzyme activity.

Books Recommended:

Nelson, DL, Cox, MM, Lehninger ***Principles of Biochemistry,*** W.H. freeman and Company, New York, USA.

Cooper, GM, ***The Cell: A Molecular Approach***, ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.

Singh BD, ***Fundamental of Genetics***, Kalyani Publication

Singh BD, ***Genetics***, Kalyani Publication

Gupta, PK, ***Cell and Molecular Biology,*** Rastogi Publications, Meerut

Singh, BD, ***Biotechnology: Expanding Horizons,*** Kalyani publications

Gupta, PK, ***Elements of Plant Biotechnology,*** Rastogi Publications, Meerut

Gupta, SN, ***Concepts of Biochemistry,*** Rastogi Publications, Meeru

Jain, JL., Jain S, Jain, N, ***Fundamentals of Biochemistry***, S Chand Publishing, New Delhi

B.Sc.-III (Botany)

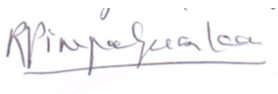
Practical

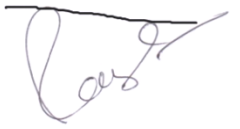
1. Study of host parasite relationship pf plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and Potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of Curd.
6. Study of plant diseases as listed in the theory paper.
7. Biochemical test of carbohydrate and protein.
8. Instrumentation techniques

PRACTICAL SCHEME

TIME: 4 Hrs. **M.M. : 50**

1.	Plant Disease/Symptoms	10
2.	Instrumentation techniques	05
3.	Staining of Microbes	05
4.	Tissue Culture techniques	05
5.	Spotting	10
6.	Project Work/ Field Study	05
5.	Viva-Voce	05
6.	Sessional	05





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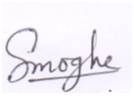

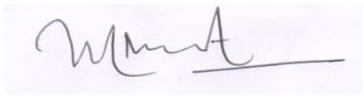

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