

SYLLABUS

B.Sc. (Honours)

CHEMISTRY/BIOCHEMISTRY

(Foundation Course)

For

Session

2018-19

2019-20

2020-21



Department of Chemistry
A.P.S. University, Rewa (M.P.)

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	I
PEPER	H-I
TITLE OF THE PAPER	Organic and Inorganic Chemistry
Max.	70

Unit-I: Alcohols and Phenols

Alcohols: Classification and nomenclature. Monohydric alcohols- nomenclature, methods of formation of reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature, Reactions of alcohols. dihydric alcohols nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$\text{Pb}(\text{OAc})_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric alcohols-nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature, structure and bonding, Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols- electrophonic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gaiterman synthesis, Hauer-Hoesch reaction. Lederer- Manasse reaction and Reimer, Tiemann reaction.

Unit-II: Aldehydes and Ketones

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketone using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevengel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction, Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones. Cannizzaro's reaction. Meerwein-Ponndorf-Verley, Clemmensen, Wolff-Kishner, LiAlH_4 and NaBH_4 reduction. Halogenation of enolizable ketones. An introduction to α , β unsaturated aldehydes and ketones.

Unit-III: P-Block Elements

Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16. Hydrides of boron-diborane and higher boranes. Borazine, borohydrides Fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetra nitride, basic properties of halogens, interhalogens.

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

Unit-IV: Chemistry of Elements of First Transition Series

Characteristic properties of d block elements. Properties of the elements of the first transition series their Binary compounds such as Carbides, Oxides and Sulphides.

Complexes: Complexes illustrating relative stability of their oxidation states, coordination number and geometry.

Unit-V: Non-aqueous Solvents

Physical properties of solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2 .

Acids and Bases: Arrhenius, Bronsted- Lowry, the Lux-Flood solvent system and Lewis concepts of acids and bases.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	I
PEPER	H-II
TITLE OF THE PAPER	Elements of Biochemistry
Max.	70

Unit-I: Carbohydrates

Monosaccharide, Disaccharides, polysaccharides, Biological significance of carbohydrates, Bio synthesis of Disaccharides, polysaccharides. Nucleic Acids- Physical configuration of nucleic acids, chemical composition of nucleic acids, structures of purines and pyrimidines bases. Biological significance of nucleic acids, mechanism of Enzymes action Enzymes and co-enzymes.

Unit-II: Amino Acids & Proteins

Structure of protein amino acids, properties of amino acids and their synthesis of amino acids, catabolism of amino acids. Proteins- The chemical structure of proteins, properties of proteins, biological significance of proteins, mechanism of protein synthesis, Control of protein synthesis.

Unit – III Fats Oils and Detergents

Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value, acid value. Soaps, synthesis detergents, alkyl and aryl sulphonates.

Unit-IV: Enzymes & Co-enzymes

Definition, classification and nomenclature of Enzymes, Physio-chemical nature of Enzymes, Enzyme kinetics, mechanism of Enzymes action, factors affecting enzyme activity, co-enzymes and its Biological significance. Mechanism of co-enzymes action.

Unit-V: Nucleic acids:

Nucleic acid, Introduction, Constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	II
PEPER	H-III
TITLE OF THE PAPER	Organic & Physical Chemistry
Max.	70

Unit-I: Arenes and Aromaticity

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

Unit-II: Alkenes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regio-selectivity in alcohol dehydration the Saytzeff rule, Hoffmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation oxymercuration-reduction, Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO₄, polymerization of alkenes, Substitution at the allylic and vinylic positions of alkenes, industrial applications of ethylene and propene.

Unit-III: Alkyl and Aryl Halides

Nomenclature and classes of alkyl halides, methods of formation, chemical reactions mechanism of nucleophilic substitution reaction of alkyl halides. SN₂ and SN₁ reactions with energy profile diagrams. Polyhalogen compounds : chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reactions. The addition elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides versus allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC, Freon.

Unit-IV: Chemical Kinetics

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

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

Unit-V Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): properties- Kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulz law, gold number, Liquids in liquids (emulsions) types of emulsions, preparation. Emulsifier, Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids. Green chemistry Introduction to green chemistry what is green chemistry? need for green chemistry. goals of green chemistry. Limitations/obstacles in the pursuit of the goals of green chemistry. Examples of green synthesis/reactions. green synthesis of the following compounds: adipic acid, catechol, BHT, methyl methacrylate, urethane, aromatic amines (4- aminodiphenylamine), benzyl bromide, acetaldehyde, disodium iminodiacetate (alternative to strecker synthesis), citral, ibuprofen, paracetamol, turtural. oxidation reagents and catalysts; biomimetic, multifunctional reagents; combinatorial green chemistry; proliferation of solvent less reactions; on covalent derivatization; green chemistry in sustainable development

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	II
PEPER	H-IV
TITLE OF THE PAPER	Physical & Inorganic Chemistry
Max.	70

Unit-I: Mathematical Concepts and Computer

Mathematical Concepts: Logarithmic relations, (rules and types), use of log table and antilog table in calculations, curves sketching, straight line and linear graphs, calculation of slopes, Differentiation of functions like Kx , ex , x^n , $\sin x$, $\log x$; multiplication and division in differentiation, maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions; Factorials, Probability.

Computer: General introduction to computer different components of a computer Hardware and software, input-output devices binary number and arithmetic; introduction to computer languages Programming and operating systems.

Unit-II: Gaseous States and Molecular Velocities

Gaseous States and Molecular Velocities: Critical phenomenon : PV isotherms of ideal gases, Andrew's experiment, continuity of states, the isotherms of Vander Waals equations, relationship between critical constants and Vander Waals constants, Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision numbers, mean free path and collision diameter.

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

Unit-III: Atomic Structure

Elementary Quantum Mechanics: Idea of de Broglie matter waves, Heisenberg uncertainty principal, atomic orbital's, Shapes of s , p , d orbitals, Schrodinger wave equation, significance of ψ and ψ^2 , radial and angular wave functions and probability distribution curves, effective nuclear charge.

Unit IV: Periodicity of Elements

Definition, periodicity of elements long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s & p - block. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.(b) Atomic radii (van der Waals), factors affecting Atomic radii; (c) Ionic radii; (d) Covalent radii; (e) Ionization enthalpy/Ionization potential, factors affecting ionization energy; (f) Electron gain enthalpy (Electron affinity), factors affecting electron gain enthalpy, trends of Electron gain enthalpy (Electron affinity) in periodic table. (g) Electronegativity, trends of Electronegativity in periodic table, Pauling's/ Mulliken's and Mulliken-Jaffe's electronegativity scales. Hund's rules, Aufbau rule and Pauli's exclusion law.

Unit V: Chemical Bonding

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

SESSION	2019-20
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	III
PEPER	H-V
TITLE OF THE PAPER	Organic & Inorganic Chemistry
Max.	70

Unit I: Structure and Bonding

Hybridizations, Bond length, and bond angles, bond energy; Localized and delocalized chemical bond, vander Waal's interaction, inclosing compound, clatherates, charge transfer complex . resonance, hyper conjugation. Aromaticity, inductive and field effect hydrogen bonding

Mechanism of Organic reaction: Curved arrow notation . drawing electron movement with arrows half headed and double headed arrow homolytic and hetrolytic bond breaking

Types of Reagents: Electrophiles and nuclophiles. Types of organic reaction. Energy consideration, Reactive intermediates carbocations, carbanions, free radicals Methods of determination of reaction mechanism .

Unit –II: Stereochemistry

Concealments of symmetry .molecular cherallity. enantiomers estrogenic centers optical activity properties of enantiomers chiral and achiral molecule with two stereogenic centres distereoisomer mesocompound resolution of enantiomers inversion and recemization Relative and absolute configuration sequence rule D&L, R&S system of nomenclature , Nomenclature E&Z system geometrical isomerism in alicyclic compound Conformatioept of isomerism .types of isomerism optical isomerism n ,conformational analysis of ethane and n-butane Conformation of cyclohexane axial and equatorial bonds Newman projection and saw horse formula Fiecher and Flying wedge formula.

Unit-III: Alkanes and Cycloalkanes

IUPAC nomenclature, classification isomerism in alkanes sources and methods of preparation (with special reference Wurtz, Kolbe, Corey's House reaction and decarboxylation of carboxylic acid) Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenations of alkanes. Cyclo alkane: Nomenclature methods of preparation chemical reaction , Bayer's strain theory and its limitation ring strain in cyclopropane cyclobutane , theory of stainless rings

Unit –IV: S- Block Elements

Comparative study diagonal relationship salient feature of hydrides salvation and complexation tendencies including their function in biosystems an introduction to alkyl and aryls.

Unit-V: Solid State

Definition of space lattice Unit cell Laws of crystallography –(i) Law of constancy of interfacial angles (ii) law of rationality of indices (iii) law of symmetry .Symmetry elements in crystals. X-ray diffraction by crystal Derivation of Bragg's equation Determination of crystals structure of NaCl ,KCl and CsCl (Laue's methods and powder methods.) Catalysis characteristics of catalyzed reaction classification of catalysis miscellaneous Example.

SESSION	2019-20
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	III
PEPER	H-VI
TITLE OF THE PAPER	Advanced Chemistry-I
Max.	70

Unit-I: Electromagnetic Spectrum

Absorption Spectra: Ultraviolet (UV) absorption spectroscopy- absorption laws (Beer-Lambert's law). Molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation, Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy: Molecular vibrations Hooke's law, selection rules, intensity an deposition of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

Unit-II: Thermodynamics-I

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

First law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law Joule-Thomson coefficient and inversion temperature. Calculation of W, q, dU and dH for the expansion of ideals gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry: Standard state, standard enthalpy of formation- Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchoffs equation.

Second Law of Thermodynamics: need for the law, different statements of the law, Carnot cycle and its efficiency, Cannot theorem. Thermodynamic scale of temperature.

Unit-III: Thermo dynamics-II

Concept of entropy: Entropy as a state function, entropy as a function of V&T, entropy as a function of P&T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases. Third Law of thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data.

Thermodynamics-III: Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P.V and T.

Chemical Equilibrium: Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chateliers principle. Reaction isotherm and reaction isochors- Clapeyron equation and Clausius- Clapeyron equation applications.

Unit-IV: Chemistry of Lanthanide Elements:

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

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

Unit-V: Organic Compounds of Nitrogen:

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic, Substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.

Halonitroarenes: Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines, Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive animation of aldehydic and ketonic compounds. Gabriel-Phthalamide reaction, Hoffmann bromamide reaction. Reactions of amines, electrophilic aromatic. Substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts azo coupling.

SESSION	2019-20
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	IV
PEPER	H-VII
TITLE OF THE PAPER	Advanced Chemistry -II
Max.	70

Unit-I: Electrochemistry-I

Electrical Transport: Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations.

Unit-II: Electrochemistry-II

Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of K_2 of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations. Types of reversible electrodes: gas metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes-standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells, reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermo dynamic quantities of cell reactions (AG^o, AH and K), polarization, over potential and hydrogen.

Unit-III: Electrochemistry and Corrosion

Concentration cells with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titration. Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric method. Buffers- Mechanism of buffer action, Henderson-Hasselbalch equation, hydrolysis of salts.

Corrosion: Types, Theories and methods of combating it.

Unit-IV: Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition.

Transition Elements-II: Comparative treatment of elements of second and third transition series magnetic behavior, spectral properties and stereochemistry.

Unit-V: Carboxylic Acid

Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituent's on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation, methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents, haloacids, hydroxyl acids-Malic, tartaric & citric acid.

Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides. Relative stability of acyl derivatives. Physical properties, inter conversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions, Mechanisms of esterification and hydrolysis (acidic and basic).

SESSION	2019-20
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	IV
PEPER	H-VIII
TITLE OF THE PAPER	Industrial Chemistry
Max.	70

Unit-I: Paint & Pigment

Classification of paints, constitution of paints. Setting of paints. Qualities of a good paint, paint failure, Methods of applies paints, baking, paint removers.

Pigment: Definition study of following pigments lithopone, titaniumdioxide ultramarine blue, zincoxide, white lead. Varnishes: - raw material manufacture of varnishes japaines.

Unit II: Pulp & Paper

Manufacture of pulp, sulfate pulp, rag pulp, benting, refining, flling, sizing & colouring manufacture of paper, calendaring ecological problems of Indian pulp & paper industry.

Unit-III: Cement Industries

Types of cements cementing materials, raw materials manufacture setting of cements, properties of cement, testing of cement, mortars & concrete, curing of concrete, decay of concrete. LIME manufacture of lime, properties of lime, setting & hardening of lime, gypsum, plaster of Paris.

Unit-IV: Fertilizers

Definition & classification of fertilizer manufacture of phosphate fertilizer (superphasate triple superphasate of calcium) manufacture of nitrogen fertilizers (urea & ammonium phosphate pollution caused by fertilizers, effects of fertilizers.

Unit-V: Soap and Detergents, Fats, Oil & Wax Soap and Detergents

Soap- manufacture, toilet and transparent soap, metal soap, cleaning action of soap. Principal group of synthetic detergent, classification of surface active agents, cationic detergents, non ionic detergents, amphoteric detergents, containing enzymes, eco friendly detergent. Manufacture of shampoos. Fat, Oil & Wax properties, Classification, Analysis, Manufacture and Refining of vegetable oils, animal and mineral oil, hydrocarbon oil, essential oil, oils as emollients, some common wax, solubility of wax, synthetic fat, oil and wax, manufacture of candel hydrogenation of oil.

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	V
PEPER	H-IX
TITLE OF THE PAPER	Complex and Polymer Chemistry
Max.	70

Unit-I: Metal ligand bonding in transition metal complexes

Limitation of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal field parameters.

Thermodynamics and kinetic aspects of metal complexes

A brief outline of Thermodynamic stability of metal complexes and factors affecting the stability, substitution reaction of square planar complexes Magnetic properties of transition metal complexes Types of magnetic behaviour, Methods of determining magnetic susceptibility, spin (only formula) LS coupling, correlation of μ_s (spin only) and μ effective values. Orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit-II: Electron spectra of transition metal complexes

Types of electronic transition, selection rules for d-d transition, spectroscopic ground states, spectrochemical series, Orgel energy level diagram for d1-d9 states, discussion of the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$

Unit III: Synthetic polymers

Addition or chain- growth polymerization. Free radical vinyl polymerization. Ionic vinyl polymerization. Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

Unit IV: Organic Synthesis via Enolates

Acidity of α - hydrogen's Alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3- dithianes, Alkylation and Acylation of enamines.

Unit V: Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of Photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non- radiative processes (internal conversion, intersystem crossing) quantum yield photosensitized reaction- energy transfer processes (simple examples).

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	V
PEPER	H-X
TITLE OF THE PAPER	Spectroscopy and Organometallic Chemistry
Max.	70

Unit I: Organometallic Compounds

Definition, Nomenclature and classification of Organometallic Compounds, preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti. A brief account of metal- ethylenic complexes and homogeneous hydrogenation, mononuclear carbonyl and the nature of bonding in metal carbonyls. Organo- magnesium compounds: the Grignard reagents – formation, structure and chemical reaction. Organo-zinc compounds: Formation and chemical reactions. Organo-lithium compounds: Formation and chemical Reactions.

Unit II: Spectroscopy

Nuclear magnetic resonance (NMR) Spectroscopy, proton magnetic resonance (H NMR) Spectroscopy, nuclear shielding and de-shielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, Interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2- tribromoethane, ethyl acetate, toluene and acetophenone.

Structure elucidation- Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

Unit III: Spectroscopy

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

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

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, idea of Vibrational frequencies of different functional groups.

Raman spectrum: Concept of polarizability, pure rotation and pure vibrational Raman spectra of diatomic molecules, selection rules.

Unit IV: Physical Properties and Molecular Structure

Optical activity, polarization- (Clausius-Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment. Measurement of dipole moment- temperature and refractivity method, dipole moment and structure of molecules, magnetic properties- Paramagnetism, diamagnetism and ferromagnetics.

Unit V: Heterocyclic Compounds

Introduction: Molecular Orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution, Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, Piperidine and pyrrole. Introduction to condensed five and six-membered heterocycles, Preparation and reactions of Indole, quinoline and isoquinoline. With special reference to Fischer indole synthesis, Skraup synthesis and Bischler- Napieralski synthesis. Mechanism electrophilic substitution reaction of indole, quinoline and isoquinoline.

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	V
PEPER	H-XI
TITLE OF THE PAPER	TECHNIQUES & INSTRUMENTATION
Max.	70

Unit I: Voltammetry

General principle of voltammetry, principle of polarography, Polarographic wave, half wave potential and its importance, Ilkovic equation, principle of cyclic voltammerty, different applications of polarography and cyclic voltammerty.

Unit II: Chromatography

Principle and types of Chromatography, Introduction and applications, Paper chromatography, TLC, Column chromatography, GLC, HPLC, Affinity chromatography, Ion-exchange chromatography, Molecular sieving chromatography,

Unit III: Electrophoresis

Introduction, Principle and Types of Electrophoresis and factors affecting the rate of electrophoresis, Free and Zonal electrophoresis, Paper electrophoresis, Gel electrophoresis, Immuno-electrophoresis, Iso-electric focusing.

Unit IV: Centrifugation

Principle of Centrifugation, Types of centrifuges, Preparative and Analytical centrifugation, sedimentation coefficient, RCF, Factors affecting RCF, Ultracentrifugation, Applications in biology.

Unit V: Radioactivity

Production of Isotopes, Synthesis of labeled compounds, measurement of radioactivity, Methods based upon Gas ionization, Ionization chamber, Proportional counters, Geiger Muller counter, Methods based upon excitation - Liquid Scintillation Counting.

Microscopy: Principle of microscopy, types, compound light phase, contrast florescence microscope, electron microscope and application.

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	VI
PEPER	H-XII
TITLE OF THE PAPER	ENVIORNMENTAL CHEMISTRY
Max.	70

Unit I: Enviornment

Introduction, Composition of atmosphere, vertical temperature, heat budget of the earth atmospheric system, vertical stability atmosphere. Biochemical cycles of C, N, P, S, & O, Biodistribution of elements.

Unit II: Hydrosphere

Chemical composition of water bodies- lakes, streams, rivers & wet lands etc. Hydrological cycle.

Aquatic pollution & water quality: Inorganic, organic, pesticide, agricultural, industrial and sewage, detergents, oil spills and oil pollutants. Water quality parameters- dissolved oxygen, biochemical oxygen demand, solids, metals, and contents of chloride soleplate, phosphate, nitrate and microorganisms. Water quality standards. Analytical methods for measuring BOD, DO, COD, F, Oils, metals (As, Cd, Cr, Hg, Pb, Se etc), residual chloride and chloride demand.

Unit III: Purification & treatment of water

Introduction, potability of water, sterilisarion and disinication of water by ozonization and silver ion method, removal of gas from water determination softening of water by lime soda process, determination of hardness of water by soap and titration method

Unit IV: Soils

Composition, micro and macro nutrients, pollution, fertilizers, pesticides, plastic and metals. Waste treatment.

Unit V: Atmosphere

Chemical composition of atmosphere- particles, ions, radicals and their formation. Chemical & photochemical reactions in atmosphere, smog formation. Oxides of N,C, S, O and their effects.

Air pollution: Pollution by chemicals, petroleum, minerals, chlorofluorocarbons. Green house effect, acid rain, air pollution controls and their chemistry. Analytical methods for measuring air pollutants. Continuous monitoring instruments.

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	VI
PEPER	H-XIII
TITLE OF THE PAPER	Pharmaceutical Chemistry
Max.	70

Unit I: General pharmacology

Nature and sources of drugs, Routes of drug administration and Dosage forms, Absorption and Bioavailability of drugs, Factors affecting drug absorption, Distribution of drugs, Fate of drugs.

Unit II: Drug action

Mechanism of action of a drug, Drug Receptors, Dose response relationship, Adverse drug reactions (ADR), Manifestations of ADR, Factors affecting the drug effect. Sedatives, Hypnotics, Antipyretic and analgesic drugs, NSAIDS, Pharmacology of cough, Hypertension and Heart failure.

Unit III: Drugs in git

Digestants, Antiflatulants, Appetite suppressants, Hypolipidaemic agents. Emetics, drug therapy of vomiting, Vertigo and Diarrhea, Pharmacotherapy of constipation.

Unit IV: Dosages Certification

Dosage form consideration in preformulation, solid dosage form, solution formulations, emulsion, suspension, freeze dried products and its regulatory considerations, drug design phase, solubility analysis, dissolution and permeation, characterization scheme, stability tastings, order of reaction, antioxidants, chelating agents, impurity, GMP related to bulk drugs and APIs.

Unit V: Chemotherapy

General principles of chemotherapy of infections, Chemotherapy of UTI, Chemotherapy of Malaria, Chemotherapy of Tuberculosis, Chemotherapy of viral infections, Antiseptics, disinfectants and insecticides.

Department of Chemistry

SYLLABUS

B.Sc. (Honors) CHEMISTRY

(SUBS.)

For

Session

2018-19

2019-20

2020-21

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (Subs.)
SEMESTER	I
PEPER	S-I
TITLE OF THE PAPER	Botany
Max.	70

Unit – I

Plant Classification & Taxonomy

(A) Concept of Gymnoperm and Angiosperm structure, characters and life cycles, Methods of Plant Breeding – Introduction, Selection and Hybridisation (pedigree, backcross, mass selection, bulk method), Polyploidy, Male sterility and heterosis breeding.

(B) Bryophytes: Occurrence, morphology, classification, anatomy and reproduction.

Pteridophytes: Occurrence, Morphology, Classification, anatomy and reproduction.

Unit – II

Algae – Occurrence, Structure, Classification Reproduction.

Cyanobacteria - Occurrence, Structure, Classification Reproduction.

Fungi – Classification, Occurrence, Structure and Reproduction.

UNIT – III

(A) Morphology, Anatomy and different function of Flowering plants, Root, Stem, Leaves, Flower, Fruit and seeds.

(B) Movement of water, food, Nutrients and exchange of gases, Plant and water, mineral nutrition.

Unit – IV

Photosynthesis: Photochemical reaction, Photophosphorelation, Carbon fixation Pathway; C3, C4 and CAM pathways, Respiration (aerobic, anaerobic, including fermentation), Photorespiration, Nitrogen cycle and Fixation.

Unit – V

Importance of secondary metabolites, Pigments as photoreceptors (plastidial pigments and phytochromes), Plant movements; photoperiodism and flowering, Vernalisation, senescence, Growth substances (Plant Hormones) – their chemical nature and role, Fruit Ripening, Dormancy, Storage and Germination of seeds.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (Subs.)
SEMESTER	II
PEPER	S-II
TITLE OF THE PAPER	Cell Biology
Max.	70

Unit – I

Morphology of Cell, Prokaryotic and Eukaryotic Cell Structure, Plant Cell Vs Animal Cell, Structure and Composition of Plant cell wall, Bacterial Cell wall and Plasma Membrane, Transport across the Plasma membrane.

Unit - II

Origin, Structure, Cellular organization and Functions of mitochondria, golgi apparatus, Chloroplast, endoplasmic reticulum, lysosomes, nucleus, ribosome, Chromosome structure and its models.

Unit – III

Cell Cycle, Cell division: Interphase, Mitosis, Meosis and its regulation, Ageing of cell, cell death, cytoskeleton, cell adhesion, cell junctions, cell check point, cell cycle regulation.

Unit – IV

Structural organization and chemical composition of chromosome,s nucleosomes organization, special chromosomes, chromosome staining, Banding pattern in human chromosomes.

Unit – V

Transport by vesicles formation, Endocytosis, Exocytosis, Receptor mediate eno-exo cytosis, Basics of signal transduction, Protein trafficking, Protein sorting, Stem cell biology, Cancer cell biology.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (Subs.)
SEMESTER	III
PEPER	S-III
TITLE OF THE PAPER	Molecular Biology
Max.	70

Unit – I

Genetic code: Basic features, Biological significance, various types of genes, Wobble hypothesis. Organization of DNA and RNA in prokaryotes and in eukaryotes, Types of DNA & RNA.

Unit – II

Central dogma, DNA replication in prokaryotes and eukaryotes, conservative, semi conservative and dispersive types, Enzymology of DNA replication. Errors & regulation of DNA replication, DNA repair.

Unit – III

Transcription in Prokaryotes: Mechanism of Transcription (Initiation, Elongation, Termination), RNA polymerases, Promoters, Post transcriptional modification, Inhibitors of transcription.

Unit – IV

Translation: Mechanism of Translation (Initiation, Elongation & Termination), Ribosomes structure, A & P sites, Prokaryotic and Eukaryotic Ribosomes, Release Factors and Nonsense codons, Post translational modifications. Apoptosis.

Unit – V

Regulation of Gene Expression – Concept of operon, promoters, Operator, Repressors, Structural genes, inducers, *lac* operon, *trp* operon, Attenuation, *ara* operon, positive regulation, negative regulation, cascade regulation.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (Subs.)
SEMESTER	IV
PEPER	S-IV
TITLE OF THE PAPER	Enzyme
Max.	70

Unit- I

General Properties of Enzymes, Structural properties of enzymes, Nomenclature and Classification of Enzymes, Protein nature of Enzymes, Non-protein enzymes, Metalloenzymes and metal activated enzymes, turn over no.

Unit – II

Models proposed for Enzymatic Reactions, Factors affecting the rate of enzyme catalyzed reaction. Mechanism of action of enzymes: Lock & Key model, induced fit model, enzyme-substrate model, active site, active site determination.

Unit – III

Acid-base catalysis of enzymes, Covalent catalysis, Metal ion catalysis, Serine Protease, Ribonuclease, Chymotrypsin, Lysozyme, measurement of enzyme activity, Machalis Menten equation, significance of V_{max} and K_m .

Unit – IV

Enzyme inhibition: Reversible-Irreversible inhibition, Feedback Inhibition, Concept of Coenzymes and Cofactors activity and binding efficiency, Allosteric Inhibition, rate of enzyme action.

Unit – V

Enzyme Biotechnology – Immobilization, immobilization techniques, Uses of enzymes in milk industry, food industry, leather industry, enzymes in cellulose & metal degradation, Designer enzymes, Biosensors, Morden enzyme tools & technology, enzyme extraction and purification.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (Subs.)
SEMESTER	V
PEPER	S-V
TITLE OF THE PAPER	Metabolism
Max.	70

Unit – I

Biological Oxidation: Oxidation, Reduction, Enzymes involved in oxidation-reduction, Electron Transport Chain in detail. Basal Metabolic Rate & its affecting factors.

Unit – II

Digestion and absorption of carbohydrates, Concept of Carbohydrate Metabolism, Glycolysis – aerobic & anaerobic Glycolysis, TCA cycle, Glycogen Metabolism.

Unit - III

Digestion, absorption and mobilization of Lipids, Transport of Fatty Acids, Role of Hormones in Digestion and mobilization, Elementary idea of metabolism of Triglycerides, β -oxidation of Fatty acids, Cholesterol, Ketone Bodies.

Unit – IV

Digestion, absorption and mobilization of Proteins and Amino Acids, Oxidation, Reduction, Decarboxylation, deamination and transamination of amino acids, Concept of Glucogenic and Ketogenic amino acids, Nitrogen excretion and Urea cycle.

Unit – V

Heam Metabolism – Source of Bilirubin, Transport of Bilirubin, Conjugation of Bilirubin, Secretion and excretion of Bilirubin, Detoxication, xenobiotices metabolism.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	I
PEPER	S-1
TITLE OF THE PAPER	Matrices, Trigonometry, Calculus, Geometry
Max.	120

Unit I

Linear independence of row and column Matrices, row & column rank of matrix. Equivalence of column and row rank. Eigen values eigen vectors. Characteristic equation of matrix, Cayley Hamilton theorem and its use in finding inverse of matrix, application of matrix to a system of linear equation, solving the linear equation. Theorem on consistency and inconsistency of a system of linear equations, solving the linear equations with three unknowns.

Unit II

De-Moivre's theorem and its application. Direct and inverse circular and hyperbolic functions, logarithm of a complex quantity, expansion of trigonometrically function.

Unit III

Concept of partial differentiation, Successive differentiation Leibnitz theorem, Maclaurin and Taylor series expansions. Asymptotes. Tracing of curves in Cartesian and Polar Co-ordinates.

Unit IV

Integration of irrational algebraic and transcendental function, reduction formula definite integral Quadrature, Rectification.

Unit V

General equation of second degree. Tracing of Conics. Polar equation of a conic. Equation of Cone with given base. Generators of cone, Right circular cone.

SESSION	2018-19
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	II
PEPER	S-2
TITLE OF THE PAPER	Differential Equation, Vector Calculus And Analysis & Elementary
Max.	120

Unit I

Linear equation and equation reducible to the linear form , Exact differential equations. First order higher degree equation for x,y,p Clairaut's form and singular solutions. Geometrical meaning of a differential equation, orthogonal trajectories, Linear differential equations with constant coefficients.

Unit II

Homogeneous Linear ordinary differential equation. Linear differential equations of second order. Transformation of the equation by changing the dependent and independent variables. Method of variation of parameters , ordinary simultaneous differential equations.

Unit III

Scalar and vector product of three vectors, product of four vectors reciprocal vectors. Vector differentiation. Gradient divergence and curl. Vector integration, Line, Surface and volume integrals.

Unit IV

Definition and basic properties of group ,subgroup,cyclic groups, simple properties. Coset decomposition and related theorems. Lagrange' theorem and Fermat's theorem, Normal subgroup, Quotient groups.

Unit V

Homomorphism and Isomorphism of groups, kernel of homomorphism. Fundamental theorem of homomorphism of groups.

SESSION	2019-20
CLASS	<i>B.Sc. CHEMISTRY (HONS.)</i>
SEMESTER	<i>III</i>
PEPER	<i>S-3</i>
TITLE OF THE PAPER	<i>Advanced Calculus and Mechanics</i>
Max.	<i>120</i>

Unit I

Definition of a sequence, theorems on limits of sequences, Bounded and monotonic sequence, Cauchy's convergence criterion series of nonnegative terms, Comparison test Cauchy's integral test, Ratio test, Raabe's test, Logarithmic test De-Morgan and Bertrand's test.

Unit II

Alternating series Leibnitz's theorem, Absolute and conditional convergence, Continuity of function of one variable, sequential continuity, properties of continuous functions, uniform continuity.

Unit II

Chain rule of differentiability, mean value theorems and their geometrical interpretation, Darboux's intermediate, Value theorem for derivatives, Limit and continuity of function of two variables.

Unit IV

Analytical conditions of equilibrium of coplanar forces, virtual work, Catenary.

Unit V

Velocities and Accelerations along radial and transverse direction and along tangential and normal directions, Simple harmonic motion.

SESSION	2019-20
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	IV
PEPER	S-4
TITLE OF THE PAPER	Partial and Advanced Differential Equation
Max.	120

Unit I

Partial differential equation of the first order, Lagrange's solution, Some special types of equations, Charpit's general methods of solution

Unit II

Partial differential equation of the second and higher order, Classification of linear partial differential equations of second order, Homogeneous and non homogeneous equations with constant coefficient, Partial differential equations reducible to equations with constant coefficient.

Unit III

Calculus of variations-variational problems with fixed boundaries, Euler's equation for functions containing first order derivative and one independent variable, Extremals.

Unit IV

Series solution of differential equations, Power series methods, Bessel's equations, Bessel's function and its properties.

Unit V

Recurrence and generating relations, Legendre's equations, Legendre's function and its properties recurrence and generating relations, Orthgonality of functions, Sturm-liouville problem, Orthgonality of eigen functions, Reality of eigen value.

SESSION	2020-21
CLASS	B.Sc. CHEMISTRY (HONS.)
SEMESTER	V
PEPER	S-5
TITLE OF THE PAPER	Linear Algebra, Real Analysis and Discrete Mathematics
Max.	120

Linear Algebra

Unit I

Definition of Vector Space and example, Vector subspace, Addition of vector space, linear span, linear dependence and independence, Basis, finite dimensional vector space, existence and extension theorem.

Unit II

Dimension of addition of vector space, quotient space and dimension, Isomorphism, Linear transformation and matrix representation, algebra of linear transformation, rank and nullity the theorem.

Real Analysis

Unit II

Riemann integral, Interability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus.

Unit IV :

Partial derivation and differentiability of real-valued functions of two variables, Schwarz and Young's theorem, Furiesr series of half and full intervals.

Discrete Mathematics

Unit V

Countability, theory of mathematical induction, inclusion and exclusion.

Paper FC- 1

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Unit-I

- 1- Lora=rkiqdkjrh $\frac{1}{4}$ dfork $\frac{1}{2}$ & t;'kadjizlkn
- 2- iq"i dh vfHkyk"kk $\frac{1}{4}$ dfork $\frac{1}{2}$ &ek[kuykyprqosZnh
- 3- okD; lajpukvkSj v'kqf);kj $\frac{1}{4}$ ladfyr $\frac{1}{2}$
- 4- o.kZ&fopkj $\frac{1}{4}$ Loj&O;atu] oxhZdj.k] mPPkkj.k LFKku $\frac{1}{2}$

Unit-II

- 1- ueddknjksxk $\frac{1}{4}$ dgkuh $\frac{1}{2}$ &izsepan
- 2- ,d FksjtkHkkst $\frac{1}{4}$ fuca/k $\frac{1}{2}$ &MkW- f=HkqouukFk 'kqDy
- 3- i;kZ;okph] foykse] ,dkFkhZ] vusdkFkhZ ,oa 'kCn;qXe 'kCn
 $\frac{1}{4}$ ladfyr $\frac{1}{2}$
- 4- fojkefpUg& $\frac{1}{4}$ ladfyr $\frac{1}{2}$] laf/k $\frac{1}{4}$ ladfyr $\frac{1}{2}$

Unit-III

- 1- Hkxokucq) $\frac{1}{4}$ fuca/k $\frac{1}{2}$ &LokehfoosdkuUn
- 2- yksdra= ,d /keZgS $\frac{1}{4}$ fuca/k $\frac{1}{2}$ &MkW- loZiYYkhjk/kkd`".ku
- 3- ugha :dh gS unh &ghjkykyckNksfr;k
- 4- iYYkou

Unit-IV

- 1- vQlj $\frac{1}{4}$ fuca/k $\frac{1}{2}$ & 'kjntks'kh
- 2- gekjh $\frac{1}{4}$ lkaLd`frd ,drk $\frac{1}{4}$ fuca/k $\frac{1}{2}$ &jke/kkjh flag fnudj
- 3- la{ksi.k $\frac{1}{4}$ ladfyr $\frac{1}{2}$
- 4- lekl $\frac{1}{4}$ ladfyr $\frac{1}{2}$

Unit-V

- 1- uSfrdewY; ifjp; ,oaoxhZdj.k $\frac{1}{4}$ vkys[k $\frac{1}{2}$ &MkW- 'kf'kjk;
- 2- vkpj.k dh IH;rk $\frac{1}{4}$ fuca/k $\frac{1}{2}$ &ljkjiw.kZ flag
- 3- varKkZuvkSjuSfrd thou $\frac{1}{4}$ ys[k $\frac{1}{2}$ &MkW- loZiYYkhjk/kkd`".ku
- 4- vllknhiksHko $\frac{1}{4}$ ys[k $\frac{1}{2}$ &Lokeh J)kuan

F C - 2

English Language

Unit – I

1. Where the mind is without fear : Rabindranath Tagore
2. The Hero: R.K.Narayan
3. Trust with destiny: Jawaharlal Nehru
4. Indian Weavers:Sarojini Naidu
5. The Portrait of a lady:Khushwant Singh
6. The Solitary Reaper: William Wordsworth

Unit – II

Basic Language Skills: Vocabulary, Synonyms, Antonyms, Word Formation, Prefixes, Suffixes.

Unit – III

Basic Language Skills: Uncountable Nouns, Verbs, Tenses, Adverbs.

Unit – IV

Comprehension/Unseen Passage, Translation of sentences (English to Hindi & Hindi to English).

Unit – V

Composition and Paragraph Writing

F C-3

Entrepreneurship Development

Unit – I

Entrepreneurship Development - Concept and importance, function of enterpriser, Goal determination – problems, challenges and solutions.

Unit – II

Project Proposal -Need and objects, Nature of organization, Production Management, Financial Management, Marketing Management, Consumer Management.

Unit –III

Role of regulatory institutions, Role of development organizations, Self employment oriented schemes, Various growth schemes.

Unit – IV

Financial management of project - Financial institution and their role, Capital estimation and arrangement, Cost and price determination, Accounting management.

Unit – V

Problem of entrepreneurs - Problem relating capital, Problem relating registration, Administration problem and how to overcome from above problems.

F C -04

Environmental Studies

Unit – I Study of Environment & Ecology

- (a) Definition and Importance.
- (b) Public participation and Public awareness.
- (c) Ecology – Introduction.
- (d) Ecosystem – Concepts, components, structure & functions, Energy flow, Food chain, Food web, Ecological Pyramids & types.

Unit – II Environmental Pollution and Population

- (a) Air, Water, Noise, Heat and Nuclear Pollution, Definition, causes, effects and prevention of pollution.
- (b) Population Growth, Disparities between countries.
- (c) Population Explosion, Family Welfare Programme.
- (d) Environment and human health.
- (e) Cleanliness and disposal of domestic waste.

Unit – III Natural Resources, Problems and Conservation

- (a) Water Resources
- (b) Forest Resources
- (c) Land Resources
- (d) Food Resources
- (e) Energy Resources

Unit – IV Bio-diversity and its protection

- (a) Introduction – Genetic species and ecosystem diversity.
- (b) Value of Bio-diversity – Consumable use, Productive use, Social, Moral and Aesthetic Values.
- (c) India as a nation of mega bio-diversity centre, Bio-diversity at national and local levels.
- (d) Threats to Bio-diversity – Loss of Habitat, Poaching of wild life, Man and wild life conflicts.

Unit – V Disaster Management and Environmental Laws

- (a) Disaster Management – Flood, Earthquake, Cyclones and Landslides.
- (b) Conservation of laws for air and water pollution.
- (c) Wildlife Conservation Laws.
- (d) Role of information technology in protecting environment and health.

Department of Chemistry
A.P.S. University Rewa (M.P.)

(Academic Session 2018-19)

Class	–	B.Sc.(Honors) Chemistry I & II SEM.
Subject	–	Chemistry
Paper	–	Practical
Max. Marks: 200 (100 + 100)	–	Time: 6 Hours

Physical Chemistry

- (A) Any one Experiment **24 Marks**
- (i) Determination of melting point
 - (ii) Determination of boiling point
 - (iii) Weighing and preparation of solution
- (B) Any one Experiment **24 Marks**
- (i) Determination of surface tension /percentage composition of given liquid mixture using surface tension method.
 - (ii) Determination of viscosity/percentage composition of given liquid mixture using viscosity method.

Inorganic Chemistry

32 + 16 Marks

- (i) Inorganic mixture analysis
(Mixture analysis for two cations and two anions)
- (ii) Separation of cations by paper chromatography

Organic Chemistry (Any two)

48 Marks

- (i) Crystallization
- (ii) Sublimation
- (iii) Detection of elements
- (iv) Identification of functional group

Viva-voce

26 Marks

Record

30 arks

*Practical examination will be held at the end of II SEM.

Department of Chemistry
A.P.S. University Rewa (M.P.)

(Academic Session 2019-20)

Class	–	B.Sc.(Honors) Chemistry III & IV SEM.
Subject	–	Chemistry
Paper	–	Practical
Max. Marks: 200 (100 + 100)	–	Time: 6 Hours

Inorganic Chemistry

24 Marks

- (i) Analysis of inorganic mixture containing five radicals with at least on interfering radical
- (ii) Determination of acetic acid in commercial vinegar using NaOH
- (iii) Redox titrations
- (iv) Estimation of Hardness of water by EDTA.

24 Marks

Physical Chemistry

32 + 16 Marks

- (i) Determination of transition temperature of given substance by thermometric method.
- (ii) To determine the enthalpy of neutralization of strong acid, strong base.
- (iii) Verification of Beer's – Lambert law.
- (iv) To study the phase diagram of two component system by cooling curve method.

Organic Chemistry (Any two)

48 Marks

- (i) Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
- (ii) Use of paper chromatography/Thin layer chromatography: determination of R_f values, separation and identification of organic compounds.
 - a. Separation of green leaf pigments (spinach leave may be used)
 - b. Separation of dyes.

Viva-voce

26 Marks

Record

30 Marks

*Practical examination will be held at the end of IV SEM.

Department of Chemistry
A.P.S. University Rewa (M.P.)

(Academic Session 2020-21)

Class	–	B.Sc.(Honors) Chemistry V SEM.
Subject	–	Chemistry
Paper	–	Practical
Max. Marks: 200 (100 + 100)	–	Time: 6 Hours

Inorganic Chemistry

- | | |
|--|-----------------|
| (i) Gravimetric analysis:
Barium as Barium sulphate, Copper as cuprous-thiocyanate. | 24 Marks |
| (ii) Complex compound preparation
a. Potassium chlorochromate(IV)
b. Tetramine copper(II) sulphate monohydrate
c. Hexamminenickel(II)chloride | 24 Marks |
| (iii) Effluent water analysis, Identification of cations and anions in different samples . | |
| (iv) Water analysis, to determine dissolved oxygen in water sample in ppm. | |

Physical Chemistry

32 + 16 Marks

- | | |
|---|--|
| (i) To determine the velocity constant (Specific reaction rate) of hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature. | |
| (ii) Determination of partition coefficient of iodine between carbon tetra chloride and water. | |
| (iii) Job's method | |
| (iv) pH- metric titrations, conductometric titrations. | |

Organic Chemistry (Any two)

48 Marks

- Binary mixture analysis containing two solids:
Separation ,identification and preparation of derivatives
- Preparation
 - Acetylation, (ii) Benzoylation (iii) meta dinitro benzene
 - Picric acid

Viva-voce

26 Marks

Record

30 Marks

*Practical examination will be held at the end of VI SEM.

A.P.S. University Rewa (M.P.)

(Academic Session 2018-19)

Class	–	B.Sc.(Honors) Chemistry I & II SEM.
Subject	–	Botany /Cell Biology (Subsidiary)
Paper	–	Practical
Max. Marks: 200 (100 + 100)	–	Time: 6 Hours

(A) Botany: Any two Experiments

(18 + 17) Marks

- (i) To study the tissue organization in root and shoot apices using permanent slides.
- (ii) Morphology and anatomy of the following Hibiscus, Pinus.
- (iii) Section cutting of Bryophytes and Pteridophytes.
- (iv) Comparative study of mitosis and meiosis cell division in plant cell by using permanent slides.
- (v) Systematic study of locally available plants belonging to families prescribed theory practical.
- (vi) Demonstration of herbarium techniques.

(B) Cell Biology: Any two Experiments

(18 + 17) Marks

- (i) Identify and comment upon spots.
- (ii) Preparation of blood film (Leishmen's stain) prepared slides showing the parasites.
- (iii) Study of T.S. and L.S. of different human organs (Prepared slides).
- (iv) Comparative examination of mitosis and meiosis in an animal cell by using prepared slides.
- (v) Study of living animals – Amoeba, Paramecium, Euglena, Hydra, Starfish, Octopus.
- (vi) Demonstration of different developmental stages of embryo of frog by prepared slides.

Viva-voce
Record

14 Marks
16 Marks

*Practical examination will be held at the end of II SEM.