B.Sc. Part-I Subject Name :Inorganic Chemistry
Subject Code:CH-101

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I Atomic Structure:** Idea of De Broglie matter waves, Heisenberg's uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and $\psi 2$, quantum numbers, radial and angular wave function and probability distribution curves, shapes of s, p, d, orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, electronic configurations of the elements, effective nuclear charge. **Periodic Properties** **Practical Lab**
2	SEPTEMBER	**UNIT-II Chemical Bonding:** Covalent Bond: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridizations and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2 and H_2O; MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules. **Practical Lab**
3	OCTOBER	**UNIT II:** Multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference. **Practical Lab**
4	OCTOBER	**UNIT TEST-I (UNIT-1,2)**
5	NOVEMBER	**UNIT-III Ionic Solids:** Ionic structure, radius ratio effect and coordination number, limitations of radius ratio rule, lattice defects, semi-conductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions, Fajan's rule, Metallic bond: Free electron, valence bond and band theories. Weak Interactions: Hydrogen bonding, van der Waals forces. **Practical Lab**
6	DECEMBER	**UNIT-IV s-Block Elements:** Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their functions in biosystems, an introduction to alkyls and aryls of s-block elements. **Practical Lab**
7	JANUARY	**Chemistry of Noble Gases:** Chemical properties of Noble gases, chemistry of xenon, structure and bonding in xenon compounds. **Practical Lab**
8	FEBRUARY	**p-Block Elements:** Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16. **Practical Lab**
9	MARCH	**UNIT-V Chemistry of Compounds:** Hydrides of Boron: diborane and higher boranes, borazines, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides. **Practical Lab**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (UNIT-3,4,5)**

B.Sc. Part-I Subject Name: Organic Chemistry
Subject Code:CH-102

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I Structure and Bonding:** Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bonds, van der Waals interactions, inclusion compounds, clathrates,charge transfer complexes, resonance, hyperconjugation, inductive and field effects, hydrogen bonding. **Mechanism of Organic Reactions:** Curved arrow notation, drawing electron movements with arrows, half headed and double headed arrow, homolytic and heterolytic bond breaking. Types of reagentselectrophiles and nucleophiles. Types of organic reactions, Energy considerations. **Practical Lab**
2	SEPTEMBER	**UNIT I:Reactive Intermediates:** Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects. Kinetic and stereochemical studies). **Practical Lab**
3	OCTOBER	**UNIT-II:Stereochemistry of Organic Compounds:** Concept of isomerism, types of isomerism. Optical Isomerism: Elements of symmetry, molecular chirality enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration: Sequence rules, D&L and R&S systems of nomenclature. **Practical Lab**
4	OCTOBER	**UNIT TEST:I (UNIT-1,2)**
5	NOVEMBER	**UNIT II:Geometric Isomerism:** Determination of configuration of geometric isomers, E&Z systems of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational Isomerism: Conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and sawhorse formulae. Difference between configuration and conformation. **Practical Lab**
6	DECEMBER	**UNIT-III Alkanes and Cycloalkanes:** **Alkanes:** IUPAC nomenclature of branched and unbranched alkanes, alkyl group, classification of carbon atoms in alkanes, isomerism in alkanes, sources, methods of preparation (with special reference to Wurtz reaction, Kolbe reactions, Corey-House reaction and decarboxylation of carboxylic acids), Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. **Practical Lab**
7	JANUARY	**Cycloalkanes:** Nomenclature, methods of preparation, chemical reactions, Baeyer's strain theory and its limitations, ring strains in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring: banana bonds. **Unit-IV Alkenes, Cycloalkenes, Dienes and Alkynes:** **Alkenes, Cycloalkenes and Dienes:** Nomenclature of alkenes, methods of preparation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration, the Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-Mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof's rule, hydroboration-oxidation, oxymercuration-reduction, epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene. **Practical Lab**

8	FEBRUARY	**Unit-IV** Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of preparation, polymerization. Chemical reactions-1,2- and 1,4-additions, Diels-Alder reaction. **Alkynes:** Nomenclature, structure and bonding in alkynes. Methods of preparation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reduction, oxidation and polymerization. **Unit-V Arenes, Aromaticity, Alkyl and Aryl Halides:** **Arenes and Aromaticity:** Nomenclature of benzene derivatives. The aryl groups. Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure and MO picture. Aromaticity: Huckle's rule, aromatic ions. Aromatic electrophilic substitution: General pattern of the mechanism, role of π- and σ-complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel Crafts reaction, energy profile diagrams. Activating & deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. methods of formation of alkylbenzene, alkynyl benzene and biphenyl. **Practical Lab**
9	MARCH	**Alkyl and Aryl Halides:** Nomenclature and classes of alkyl halides, methods of preparation, chemical reactions. Mechanism of nucleophilic substitution reactions of alky halides, SN2 and SN1 reactions with energy profile diagrams. Polyhalogen compounds: chloroform and carbon tetrachloride. Methods of preparation of aryl halides, nuclear and side chain reactions. The addition, elimination and the elimination-addition mechanism of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and use of D.D.T. and B.H.C. **Practical Lab**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (UNIT :3,4,5)**

B.Sc. Part-I Subject Name :Physical Chemistry
Subject Code:CH-103

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-1 Mathematical Concept and Computers:**
2	SEPTEMBER	**UNIT-II:Gaseous States:** Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of state. **Critical Phenomena:** PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state. **Molecular Velocities:** Root mean square, average and most probable velocities. Qualitative discussions of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect). **Practical Lab**
3	OCTOBER	**UNIT-III:Liquid State:** Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases.Liquid Crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholesteric phases. Thermography and seven segment cells. **Practical Lab**
4	OCTOBER	**UNIT TEST-I (UNIT:1,2)**
5	NOVEMBER	**UNIT-III:Colloidal State:** Definition of colloids, classification of colloids. Solids in liquids (sols): kinetic, optical and electrical properties; stability of colloids. Protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, emulsifier. Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids. **Practical Lab**
6	DECEMBER	**UNIT-IV:Solid State:** Classification of solids, definition of space lattice, lattice points, crystal lattice and unit cell. Seven crystal systems. Symmetry elements in crystals. Types of solid crystals: Ionic, covalent, molecular and metallic. Laws of crystallography (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. **Practical Lab**
7	JANUARY	**UNIT-IV:** X-ray diffraction by crystals. Derivation of Bragg's equation Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method). **UNIT-V:Chemical Kinetics and Catalysis:** Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction: concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions-zero order, first order, second order, pseudo-order, half-life and mean life. **Practical Lab**
8	FEBRUARY	**UNIT-V:** **Determination of the order of reaction:** differential method, method of integration, method of halflife period and isolation method. Radioactive decay as a first order phenomenon. Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometry. **Practical Lab**

9	MARCH	**UNIT-V:Theories of Chemical Kinetics:** Effect of temperature on rate of reaction, Arrhenius concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Catalysis, characteristics of catalyzed reactions, classification of catalysis, miscellaneous examples. **Practical Lab**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (3,4,5)**

B.Sc. Part-I Subject :Botany
Paper I -Diversity of Microbes and Cryptogams (Thallophyta)

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I:Viruses and Bacteria :** General account of viruses and mycoplasma, bacteria-structure, nutrition. reproduction and economic importance, General account of Cyanobacteria, economic importance, Nostoc, Oscillatoria. **Practical Lab**
2	SEPTEMBER	**UNIT-II: Algae:** General Characters, classification and economic importance, important features and life history of chlorophyceae : Volvox. **Practical Lab**
3	OCTOBER	**Unit-II:** Oedogonium, Coleochaete, Chara **Practical Lab**
4	OCTOBER	**UNIT TEST-I (UNIT-1,2)**
5	NOVEMBER	**UNIT-III :Algae :** General Characters, classification and economic importance, important features and life history of Xanthophyceae - Vaucheria. **Practical Lab**
6	DECEMBER	**UNIT-III:** Phaeophyceae-Ectocarpus Sargassum,Rhodophyceae - Polysiphonia. **Practical Lab**
7	JANUARY	**UNIT-IV: Fungi :** General characters, classification and important features and life history of Mastigomycotina- Phytophthora Oomycotina-Albugo,Ascomycotina-Saccharomyces, Penicillium, Erysiphae **Practical Lab**
8	FEBRUARY	**UNIT-IV:** Basidiomycotina-Puccinia, Ustilago and Agaricus, **UNIT-V:** Deuteromycotina- Colletotrichum, Alternaria. Economic importance of fungi. Plant diseases and General account of Lichens, special studies about green ear disease, white rust **Practical Lab**
9	MARCH	**UNIT-V:**Stem rust disease of Wheat, Smut disease, Citrus canker, Tobacco mosaic disease, Little leaf disease of brinjal. **[Practical Lab]**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (3,4,5)**

B.Sc. Part-I Subject :Botany
Paper II : Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany)

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I:Bryophyta:** General characteristics and classification of bryophyta, economic importance and alternation of generation **Practical Lab**
2	SEPTEMBER	**UNIT-II:**Structure, reproduction and economic importance of Hepaticopsida. Riccia, Marchantia **Practical Lab**
3	OCTOBER	**UNIT-II:**Porella, Anthoceratopsida-Anthoceros, Bryopsida-Sphagnum, Polytrichum. **Practical Lab**
4	October	**UNIT TEST-I (UNIT-1,2)**
5	NOVEMBER	**UNIT-II:Pteridophyta :** The first vascular land plant, types of steles, important characteristies of Psilopsida,Lycopsida **Practical Lab**
6	DECEMBER	**UNIT-III:**Sphenopsida, and Pteropsida **Practical Lab**
7	JANUARY	**UNIT-III:**Classification of Pteridophyta. **UNIT-IV:**Structure and reproduction in Lycopodium **Practical Lab**
8	FEBRUARY	**UNIT-IV:**Selaginella, Equisetum, Adiantum and Marsilea **Practical Lab**
9	MARCH	**UNIT-V:**Fossilization, Types of fossils, Techniques of fossil study, Geological time scale. General characters of Rhynia, Lepidodendron, Calamites, Cladoxylon in brief. **Practical Lab**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (UNIT-1,2)**

B.Sc.Part-I Subject :Botany
Paper III - Cell Biology, Genetics and Plant breeding

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I:The cell envelopes :** Plasma membrane, bilayer lipid structure, functions of the cell wall, ultra structure of prokaryotic and eukaryotic cells. Structure and function of other organelles. Golgi bodies **Practical Lab**
2	SEPTEMBER	**UNIT-I:**E.R. Peroxisomes, vacuoles. Structure and function of nucleus : Ultrastructure, nuclear membrane, nucleolus. **UNIT-II Chromosome organization :** Morphology, Centromere and telomere, chromosome alterations, deletion, duplication, translocation, inversion **Practical Lab**
3	OCTOBER	**UNIT-II:**Variations in chromosome number, aneuploidy, polyploidy, sex chromosomes. DNA the genetic material ; DNA structure, replication DNA, protein interactions, the nucleosome model, genetic code, satellite and repetitive DNA, cell division-Mitosis, Meiosis. **Practical Lab**
4	October	**UNIT TEST-I (UNIT-1,2)**
5	NOVEMBER	**UNIT-III:Genetic Inheritance:** Mendelian laws of segregation and independent assortment Linkage analysis, allelic and non allelic interaction. Gene expression : Structure of gene, transfer of genetic information, transcription, translation **Practical Lab**
6	DECEMBER	**UNIT-III:Protein synthesis:** ribosomes, RNA ;regulation of gene expression in prokaryotes, Lac operon. **Practical Lab**
7	JANUARY	**UNIT-IV:Genetic Variations :** Mutations, spontaneous and induced mutation. **Practical Lab**
8	FEBRUARY	**Unit IV Extranuclear genome :** presence and function of mitochondrial and plastid DNA, Plasmids. **UNIT-V:Plant Breeding :** Methods of plant breeding selection (Mass, Pureline and clonal) **Practical Lab**
9	MARCH	**UNIT-V:**Introduction and acclimatization, Hybridization and hybrid vigour, inbreeding depression. **Practical Lab**
10	APRIL	**REVISION CLASSES, UNIT TEST-II (UNIT-1,2)**

B.Sc. Part-I Subject : Physics
Paper Name : Mechanics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I:** Inertial & non-inertial frames, Galilean transformations and invariance of physical laws, fictious force, uniformly rotating frames and transformation of displacement, velocity and acceleration, Coriolis force, motion relative to earth, effect of rotation of earth on 'g', Focault's pendulum and its time period. **Practical Lab**
2	SEPTEMBER	**Unit-II :** Concept of centre of mass, Centre of mass of a system of particles, equation of motion, conservation of linear momentum, Relationship between (Lab and center of Mass frames of in 1-D and 2-D reference) elastic and inelastic collision **Practical Lab**
3	OCTOBER	**Unit II** Motion of a system with varying mass, Motion in a central force field, conservation of angular momentum, trajectory of a particle under gravitational force, Kepler's laws, Rutherford's formula. **Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Elasticity, stress and strain, Hooke's Law, Elastic constants and their relations, theory of bending of beams and torsion of a cylinder, Cantilever, cantilever supported at both ends. Experimental determination of elastic constants by bending of beam and Searle's method, modulus of rigidity by static and dynamic method, Poisson's ratio for rubber.**Practical Lab**
6	DECEMBER	**Unit-IV:** Qualitative idea of Oscillations in an arbitrary potential well, simple harmonic motion, Coupled oscillator, Eqvation of mation of two simple harmonic coupled oscillators and energy transfer normal modes, normal coordinates of two linear coupled oscillators.**Practical Lab**
7	JANUARY	**Unit-IV:** Damped harmonic oscillation- example of Ballistic galvanometer, forced harmonic oscillators, phase relations, power absorption, resonance, band width and quality factor, LCR series and parallel circuits.**Practical Lab**
8	FEBRUARY	**Unit V:** General equation of one dimensional wave equation and its solution, longitudinal and transverse waves, Plane progressive harmonic wave, its energy density, energy flux and intensity, pressure waves in gas.**Practical Lab**
9	MARCH	**Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-I Subject : Physics
Paper Name : Electromagnatism

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Scalar and Vector Fields, Gradient of a scalar field, relation between conservative field and Potential, line, surface and volume integral of vector fields, concept of flux, Divergence and Curl of a vector field and their physical significance, Gauss' divergence and Stokes curl theorem with proof, Del and Laplacian operator in Cartesian, Cylindrical and Spherical coordinates.**Practical Lab**
2	SEPTEMBER	**Unit-II :** Atomic and molecular dipoles, induced dipole and polarizability, dielectrics and their electrical polarization,susceptibility and displacement vector, Capacity of a capacitor with partially and completely filled dielectrics, Gauss' law in integral and differential form, Lorentz local field and Clausius-Mossoti equation.**Practical Lab**
3	OCTOBER	**Unit III** Conductors is an electric field, boundary conditions for electrostatic field and potential at dielectric surface, uniqueness theorem, method of electrical images and its application for system of point charge near a grounded conducting plane.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Poisson's and Laplace equation in Cartesian, cylindrical and spherical coordinates (without proof) solution of Laplaces equation in cartesian coordinates, boundary conditions.**Practical Lab**
6	DECEMBER	**Unit-IV:** Rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, self and mutual induction, Measurement of self induction by Rayleigh's method. **Practical Lab**
7	JANUARY	**Unit-IV:** AC circuits and complex numbers and their application in solving AC circuit problems, complex impedance and reactance, series and parallel resonance. Quality factor, power consumed by an AC circuit, Power factor.**Practical Lab**
8	FEBRUARY	**Unit V:** Biot Savart law, Amperes circuital law in differential and integral form, Magnetization vector, Magnetizing field H, relation between B, H and M. uniform magnetization and surface current, Non – uniform magnetization, orbital and spin angular momentum & magnetic moment, orbital gyro magnetic ratio and Bohr Magnetion, Magnetic suspectibility.**Practical Lab**
9	MARCH	**Unit V:** Time Varying Fields, Faraday's law of electromagnetic induction, its integral and differential form, Maxwell's equation in differential and integral form, Maxwell's displacement current, Wave equation for electric and magnetic field.**Practical Lab Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-I Subject : Physics
Paper Name : Optics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Fermat's principle of extremum path, Aplantic points of a spherical refracting surface, Cardinal points of an optical system, Newton's formula and other relations for coaxial lens system, thick lens & lens combination, Lagrange's law, Aberration in images.**Practical Lab**
2	SEPTEMBER	**Unit-I :** spherical aberration and methods of its reduction, chromatic aberration, achromatic combination of lenses placed in cotact and placed at some distance, coma and astigmatism, Eye pieces: Huygen's, Ramsden's and Gauss's eyepieces and their comparison.**Practical Lab**
3	OCTOBER	**Unit II :** Youngs double slit experiment, temporal and spatial coherence, coherence length and time effect of size of slit and purity of spectral line, Interference in thin films,colour in thin films.Wedge shaped film, Newton's rings and determination of wavelength and refractive index of liquid by Newton ring, Hadinger and Fizeau fringes, Michelson Interferometer, Measurement of wavelength.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Fraunhofer diffraction at single slit, intensity distribution and width of central maxima, and determination of slit size, two slit diffraction and its intensity distribution with missing orders. Diffraction due to N slits with intensity distributions. **Practical Lab**
6	DECEMBER	**Unit-III:** Plane transmission grating its formation and intensity distribution, Dispersive power of grating, Angular width of principal maximum, Absent Spectra, Rayleigh's criterion, resolving power of plane transmission grating.**Practical Lab**
7	JANUARY	**Unit-IV:** Polarization states of electromagnetic waves, Plane, Circularly and Elliptically Polarised Light, quarter and half wave plates, methods of production & detection of polarized light.**Practical Lab**
8	FEBRUARY	**Unit-IV:** Huygen's theory of double refraction using Fresnal's ellipsoidal surface, Crystal Optics, Optical activity, Specific rotation, Fresnel's law of optical rotation, Biquartz and Laurent's half shade polarimeters, Reflection and refraction of plane EMW at plane dielectric surface, boundary conditions, Fresnel's relations.**Practical Lab**
9	MARCH	**Unit V:** Stimulated and spontaneous emission, stimulated absorption, Einstein's A and B coefficients, population inversion, conditions for laser action, metastable states, Types of lasers, construction,working and energy level schemes of He-Ne and Ruby laser, Applications of Lasers.**Practical Lab Previous Year Paper Solved in class room of Unit I, II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-I Subject : Mathematics
Paper I : Number theory and Abstract Algebra

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I** Divisibility theory : Division algorithm, Greatest Common divisor(GCD) and its algorithm,Linear diophantine equations of two variables (using Euclid algorithm and Bhaskaracharya's Kuttaka method) Fundamental theorem of arithmetic, congruences, Chinese Remainder Theorem, Euler's Ø function, primitive roots. Binary operation. Addition and multiplication modulo operations. Definition of a group with examples and simple properties.
2	SEPTEMBER	**Unit – II** Permutation group, cycle, transpositions, even and odd permutations and alternating group. Order of an element of a group and its properties.Subgroups of a group with its properties, Cyclic groups and their properties, Cosets. Index of a subgroup, Lagrange's theorem and its applications.
3	OCTOBER	**Unit – II** Subgroups of a group with its properties, Cyclic groups and their properties, Cosets. Index of a subgroup, Lagrange's theorem and its applications.
4	OCTOBER	**Unit Test-I**
5	NOVEMBER	**Unit – III** Normal subgroups with properties. Simple groups, Quotient groups. Group homomorphism with its kernel and properties. Isomorphism, Cayle's theorem, automorphism, Fundamental theorem of homomorphism.
6	DECEMBER	**Unit – IV** Rings, Zero divisors, integral domains and fields. Characteristic of a ring, Subrings, subfield, prime field, ring homomorphism and isomorphism. and Practical
7	JANUARY	**Unit – IV** Ideals and their properties. **Unit – V** Principal ideals and principal ideal ring. Prime ideal. Maximal ideal and Practical
8	FEBRUARY	**Unit – V** Fundamental theorem of ring homomorphism. Euclidean ring and its properties. Polynomial over a ring. Polynomial ring. Polynomial over an integral domain and over a field.
9	MARCH	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-I Subject Name : Mathematics
Paper II : Advanced Calculus

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I** Polar coordinates, angle between radius vector and tangent, polar sub tangent and subnormal. Perpendicular from pole on tangent. Pedal equation of a curve. Derivative of length of an arc in cartesian and polar coordinates.
2	SEPTEMBER	**Unit – I** Curvature, Radius of curvature and its formula in various forms. Centre of curvature, chord of curvature. **Unit – II** Partial differential coefficients of a function of two or more variables. Total differential coefficient. Composite function.
3	OCTOBER	**Unit – II** Euler's theorem on homogeneous functions of two, three and m variables. First and second differential coefficients of an implicit function. Taylor's theorem for a function of two variables. Jacobians with properties. Maxima, minima and saddle points of functions of two and three variables. Lagrange's method of undetermined multipliers..
4	NOVEMBER	**Unit – III** Asymptotes, envelopes and evolutes. Test for points of inflexion and multiple points. Test for concavity and convexity. Tracing of curves in cartesian and polar coordinates.
5	NOVEMBER	**Unit Test-I**
6	DECEMBER	**Unit – IV** Quadrature, Rectification.
7	JANUARY	**Unit – IV** Volumes and surfaces of solids of revolution. Differentiation under the sign of integration.
8	FEBRUARY	**Unit – V** Beta and Gamma functions. Double integrals and their evaluation by change of order and changing into polar coordinates.Triple integrals, Dirichlet's double and triple integrals with their Liouville's extension.
9	MARCH	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-I Subject Name : Mathematics
Paper III : Vector Calculus and Coordinate Geometry

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I** Vector differentiation and integration, Problems based on Gradient, divergence and curl. Vector identities.
2	SEPTEMBER	**Unit – I** Line and surface integrals.Theorems of Gauss, Green, Stokes(without proof) and problems based on these.
3	OCTOBER	**Unit – II** Ellipse : standard equation, auxiliary circle, eccentric angle, tangent, normal, two tangents from point, chord of contact, pole, polar, chord whose mid point given, diameter, conjugate diameters and four normals from a point.
4	**OCTOBER**	**Unit Test-I**
5	NOVEMBER	**Unit – II** Hyperbola : Standard equation, parametric co-ordinates, asymptotes, equation referred to asymptotes as axes, conjugate diameters and rectangular hyperbola.
6	DECEMBER	**Unit – III** Polar Equation : Standard equation, directrix, tangent, normal, polar and asymptotes. Sphere : standard equations in various forms, plane section, sphere through the circle of intersection of two spheres, power of a point, tangent plane, polar plane, polar line, angle of intersection of two spheres, length of tangent, radical plane, radical axis, co-axial system of spheres and limiting points.
7	JANUARY	**Unit – IV** Cone : Homogeneous equation in x, y, z, cone with a given vertex and given base, enveloping cone, condition for the general equation to represent a cone, tangent plane, reciprocal cone, angle between the two lines, in which a plane cuts a cone, three mutually perpendicular generators and right circular cone. Cylinder : Right circular cylinder and enveloping cylinder
8	FEBRUARY	**Unit – V** Central Conicoids : Standard equation, tangent plane, condition of tangency, director sphere, polar plane, polar lines, section with a given center, enveloping cone, enveloping cylinder. Ellipsoid : Normal, six normals from a point, cone through six normals, conjugate diameters and their properties.
9	**MARCH**	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc.Part-I Subject: Zoology
Paper I- Animal Diversity Part-I (Protozoa to Annelida)

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I Taxonomy: -** Classification of Protozoa. Porifera, Coelenterata, Platyhelminthes and Nematoda up to class with examples.**Practical Lab**
2	SEPTEMBER	**UNIT I** Fundamentals of body organization emphasizing symmetry, metamerism, coelome and levels of structural organization. **UNIT-II Protozoa: -** Study of structural organization and life history of paramecium. Study of locomotion, osmoregulation, nutrition and reproduction in protozoa..**Practical Lab**
3	OCTOBER	**UNIT II** Parasitism, pathogenecity and control in protozoans with special reference to Entamoeba and Plasmodium.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**UNIT-III Porifera: -** Habit, habitat, structure and function of Sycon. Types of canal system. **Coelenterata: -** Habit, habitat, structure, function and life history of Aurelia. Polymorphism in coelenterata, coral reef. **Practical Lab**
6	DECEMBER	**UNIT III Ctenophora -** Structural organization and affinities.**Practical Lab**
7	JANUARY	**UNIT-IV Platyhelminthes: -** Structural organization and life history of Fasciola. Parasitic adaptation in Helminthes.**Practical Lab**
8	FEBRUARY	**UNIT-IV Aschehelminthes: -** Study of structure and life history of Ascaris Nematode parasites and human diseases.**Practical Lab**
9	MARCH	**UNIT V** Classification of Annelida (up to subclass); metamerism and coelome in Annelida General account of Annelida structural organization, Physiology & life history of Hirudinaria, Trochophore larva.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part-I Subject: Zoology
Paper-II- Genetics and Biotechnology

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I** Mendelian Genetics: - Mendel's laws of inheritance. Monohybrid and dihybrid cross.Dominance. Incomplete dominance.**Practical Lab**
2	SEPTEMBER	**UNIT I** Current status of Mendelism. Genetic variation: Variation in chromosome number (Euploidy and Aneuploidy). **UNIT-II** Genetic disorders in Human beings (Down's, Turner's, Klinefelter's and Edward's syndrome) Types of chromosomal mutations.**Practical Lab**
3	OCTOBER	**UNIT II** Molecular basis of gene mutation, mutagens, crossing over and linkage. **Unit- III** Sex-determination XX-XY. XO-XY and WZ mechanisms. Sex-linked inheritance (X-and Y-linked) Color blindness.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**UNIT-III** Haemophilia.Gene interactions. Supplementary, complementary, epistasis and inhibitory. Multiple allele-ABO, Rh and MN blood groups and their inheritance, polymorphic genes.**Practical Lab**
6	DECEMBER	**UNIT IV** Gene structure (Recon. muton, cistron) and regulation of gene (lac operon: inducible and repressible system). Bacterial genetic transformation, Transduction and conjugation. Lytic and lysogenic cycle. Elementary idea about eugenics.**Practical Lab**
7	JANUARY	**UNIT-IV** Elementary idea about genetic engineering. Gene cloning and recombinant DNA technology (Vectors for gene transfers. Plasmids and phages). Restriction enzymes.**Practical Lab**
8	FEBRUARY	**UNIT-V** Introduction. Historical prospective animal cell hybridoma, major areas and future prospects of biotechnology. Medicines and Biotechnology: Microbes in medicine, antibiotics, vaccine, antibodies, antigens.**Practical Lab**
9	MARCH	**UNIT V** Enviornmental Biotechnology: use of micro organisms in metal and petroleum recovery pest control. Waste treatment, Processing of industrial waste. Degradation of Xenophobic compounds including pesticides and surfactants. Surfactants, Surfactants and oil pollutants, Food and drink biotechnology, Ferment food dairy products. Food preservation microbial spoilage, alcoholic beverages, Vinegar. Monoclonal antibodies and their applications.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part-I Subject: Zoology
Paper III- Cell Biology, Biochemistry and Microscopy

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I** (a) Introduction, Discovery of cell, cell theory, golden period of cytology, prokaryotic and eukaryotic cell characteristics of animal cell. (b) Protoplasm-: History, physical characters, colloidal property, chemical composition and Biological characters of protoplasm.**Practical Lab**
2	SEPTEMBER	**UNIT I** (c) Cell organelles: - Structure chemical composition and functions of plasma membrane, endoplasmic reticulum, Golgi apparatus, lysosome ribosome, mitochondria, nucleus and nucleolus. **UNIT-II** (a) Nucleic Acid: - Chemistry, Molecular model, Duplication, properties and functions of DNA, Types of RNA, Nucleic Acid as Genetic material. (b) Mitosis: - cell cycle, mitotic apparatus, centriole aster, and significance.**Practical Lab**
3	OCTOBER	**UNIT II** (c) Meiosis: - Introduction, meiotic cycle, synapses of chromosomes, crossing over mechanism, Initiation and control of meiosis, significance.. **Unit- III** (a) Nucleic Acid synthesis: - Synthesised DNA, RNA biosynthesis of DNA and RNA. Genetic code, transcription and translation.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**UNIT-III** Protein synthesis: - Genetic code, transcription, translation, Role of RNA, Mechanism of protein-synthesis, Regulation of protein synthesis.**Practical Lab**
6	DECEMBER	**UNIT IV** (a) Cell chemistry: - Nomenclature, classification, Action theory and specificity of Enzyme, enzyme activator, inhibitor, regulation and control of enzyme activity.**Practical Lab**
7	JANUARY	**UNIT-IV** (b) Cell metabolism: - Anabolic and catabolic process, metabolism of protein, carbohydrates and fats, ketone bodies.**Practical Lab**
8	FEBRUARY	**UNIT-V** (a) Microscopy: - Structure and functioning of compound and electron microscope.**Practical Lab**
9	MARCH	**UNIT V** Microscopy: - Principle, Uses and Limitations. **Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-II Subject Name :Inorganic Chemistry
Subject Code:CH-201

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Chemistry of Elements of First Transition Series:** Characteristics properties of d-block elements, properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.**Practical Lab**
2	SEPTEMBER	**Unit-II Chemistry of Elements of Second and Third Transition Series:** General characteristics, comparative treatment with their 3d-analogues in respect to ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.**Practical Lab**
3	OCTOBER	**Unit-III Coordination Compounds:** Werner's coordination theory and its experimental verification, effective atomic number concept, chelates.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit III** Nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.**Practical Lab**
6	DECEMBER	**Unit-IV Chemistry of Lanthanides:** Electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.**Practical Lab**
7	JANUARY	**Unit IV Chemistry of Actinides:** General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and later lanthanides.**Practical Lab**
8	FEBRUARY	**Unit-V Acids and Bases:** Arrhenius, Bronsted-Lowry, the Lux-Flood solvent system and Lewis concept of acids and bases. Non-aqueous Solvents: Physical properties of solvents, type of solvents and their general characteristics, reactions in liquid NH_3 and Liquid SO_2.**Practical Lab**
9	MARCH	**Unit V Oxidation and Reduction:** Use of redox potential data-analysis of redox cycle, redox stability in water, Frost, Latimer and Pourbaix diagrams. Principle involved in the extraction of the elements.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part-II Subject Name :Organic Chemistry
Subject Code:CH-202

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Electromagnetic Spectrum: Absorption Spectra:** Ultra-violet (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 dienes and enones.**Practical Lab**
2	SEPTEMBER	**Unit I Infrared (IR) Absorption Spectroscopy:** Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds**.** **Unit-II Alcohols:** Classification and nomenclature. **Monohydric alcohols:** Nomenclature, method of preparation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols. **Dihydric alcohols:** Nomenclature, methods of preparation, chemical reaction of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4] and pinacol-pinacolone rearrangement. **Trihydric alcohols:** Nomenclature and methods of preparation, chemical reactions of glycerol.**Practical Lab**
3	OCTOBER	**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: electrophylic aromatic substitution, acylation and carboxylation. Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction. **Unit-III 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 ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**

5	NOVEMBER	**Unit III-** Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro's reaction, Meerwein-Pondorf-Verlley, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. An introduction to α,ß-unsaturatedaldehydes and ketones.**Practical Lab**
6	DECEMBER	**Unit-IV Ethers and Epoxides:** Nomenclature of ethers and methods of preparation, physical properties. Chemical reactions: cleavage and autoxidation. Ziesel's method. Synthesis of epoxides. Acid and base catalyzed ring opening of epoxides, orientation of epoxide ring opening. Reactions of Grignard and organolithium reagents with epoxides.**Practical Lab**
7	JANUARY	**Unit IV Carboxylic Acids:** Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effect of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reductions of carboxylic acids. Mechanism of decarboxylation. Methods of formation, chemical reactions of haloacids. Hydroxyacids: malic, tartaric and citric acids. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of synthesis and effect of heat and dehydrating agents.**Practical Lab**
8	FEBRUARY	**Unit IV Carboxylic Acid Derivatives:** Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides. Relative stability and reactivity of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives and chemical reactions. Mechanism of esterification and hydrolysis (acidic and basic).Unit-V Organic Compounds of Nitrogen: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline media. Picric acid. Halonitroarenes: reactivity.**Practical Lab**

9	MARCH	**Unit V Alkyl and Aryl Amines:** Reactivity, structure and nomenclature of amines, physical properties, stereo chemistryof 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 and nitriles). Reductive amination of aldehydic and ketonic compounds. Gabrielphthalimide reaction, Hofmann bromamide reaction. Reactions of amines, electrophilic aromatic substitution in arylamines, reactions of amines with nitrous acid. Synthetic transformations of aryldiazonium salts, azo coupling.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-II Subject Name :Physical Chemistry
Subject Code:CH-203

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Thermodynamics-I:** Definition of thermodynamic terms: System, surroundings, 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 & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.**Practical Lab**
2	SEPTEMBER	**Unit-I :** Thermochemistry: Standard state, standard enthalpy of formation-Hess's law of heat summation and its applications. Heat of reaction at constant pressure and at constantvolume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation. **Unit-II Thermodynamics-II:** Second Law of Thermodynamics: Need for the law, different statements of the law. Carnot's cycle and its efficiency, Carnot theorem. 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 and entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.**Practical Lab**
3	OCTOBER	**Unit-II:** Third Law of Thermodynamics: Nernst's heat theorem. Statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz function: Gibbs function (G) & Helmholtz function (A) as thermodynamic quantities, A&G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G & A with P, V & T. **Unit-III Chemical Equilibrium:** Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le chatelier's principle. Reaction isotherm and reaction isochores, isochore- Clapeyron equation and Clausius-Clapeyron equation. applications.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**

5	NOVEMBER	**Unit-III :** Phase Equilibrium: Statement and meaning of the terms: Phase, component and degree of freedom. derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems. Phase equilibria of two component system-solid-liquid equilibria, simple eutectic Pb-Ag system. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point ($NaCl-H_2O$) system. Freezing mixtures: acetone-dry ice. Partially miscible liquids: Phenol-water and nicotine-water systems. Lower and upper consolute temperature. Effect of imurity on consulate temperature.**Practical Lab**
6	DECEMBER	**Unit-IV 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 dilution law its uses and limitations.**Practical Lab**
7	JANUARY	**Unit IV** Onsager's equation for strong electrolytes (elementary treatment only). Transportnumber: definition and determination by Hittorf's method and moving boundary method. Applications of conductivity measurements: Determination of degree of dissociation, determination of Ka of acids, conductometric titrations. **Unit-V Electrochemistry-II:** Types of reversible electrodes: Gas-metal ion, metal-metal ion, metal-insoluble salt anion and redox electrodes.**Practical Lab**
8	FEBRUARY	**Unit V** Electrode reactions, Nernst's equation, derivation of cell EMF and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolyte 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 themodynamic quantities of cell reactions (ΔG, ΔH and K), polarization, over-potential and hydrogen over-voltage.**Practical Lab**
9	MARCH	**Unit V** Concentration cell with and without transport, liquid-junction potential, application of concentration cells, valency of ions. Solubility product and activity coefficient, determination of solubility product of a sparingly soluble salt. Definition of pH and pKa. Determination of pH using hydrogen electrode by potentiometric titrations. Buffers: mechanism of buffer action, Henderson-Hazel equation, hydrolysis of salts.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-II Subject: Botany
Paper I: Diversity & Systematics of Seed Plants-Gymnosperms

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Characteristics of seed plants : Evolution of the seed habit ; seed plants with fruits (Angiosperms) **Practical Lab**
2	SEPTEMBER	**Unit-I** without fruits (Gymnosperms); fossil and living seed plants. **Unit-II** General features of Gymnosperms and their classification. **Practical Lab**
3	OCTOBER	**Unit-II** Economic importance of gymnosperms, diversity of gymnosperms.**Practical Lab**
4	October	**Unit Test-1 (Unit-1,2)**
5	NOVEMBER	**Unit-III** Fossil Gymnosperms : Comparative account and salient features of Cycadofilicales, Cordaitales.**Practical Lab**
6	DECEMBER	**Unit-III** Cordaitales, Bennettitales **Unit-IV** Morphology of Vegetative and Reproductive parts : Anatomy of root, stem and leaf.**Practical Lab**
7	JANUARY	**Unit IV** reproduction and life cycle of Cycas, Pinus. **Practical Lab**
8	FEBRUARY	**Unit IV** Ephedra. **Unit-V** Morphology of Vegetative and reproductive parts : Anatomy of root, stem and leaf.**Practical Lab**
9	MARCH	**Unit V** Reproduction and life cycle of Ginkgo, Taxus and Gnetum.**Practical Lab**
10	APRIL	**Revision Class, Unit Test-2 (Unit-3,4,5)**

B.Sc. Part-II Subject: Botany
Paper II: Diversity & Systematics of Seed Plants-Angiosperms

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Origin and Evolution of Angiosperms : Primitive Angiosperms and Ranales.**Practical Lab**
2	SEPTEMBER	**Unit-II** Angiosperm taxonomy ; Brief history ; aims and fundamental components ; Alpha taxonomy, omega-taxonomy, keys.**Practical Lab**
3	OCTOBER	**Unit-II** Taxonomic literature, Botanical nomenclature ; principles and rules ; taxonomic ranks ; type concept, principle of priority. **Unit-III** Classification of Angiosperms ; Salient features of the systems proposed by Bentham and Hooker and Engler & Prantl.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit III** Major contributions of cytology, phytochemistry and taximetrics to taxonomy.**Practical Lab**
6	DECEMBER	**Unit-IV** Diversity of flowering plants as illustrated by members of the families Ranunculaceae, Brassicaceae.**Practical Lab**
7	JANUARY	**Unit IV** Papaveraceae Capparidaceae Malvaceae, Rutaceae, Fabaceae, Apiaceae.**Practical Lab**
8	FEBRUARY	**Unit-V** Salient features of some families ;Asteraceae,Acanthaceae, Apocynaceae, Asclepediaceae, Solanaceae.**Practical Lab**
9	MARCH	**Unit V** Lamiaceae, Amaranthaceae, Euphorbiaceae, Liliaceae and Poaceae.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-II Subject: Botany
Paper III:Structure Development and Reproduction of Flowering Plants

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** The basic body plan of flowering plant, modular type of growth, Diversity in plant form in annuals, biennials and perennials, Convergence and evolution of tree habit in gymnosperms, monocotyledons and dicotyledons, trees-largest and longest lived organisms.**Practical Lab**
2	SEPTEMBER	**Unit-II** The shoot system : The shoot apical meristem and its histological organization, vascularization of primary shoot in monocotyledons and dicotyledons ; formation of internodes, branching pattern, monopodial and sympodial growth, canopy architecture, cambium and its function, formation of Secondary Xylem.**Practical Lab**
3	OCTOBER	**Unit II** A general account of wood structure in relation to conduction of water and minerals, characteristics of growth rings, sapwood and heart wood, role of wood skeleton, secondary phloem, structure, function, relationships; periderm. **Unit-III** Leaf : Origin, development arrangement and diversity in size and shape, internal structure in relation to photosynthesis and water loss.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit III** Adaptation to water stress, senescence and abscission. The root system : The root apical meristem ; differentiation of primary and secondary tissues and their roles ; structural modification for storage, respiration, reproduction and for interaction with microbes.**Practical Lab**
6	DECEMBER	**Unit-IV** Flower : A modified shoot, structure, development and varieties of flower, functions, structure of anther and pistil, the male and female gametophytes.**Practical Lab**
7	JANUARY	**Unit IV** types of pollination, attractions and rewards for pollinators pollen pistil interaction, self incompatibility, double fertilization ; formation of seed-endosperm and embryo, fruit development and maturation.**Practical Lab**
8	FEBRUARY	**Unit-V** Significance of seed : Suspended animation, ecological adaptation, unit of genetic recombination and replenishment.**Practical Lab**
9	MARCH	**Unit V** dispersal strategies, vegetative reproduction, vegetative propagation, grafting, economic aspects.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part -II Subject : Zoology
PAPER-I : ANIMAL DIVERSITY (Part-2)
Arthropoda to Protochordata

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I - Arthropoda** 1. General characters and classification of phylum - Arthropoda up to subclass. 2. Habit, habitat, external features, appendages, digestive, respiratory, circulatory, excretory, reproductive and nervous system and sense organs of prawn (Palaemon).**Practical Lab**
2	SEPTEMBER	**Unit I**-3. Larval forms of Crustacea. 4. Metamorphosis in Insects. 5. Apiculture,sericulture,lac culture.**Practical Lab**
3	OCTOBER	**Unit – II- Mollusca** 1. General characters and classification phylum - Mollusca upto subclass. 2. Habit, habitat, external features, coelom, general anatomy, digestive, respiratory, circulatory, excretory, reproductive systems, of snail (Pila) . 3. Torsion in Gastropoda. 4. Larval forms of Mollusca. 5. Pearl culture.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit – III - Echinodermata** 1. General characters and classification of phylum-Echinodermata upto subclass. 2. Habit, habitat, symmetry, external features, coelom, general anatomy, disgestive, respiratory, circulatory, excretory, water vascular, reproductive, nervous system and sense organs of star fish (Asterias).**Practical Lab**
6	DECEMBER	**Unit III** 3. Larval forms of Echinodermata. 4. Autotomy and regeneration in Echinoderms. **Unit --IV** Chordata : Primary chordate characters, invertebrate chordates (Protochordata), concept of invertebrate and nonchordate.**Practical Lab**

7	JANUARY	**Unit IV Hemichordata :** 1. General characters and classification of Hemichordata. 2. Habit, habitat, external features, coelom, body wall, digestive, skeletal, respiratory, circulatory, excretory, nervous and reproductive system and sense organs of Balanoglossus. 3. Tornaria larva. 4. Affinities of Hemichordata.**Practical Lab**
8	FEBRUARY	**Unit - V** Urochordata and 1. General characters and classification upto class level. 2. Habit, habitat, general anatomy and various systems, including sense organs of Herdmania. Ascidian tadpole and its metamorphosis; affinities of Urochordata.**Practical Lab**
9	MARCH	**Unit V Cephalochordata:** 3. Habit, habitat, general anatomy and various systems, including sense organs of Branchiostoma (Amphioxus). 4. Affinities of Cephalochordata.**Practical Lab**
10	APRIL	**Revision Classes, Unit Test-II (Unit-1,2)**

B.Sc. Part -II Subject : Zoology
PAPER-II : ENDOCRINOLOGY AND ETHOLOGY

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT : I** Endocrinology : Introduction, basics and functions 1. Glands : Exocrine and endocrine; Secretions : Autocrine and paracrine. 2. Hormones : Chemical nature and properties, role in homeostasis. 3. Structure and functions of major endocrine glands : Pituitary, thyorid, parathyroid, adrenal gland, pancreas; their hormones, role and abnormalities due to hyposecretion and hypersecretion.**Practical Lab**
2	SEPTEMBER	**Unit I:** 4. Structure and functions of minor endocrine glands : Thymus, pineal, GIT, kidney , heart; endocrine glands in insects; their hormones and role. **UNIT : II** Endocrinology : Control and regulation of secretion and molecular mechanism 1. Regulation of hormone secretion; positive and negative feedback control mechanism. 2. Extra cellular and intracellular receptors. 3. Second messengers: Cyclic AMP, PIP2, IP3, DG, G-protein, protein kinase and role of Ca^{++} as messenger; cell signalling; amplification of signal. 4. Molecular mechanism of insulin action.**Practical Lab**
3	OCTOBER	**UNIT: III** Endocrinology: Role in reproduction 1. Hormones from testis, ovary and placenta, their structure and functions. 2. Importance of hormones in sexual differentiation in embryo.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit III** 3. Hormonal control of menstrual cycle, implantation, pregnancy, parturition and lactation. 4. Different types of contraceptives, their composition and effects.**Practical Lab**
6	DECEMBER	**UNIT: IV** Ethology: Introduction and basics 1. Introduction and history of behaviour, approaches and study of animal behaviour (ecological, physiological, evolutionary and neural methods) MRI and CAT scan. 2. Genetic basic of animal behaviour and evolution of ethology.**Practical Lab**
7	JANUARY	**Unit IV** 3. Biological clock; circadian and circannual rhythms. 4. Learning and imprinting, instinct behaviour.**Practical Lab**

8	FEBRUARY	**Unit : V** Ethology: Areas of behaviour 1. Searching of food : Honey bee , rhesus monkey and langoor. 2. Social behaviour and organization: Honey bee, termite, mammals (black-buck and monkeys).**Practical Lab**
9	MARCH	**Unit V** 3. Communication, fights and alarm call : Vocal, visual, tactile, olfactoryand acoustic; honey bee language; pheromonal and hormonal basis of aggression, brain hormone relation in sexual behaviour. 4. Migration in fishes and birds. Orientation : Taxes and kinesis.**Practical Lab**
10	APRIL	**Revision Classes, Unit Test-II (Unit-1,2)**

B.Sc.Part -II Subject : Zoology
PAPER - III : ANIMAL ECOLOGY AND BIOSTATISTICS

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT - I** 'Ecology' as a science, its meaning and history. Modern concept, scope, components of ecosystem, abiotic physical factors : temperature, light, water, soil and soil profile, current, pressure, gravity, biotic factors, intraspecific and interspecific relation, concept of limiting factors; Liebig's law of minimum, Shelford's law of tolerance, modern concept, importance.**Practical Lab**
2	SEPTEMBER	**UNIT - II** Population ecology : Determination of population density, factors affecting population density, demography, community ecology, characteristics of bio-community, interdependence for reproduction and protection , ecosystem homeostasis, ecosystem and productivity concept, its types and methods, energy flow, food chain and food web in ecosystem, ecological pyramids, ecological niche.**Practical Lab**
3	OCTOBER	**UNIT - III** Aquatic ecology, fresh water lotic and lentic fresh water habitat, fresh water biota, marine habitat, zonation, marine water biota, ecology and biota of deep sea zone, estuarine habitat and biota, terrestrial habitat.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit III** forest and desert ecosystem and biomes, ecology and human future, growth rate, role of man in modification of natural communities.**Practical Lab**
6	DECEMBER	**UNIT - IV** Natural resources, renewable resources (forest/wild life), non-renewable resources (water, mineral resources),aqua-culture and Mariculture, conservation, management of natural resources- renewable resources.**Practical Lab**
7	JANUARY	**Unit IV** non-renewable resources, environmental pollution, types (water, air, soil, pollution by insecticides, noise). Basic concepts of bioaccumulation, biomagnification, and biodegradation of pollutants, impact of urbanization, characteristics of urbanization in India, urban problems.**Practical Lab**
8	FEBRUARY	**UNIT - V** Functions and importance of biostatistics, frequency - distribution, presentation of data, mean, mode, median.**Practical Lab**

9	MARCH	**Unit V** deviation, error, probability-distribution, correlation, significance-tests, biostatistical analysis of gene distribution in populations.**Practical Lab**
10	APRIL	**Revision Classes, Unit Test-II (Unit-1,2)**

B.Sc. Part-II Subject : Physics
Paper Name : Heat, Thermodynamics and Statistical Physics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** General Thermodynamical interaction, Dependence of the number of states of external parameters, General relations in equilibrium, equilibrium conditions(P=p1,b=b 1), infinitesimal quasistatic process, Entropy of an ideal gas, Equilibrium of an isolated system, Equilibrium of a system in contact with reservoir (Gibb's free energy), equilibrium between phases.**Practical Lab**
2	SEPTEMBER	**Unit-I :** Clausius-Clapeyron equation, Triple point,Vapour in equilibrium with liquid or solid, equilibrium conditions for a system of fixed volume in contact with heat reservoir (Helmholtz free energy), Equilibrium between phases and condition of chemical equilibrium and equilibrium condition for a system at constant pressure in contact with a heat reservoir (Enthalpy), Maxwell's relations.**Practical Lab**
3	OCTOBER	**Unit II** Thermal interactions of macroscopic Systems, system in contact with a heat reservoir, first law of thermodynamics and infinitesimal general interaction, Concept of temperature and quantitative idea of temperature scale (thermodynamical parameter), Distribution of energy, second law of thermodynamics, Claussius and Kelvin's statements, partition function (Z), mean energy of an ideal gas and mean pressure, Heat engine and efficiency of the engine, Carnots cycle, thermodynamical scale as an absolute scale.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Production of Low Temperatures and Application, Joule Thomson expansion and J.T.coefficients for ideal as well as Van-der Waal's gas, Temperature inversions, Regenerative cooling and cooling by adiabatic expansion and demagnetization, Liquid He, He –I and He-II, superfluidity, quest for absolute zero, Nernst heat theorem.**Practical Lab**
6	DECEMBER	**Unit-IV:** Classical Statistics, Phase space, micro and macro states, Thermodynamic probability, Entropy and probability, Partition function (Z), The monatomic ideal gas, The principle of equipartition of energy, most probable, average and rms velocity, Specific heat capacity of diatomic gas, Specific heat capacity of solids.**Practical Lab**
7	JANUARY	**Unit-IV:** The Distribution of Molecular Velocities, the energy distribution, Transport phenomenon. mean free path, distribution of free path, coefficients of viscosity, thermal conductivity diffusion.**Practical Lab**

8	FEBRUARY	**Unit V:** Quantum Statistics, Black body radiation and failures of classical statistics, Postulates of quantum statistics, Indistinguishability, Wave function and exchange degeneracy, Priori probability, Bose-Einstein's Statistics, Planck's distribution law, Fermi-Dirac statistics.**Practical Lab**
9	MARCH	**Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-II Subject : Physics
Paper Name : Electronics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Circuit Analysis, Network-some important definitions, loop and nodal equation, Kirchhofs Laws, driving point and transfer impedances, four terminal network parameters, Open circuit, short circuit and hybrid network theorems, Superposition, Thevenin, Norton, Reciprocity, Compensation and maximum power transfer.**Practical Lab**
2	SEPTEMBER	**Unit-II :** Semiconductors, Intrinsic and extrinsic semiconductors, charge densities in N and P materials, conduction by drift and diffusion of charge, Formation of PN junction, PN diode equation, capacitance effect of diode. **Practical Lab**
3	OCTOBER	**Unit II** Rectification and power Supply, Half-wave and full wave rectifiers, calculation of Ripple factor, efficiency and regulation, bridge rectifier, Filters: shunt capacitor, L and Π filters, Voltage regulation and voltage stabilization, Zener diode, Voltage multiplier circuits.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Transistor and Transistor Amplifiers, Notations and volt ampere relations for bipolar junction transistor, CB, CE, CC configurations, characteristic curves and their equivalent circuits, Biasing of transistors.**Practical Lab**
6	DECEMBER	**Unit-III:** Fixed and emitter bias, bias stability in transistor circuits, concept of load line and operating point, hybrid parameters, Field effect transistor (JFET and MOSFET) and its circuit characteristics, Analysis of transistor amplifiers using hybrid parameters and its frequency response.**Practical Lab**
7	JANUARY	**Unit-IV:** Amplifiers with feed back, Concept of feed back Positive and negative feed back advantage of negative fead beck, stabilization of gain by negative feed back, Effect of feed back on output and input resistance, Reduction of nonlinear distortion by negative feed back, frequency response, Voltage and current feed back circuit.**Practical Lab**
8	FEBRUARY	**Unit IV:** Oscillators, Feed back requirements for oscillations, circuit requirement for oscillation, basic oscillator analysis, Colpitt and Hartley oscillators, R-C Phase shift oscillator, Piezoelectric frequency control oscillations.**Practical Lab**

9	MARCH	**Unit V:** Operational amplifier (OP-AMP), Differential amplifier, DC levels shifter, operational amplifier, input and Output impedances, input offset curren, Application of OP-AMP, Unity gain buffer, Adder, Subtractor, Integrator and Differentiator, Comparator, Waveform generator, Voltage regulator using integrated amplifiers. **Practical Lab** **Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-II Subject : Physics
Paper Name : Mathematical Physics and Methods

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Orthogonal Curvilinear coordinate system, scale factors, expression for gradient, divergence and curl and their applications to Cartesian, cylindrical and spherical polar coordinate systems, Coordinate transformation and Jacobian, Transformation of covariant, contravariant and mixed tensor, Addition, Multiplication and contraction of tensors, Quotient law, pseudo tensor, Metric tensor, transformation of Tensors.**Practical Lab**
2	SEPTEMBER	**Unit-II :** Dirac-Delta Function and its properties, Fourier series, computation of Fourier coefficients, applications to simple periodic functions like square wave, sawtooth wave and rectifier out put, Postulates of special theory of relativity and observational evidence, Lorentz transformation.**Practical Lab**
3	OCTOBER	**Unit II** Postulates of special theory of relativity and observational evidence, Lorentz transformation.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Four vector formulation, energy-momentum four vectors, relativistic equation of motion, Orthogonality of four forces and four velocities, transformation of four wave vector, longitudinal and transverse Doppler's effect, Transformation between laboratory and center of mass systems, four momentum conservation, Kinematics of decay products of an unstable particle and reaction thresholds, pair production, inelastic collision of two particles, Compton effect.**Practical Lab**
6	DECEMBER	**Unit-IV:** The second order linear differential equation with variable coefficient and singular points, series solution method and its application in the Bessel's, Hermite's, Legendre's and Laguerre's differential equations.**Practical Lab**
7	JANUARY	**Unit-IV:** Basic properties like orthogonality, recurrence relations, graphical representation and generating function of Bessel, Hermite, Legendre Laguerre and Associated Legendre functions.**Practical Lab**

8	FEBRUARY	**Unit-IV:** Technique of separation of variables and its application to following boundary value problems: (i) Laplace equation in three dimension Cartesian, Coordinate system-line charge between two earthed parallel plates, (ii) wave equation in spherical polar coordinates the vibration of circular membrane.**Practical Lab**
9	MARCH	**Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-II Subject Name : Mathematics
Paper I : Real Analysis

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** The set of real numbers as a complete ordered field, incompleteness of Q, Archimedean and denseness properties of R, Modulus, Intervals.
2	SEPTEMBER	**Unit-I** Definition of a sequence, Theorems on limit of sequence, bounded and monotonic sequences, nested interval theorem, Cauchy's sequence, Cauchy's convergence criterion.
3	OCTOBER	**Unit-II** Convergence of series of non-negative terms, their various tests (Comparison; D'Alembert's ratio, Cauchy's nth root, Raabe's, Gauss, Logarithmic, Demorgan and Bertand's, Cauchy's condensation, proof of tests not required) for convergence, Alternating series, Leibnitz's test, Series of arbitrary terms, absolute and conditional convergence, Abel's and Dirichlet's tests
4	**OCTOBER**	**Unit Test-I**
5	NOVEMBER	**Unit-III** Equivalent sets. Finite and infinite sets denumerable sets, Countable and uncountable sets. Interior point of a set, open set, limit point of a set, Bolzano-Weierstrass theorem. Closed set. Dense in itself and perfect sets. Cantor's ternary set.
6	DECEMBER	**Unit- IV** Definition of limit of a function. Continuity of a function - Cauchy's and Heine's definitions with their equivalence. Types of discontinuities. Properties of continuous functions defined on closed intervals. Uniform continuity. Differentiability.
7	JANUARY	**Unit -IV** Rolle's theorem, Lagrange's and Cauchy's mean value theorems and their geometrical interpretations. Taylor's theorem with various forms of remainders. Darboux's intermediate value theorem for derivatives. **Unit -V** Darboux sums and their properties. Riemann integral, Integrability of continuous and monotonic functions.

8	FEBRUARY	**Unit -V** Mean value theorems of integral calculus, The fundamental theorem of integral calculus. Improper integrals and their convergence comparison tests. Abel's and Dirichlet's tests.
9	**MARCH**	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-II Subject Name : Mathematics
Paper II : DIFFERENTIAL EQUATIONS

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Order and Degree of a differential equation. Differential equations of first order and first degree, variables separable, homogeneous equations. Linear equations and equations reducible to linear form. Exact differential equations and equations reducible to exact forms.
2	SEPTEMBER	**Unit-I** Differential equations of first order but not of first degree. Solvable for x, y, p Clairaut's form, singular solutions. Geometrical meaning of a differential equation, orthogonal trajectories.
3	OCTOBER	**Unit-II** Linear differential equations with constant coefficients, Homogeneous linear differential equations, Total differential equations.
4	NOVEMBER	**Unit-III** Linear differential equations of second order. Transformation by changing the dependent / independent variable. Method of variation of parameters, Exact differential equations and certain particular forms of equations.
5	**NOVEMBER**	**Unit Test-I**
6	DECEMBER	**Unit- IV** Partial differential equations of first order, Lagrange's solution. Charpit's general method of solution and Practical.
7	JANUARY	**Unit-V** 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 and Practical.
8	FEBRUARY	**Unit-V** Partial differential equations reducible to equations with constant coefficients. Monge's method.
9	**MARCH**	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-II Subject Name : Mathematics
Paper III : Mechanics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Analytical Conditions of equilibrium of a rigid body under coplanar forces. Friction
2	SEPTEMBER	**Unit-II** Center of Gravity, Common Catenary
3	OCTOBER	**Unit-III** Simple harmonic motion. Motion under repulsion varying as the distance from a point, motion under inverse square law. Motion under earth's attraction.
4	**OCTOBER**	**Unit Test-I**
5	NOVEMBER	**Unit-III** Hooke's Law, Horizontal and vertical elastic strings Rectilinear motion in a resisting medium
6	DECEMBER	**Unit- IV** Velocity and acceleration along radial and transverse directions and along tangential and normal directions. Projectiles : Motion on horizontal and inclined planes.
7	JANUARY	**Unit-V** Direct and oblique impact.
8	FEBRUARY	**Unit-V** Constrained Motion- Circular and Cycloidal
9	**MARCH**	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-III Subject Name :Inorganic Chemistry
Subject Code:CH-301

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Hard and Soft Acids and Bases (HSAB):** Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.**Practical Lab**
2	SEPTEMBER	**Unit-II Metal-Ligand Bonding in Transition Metal Complexes:** Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in square planar, octahedral, tetrahedral and trigonal bipyramidal complexes, factors affecting the crystal field parameters, Jahn-Teller distortions, applications and limitations of crystal field theory. **Practical Lab**
3	OCTOBER	**Unit-II Magnetic Properties of Transition Metal Complexes:** Types of magnetic behaviour, methods of determining magnetic susceptibility, spinonly formula, L-S coupling, correlation of ns and neff and values, orbital contribution to magnetic moments, application of magnetic moment data for 3d-metal complexes. **Unit-III Electronic Spectra of Transition Metal Complexes:** Types of electronic transitions, selection rules for d-d transitions.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit III** Spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [(Ti(H2O)6]3+ complexion. 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.**Practical Lab**
6	DECEMBER	**Unit IV Organometallic Chemistry:** Definition, nomenclature and classification of organometallic compounds; preparation and properties, bonding and applications of alkyl and aryls of Li, AI, Hg, Sn and Ti;**Practical Lab**
7	JANUARY	**Unit-IV** a brief account of metal-ethylenic complexes and homogeneous hydrogenation; mononuclear carbonyls and the nature of bonding in metal carbonyls.**Practical Lab**

8	FEBRUARY	**Unit-V Bioinorganic Chemistry:** Essential and trace elements in biological processes metalloporphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} and Mg^{2+}. Nitrogen fixation.**Practical Lab**
9	MARCH	**Unit-V Silicones and Phosphazenes:** Silicones and phosphazenes as examples of inorganic polymers. nature of bonding in triphosphazenes.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-III Subject Name :Organic Chemistry
Subject Code:CH-302

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Spectroscopy:** Nuclear Magnetic Resonance (NMR) Spectroscopy: Nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constant, 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.**Practical Lab**
2	SEPTEMBER	**Unit-I** Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques. **Unit-II Organometallic Compounds:** Organomagnesium Compounds: The Grignard reagents-formation, structure and chemical reactions. Organozinc Compounds Formation and chemical reactions. Organolithium compounds: Formation and chemical reactions.**Practical Lab**
3	OCTOBER	**Unit II** Organosulphur compounds: Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. **Unit-III Heterocylic 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.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit-III** Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six-membered heterocyles. Preparation and reactions of indole, quauinoline and isoquinoline with special reference to Fisherindole synthesis, Skraup's synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquionoline.**Practical Lab**

6	DECEMBER	**Unit-IV Organic Synthesis via Enolates:** Acidity of α-hydrogens. alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes. Alkylation and acylation of enamines.**Practical Lab**
7	JANUARY	Unit-IV Carbohydrates: Classification and nomenclature. monosaccharides: mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses, configuration, erythro and threo diastereomers, conversion of glucose into mannose, formation of glycosides, ethers and esters, determination of ring size, cyclic structure of D(+)glucose, mechanism of mutarotation, structure of ribose and deoxyribose.**Practical Lab**
8	FEBRUARY	**Unit IV** An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. Unit-V Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α-amino acids.**Practical Lab**
9	MARCH	**Unit V** Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptides and proteins, Levels of protein structure, Protein denaturation/renaturation. Introduction. constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-III Subject Name:Physical Chemistry
Subject Code:CH-303

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I Elementary Quantum Mechanics:** Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton effect. De Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance.**Practical Lab**
2	SEPTEMBER	**Unit I** physical interpretation of the wave function, postulates of quantum mechanics, particle in a one-dimensional box. Schrodinger wave equation for H-atom. separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.**Practical Lab**
3	OCTOBER	**Unit-II Molecular Orbital Theory:** Basic ideas, criteria for forming MO from AOs, construction of MO's of H2 + ion by LCAO, calculation of energy level from wave functions, physical picture of bonding and anti-bonding wave functions, concept of σ, σ*, π, π* orbitals and their characteristics.Hybrid orbitals-sp, sp2, sp3. calculation of coefficients of AO's used in these hybrid orbitals. Introduction to valence bond model of H2, comparison of MO and VB models.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit-III Spectroscopy:** Introduction, electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom.Rotational Spectroscopy: Diatomic molecules, energy levels of a rigid rotator (semi-classical principles) selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.**Practical Lab**

6	DECEMBER	**Unit III Vibrational (Infrared) Spectroscopy:** Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies. effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.**Practical Lab**
7	JANUARY	**Unit III Raman Spectroscopy:** Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules. Electronic Spectroscopy: Concept of potential energy curves for bonding and anti-bonding molecular orbitals, qualitative description of selection rules and Frank-Condon principle. qualitative description of σ, π and n MO, their energy levels and the respective transitions. Unit-IV Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law.**Practical Lab**
8	FEBRUARY	**Unit IV** Jablonski diagram depicting various processes occurring in the exited sate. qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, actinometry, photosensitized reactions-energy transfer processes (simple examples). **Unit-V Physical Properties and Molecular Structure:** Optical activity, polarization (Calusius-Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment- temperature method and refractivity method. dipole moment and structure of molecules. magnetic properties-paramagnetism, diamagnetism and ferromagnetics.**Practical Lab**

9	MARCH	**Unit-V** Solutions, Dilute Solutions and Colligative Properties: Ideal and non-ideal solutions and thier propoerties, methods of expressing concentrations of solutions, activity and activity coefficient. Roult's and Henry's laws, Azeotropes-ethanol-water system. Nernst Distribution Law-Thermodynamic derivation, applications. Dilute solution, colligative properties, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal value and abnormal molar mass, degree of dissociation and association of solutes.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part–III Subject Name : Botany
Paper – I - PLANT PHYSIOLOGY AND BIOCHEMISTRY

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I Plant water relations :** importance of water to plant life, physical properties of water diffusion and osmosis, absorption, transport of water and transpiration. Mineral nutrition : Essential macro and micro elements and their role, mineral uptake, deficiency and toxicity symptoms.**Practical Lab**
2	SEPTEMBER	**Unit I Transport of organic substances :** Mechanism of phloem transport source sink relationship, factors affecting translocation. **Unit – II** Photosynthesis : Significance, historical aspects, photosynthetic pigments, action spectra and enhancement effects.**Practical Lab**
3	OCTOBER	**Unit II** concept of two photo systems, z-scheme. Photophosphorylation, C-3 & C-4 pathway, CAM plants, photorespiration. **Unit – III** Respiration : ATP the biological energy currency, aerobic and anaerobic respiration kreb's cycle, electron transport mechanism (chemi-osmotic theory), redox potential, oxidative phosphorylation, pentose phosphate pathway.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit III** Basics of enzymology : Discovery and nomenclature characteristics of enzymes, concept of enzyme, apo enzyme and cofactors, regulation of enzyme activity, mechanism of action. **Unit – IV** Nitrogen and lipid metabolism : Biology of nitrogen fixation, importance of nitrate reductase and its regulation, ammonium assimilation
6	DECEMBER	**Unit IV** structure and function of lipids, fatty acid biosynthesis, α & β oxidation, saturated and un saturated fatty acids, storage and mobilization of fatty acids.**Practical Lab**
7	JANUARY	**Unit – V** Growth and Development : Definitions, phases of growth and development, kinetics of growth, seed dormancy Seed germination and factors of their regulation plant movements the concept of photoperiodism.**Practical Lab**

8	FEBRUARY	**Unit-V** physiology of flowering, florigen concept, biological clocks. Physiology of senescence, fruit ripening, plants hormones auxins, gibberellins, cytokinins, abscissic acid, ethylene, history of their discovery, biosynthesis.**Practical Lab**
9	MARCH	**Unit-V** mechanism of actions photomorphogenesis, phytochromes and cytochromes, their discovery, physiological role and mechanism of action.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part–III Subject Name:Botany
Paper–II ECOLOGY AND PHYTOGEOGRAPHY

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I** Plant and Environment : Atmosphere (gaseous composition), water (Properties of water cycle), light (global radiation, photosynthetically active radiation) **Practical Lab**
2	SEPTEMBER	**Unit-I** Temperature, soil (development, soil profiles, physico – chemical properties), and biota. **Unit – II** Morphological, anatomical and physiological responses of plants to water: hydrophytes, xerophytes and halophytes.**Practical Lab**
3	OCTOBER	**Unit-II** temperature, light (heliophytes and sciophytes) and salinity. **Unit – III** Community ecology : Community characteristics.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit-III** (analytical and synthetic).Ecological succession. (Hydoasere, lithosere, psammosere) , concept of climax.**Practical Lab**
6	DECEMBER	**Unit – IV** Ecosystems : structure, abiotic and biotic components, food chain, food web.**Practical Lab**
7	JANUARY	**Unit-IV** Ecological pyramids, energy flow, biogeochemical cycles carbon, water, nitrogen and phosphorus.**Practical Lab**
8	FEBRUARY	**Unit – V** Biogeographical regions of India, vegetation types of India:Forests and grassland with particular reference to Rajasthan. Environmental pollution – Air, Water and Soil.**Practical Lab**
9	MARCH	**Unit-V** WWF, Chipko movement, green house effect. Introduction to Climate change, Carbon sequestration, energy and environment, clean development mechanism (CDM).**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part–III Subject Name:Botany
Paper – III BIOTECHNOLOGY AND UTILIZATION OF PLANTS

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit – I** Biotechnology Genetic Engineering : Tools and techniques of recombinant DNA technology, cloning vectors; genomic and C-DNA library, transposable element, techniques of gene mapping and chromosome walking, genetic transformation and production of bioactive molecules Basic concept of metabolic engineering.**Practical Lab**
2	SEPTEMBER	**Unit-I** improvement of biosynthesis and accumulation of bioactive immobilization, elicitation, transgenic plants. **Unit – II** Biotechnology and Tissue Culture : Functional definition.**Practical Lab**
3	OCTOBER	**Unit-II** basic aspects of plant tissue culture, cellular totipotency, differentiation and morphogenesis, biology of Agrobacterium ; vectors for gene delivery and marker genes; salient achievements in crop biotechnology. **Unit – III** Utilization of Plants Food Plants : Rice, wheat, maize, bajra, potato, sugarcane.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit-III** (History origin & distribution), morphology, climate & soil, cultivation, preparation improved varieties, user & crop protection. Vegetable Oils : Groundnut, mustard and coconut, volatile oils, Fatty oils, classification of vegetable oils, History, origin and distribution, extraction of vegetable oils, Morphology of plant, cultivation varieties.**Practical Lab**
6	DECEMBER	**Unit – IV** Fibers : Cotton and Jute, classification of fibers, History and origin, Important fibers and their source, Distribution, Types, Climate and Soils. Cultivation, processing, characters, Improved varieties.**Practical Lab**
7	JANUARY	**Unit-IV** Wood: General account of sources of firewood, timber and bamboos. Structure and characters of wood, Important source of Timber wood, characters, plantation of fire wood, Botanical characteristics of bamboo, climate and soil, uses, diseases and insect pests.**Practical Lab**

8	FEBRUARY	**Unit-IV** Rubber & Hydrocarbon yielding plants – Calotropis. Euphorbea, History of Rubber, properties of Rubber, Types of Rubber, cultivation of plant, extraction and processing, uses. **Unit – V** Spices : General account Clove, black pepper, Dalchini, Cardamon.**Practical Lab**
9	MARCH	**Unit-V** Medicinal Plants: General account, Withania, Rauwolfia, Cinchona, Azadirachta & Aloe, Ephedra,Taxus, Chlorophytum. Beverages : Tea and Coffee.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc. Part-III Subject : Physics
Paper Name : Solid State Physics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Crystal Binding and Crystal Structure: Crystal bonding, ionic bond, binding energy of ionic crystal, determination of the repulsive exponent, covalent bonding, metallic bonding, molecular or Vander Waal's bonding, hydrogen bonding, Space lattice and Crystal structure, reciprocal lattice, Bravis lattice, Miller indices and crystal structure.**Practical Lab**
2	SEPTEMBER	**Unit-I :** Spacing of planes in Crystal Lattice, Atomic Packing, Simple cubic structure, Face centered cubic structure, Hexagonal closed packed structure, Pervoskite structure, X-ray diffraction and Bragg's law, Laue pattern.**Practical Lab**
3	OCTOBER	**Unit II** Thermal Properties of Solids, Concepts of Thermal Energy and Phonons, Internal Energy and Specific Heat, The Various theories of Lattice specific Heat of Solids, The Einstein Model, Vibrational Modes of Continuous Medium, Debye Model, Electronic Contribution of the internal Energy to the Specific Heat of Metals, Thermal Conductivity of the Lattice.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Band Theory of Solids, Formation of bands, Periodic Potential of a solid, Wave function in a Periodic Lattice and Bloch Theorem, Number of States in the Band, Kronig Penny model, Velocity of the Bloch electrons and Dynamical effective mass, Momentum, Crystal Momentum and Physical Origin of the Effective Mass, Negative Effective Mass and Holes, The distinction between metals, insulators and intrinsic semiconductors.**Practical Lab**
6	DECEMBER	**Unit-IV:** Electrical Conductivity, Drude-Lorentz Theory of Electrical Conductivity, Boltzman Transport Equation, Sommerfield Theory of Electrical Conductivity, Mathiessen's Rule, Thermal Conductivity and Widemann-Franz'sLaw, The Hall Effect.**Practical Lab**
7	JANUARY	**Unit-IV:** The Distribution of Molecular Velocities, the energy distribution, Transport phenomenon. mean free path, distribution of free path, coefficients of viscosity, thermal conductivity diffusion.**Practical Lab**

8	FEBRUARY	**Unit IV:** Superconductivity, Introduction, Meisner's effect, The Isotope Effect and Electron-Phonon Interaction, The Effect of the Superconductivity Transition on properties, Special Features of Superconducting Materials, London's equation, Flux Quantization, Qualitative discussion of BCS Theory of Superconductivity, Cooper Pairs, Applications of Superconductors, Josephson Junction.**Practical Lab**
9	MARCH	**Unit V** Magnetic Properties, Origin of Atomic Magnetism, Dynamic of Classical Dipole in Magnetic field, Magnetic Susceptibility, Phenomenon of Diamagnetism, Paramagnetism, Paramagnetism of Ionic Crystal, Ferromagnetism, Temperature Dependance of saturation of Spontaneous Magnetization, The Paramagnetic Region.**Practical Lab** **Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-III Subject : Physics
Paper Name : Nuclear Physics

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Nuclear Properties: Rutherford's scattering and Nucleus model of atom, Properties of Nuclei, Mass, Charge, Estimation of charge density, size, density, spin, parity, statistics, magnetic dipole moment, Electric Quadrupole Moment, Mass Defect and systematics of Binding energy.**Practical Lab**
2	SEPTEMBER	**Unit-I :** Constituents of nucleus, Discovery of neutron and proton-neutron hypothesis, Nuclear potential, Nuclear Force, Liquid drop model, Semi Empirical Mass formula and its applications; 1. Alpha decay, 2. Mass Parabola, 3. Mirror Nuclei, Nuclear Mass measurements, Aston's Mass Spectrograph, Double Focussing Msss Spectrograph and Doublet method.**Practical Lab**
3	OCTOBER	**Unit II** Nuclear Fission:- The Discovery of Nuclear Fission, The Energy Release in Fission, Mass and Energy distribution of fission products, Neutron emission in fission, Eenrgetics of Spontaneous fission, Bohr Wheeler theory and Quantum effects, Neutron induced fission, Fission cross-section and threshold, **Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-II:** Nuclear Fission as a source of Energy, The Nuclear Chain Reaction, condition of controlled chain Reaction, The principal of Nuclear Reactors, classification of Reactors, Typical Reactors, Power of Nuclear Reactor, Critical size of Thermal Reactors, The Breeder Reactor, Reprocessing of the Spent Fuel, Physical, Chemical and Biological effects of nuclear radiations, Radiation hazards.**Practical Lab**
6	DECEMBER	**Unit-III:** Nuclear Fusion: Nuclear Fusion reactions, The sources of stellar Energy, The problems of controlled nuclear fusion, The plasma-Fourth State of the Matter, fusion Reaction, Energy Balance and Lawson Criterion, Magnetic Confinement of Plasma. Classical plasma Losses from the Magnetic Container, Anomalous Losses, Turbulence and plasma Instabilities, The Laser fusion Problem, fusion Reactor:**Practical Lab**
7	JANUARY	**Unit-IV:** Accelerators: Ion sources, Cock-Craft-Walten High Voltage Generators, Van De- Graff Generators, Drift Tube Linear Accelerators, Wave Guide Accelerator,**Practical Lab**

8	FEBRUARY	**Unit IV:** Ionisation Chamber, Region of Multiplicative Operation, Proportional Counter, Geiger-Muller Counter, Cloud Chamber.**Practical Lab**
9	MARCH	**Unit V:** Classification of Elementary Particles, Qumtum Numbers, Fundamental Interactions, Unified approach (Basic ideas), The conservation Laws, Quarks Basic idea of color and quark confinement. **Practical Lab** **Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-III Subject : Physics
Paper Name : Quantum Mechanics and Spectroscopy

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit I:** Experimental Evidence of Quantum Theory: limitations of classical theory to explain, specific heat of solids, Black Body Radiation, Planck's quantum hypothesis and qualitative discussion of radiation law, photoelectric effect, Compton effect.**Practical Lab**
2	SEPTEMBER	**Unit-I :** Matter Waves, De Broglie relation, Davison Germer experiment, electron interference experiment, Uncertainity principle (i) Position & moments (ii) Energy & Time (iii) Angular displacement and momentum. its application such as (i) Non existence of electron in nucleus, (ii) Ground state energy of H–atom, (iii) Ground state energy of harmonic oscillator (iv) Natural width of spectral lines.**Practical Lab**
3	OCTOBER	**Unit II** Schrodinger's Wave Mechanics: Schrodinger's equation, Its need and justification, time dependent and time independent forms, physical significance of the wave function and its interpretation, probability current density. Operators in quantum mechanics, Definition of an operator, linear and Hermitian operators, State function, Expectation value of dynamical variables, position momentum and energy, Fundamental postulates of quantum mechanics, Eigenfunction and eigen values, Degenracy. Orthogonality of eigenfunction, Commutation relations, Ehrenfest's theorem and complementarity wave packet.**Practical Lab**
4	October	**Unit Test-I (Unit-1,2)**
5	NOVEMBER	**Unit-III:** Simple solution of Schrodinger's Equation: Time independent Schrodinger equation and stationary state solution, Boundary and continuity conditions on the wave function, particle in one dimensional box, Eigenfunction and eigenvalues, discrete energy levels, generalisation to three dimensions and degenaracy of levels. Potential steps and rectangular potential barrier, calculation of reflection and transmission coefficient. Qualitative discussion of the application to alpha decay, Square well potential problem calculation of transmission coefficient and resonant scattering (Ramsaur–Townsent effect).**Practical Lab**

6	DECEMBER	**Unit-IV:** Bound state problems : Particle in one dimensional infinite potential well and finite depth potential well–energy eigen–values and eigenfunction, transcedental equation and its solution, Simple harmonic oscillator (one dimensional case) and qualitative discussion of its eigenfunctions, energy eigenvalues. Zero point energy, parity symmetric and antisymmetric wave function's with graphical representation.**Practical Lab**
7	JANUARY	**Unit-V:** Schrodinger equation for a spherically symmetric potential, Schrodinger equation for a one electron atom in spherically coordinates, separation of variables, Orbital angular momentum and quantization spherical harmonics, energy levels of H–atom, Shapes of n = 1 and n = 2 wave functions, Average value of radius of H–atom.**Practical Lab**
8	FEBRUARY	**Unit-V:** Applications of Quantum Theory to Atomic Spectroscopy: Quantum features of spectra of one electron atoms, Frank–Hertz experiment and discrete energy states, Stern and Gerlach experiment, spin and magnetic moment, Spin orbit coupling and qualitative explanation of fine structure, Atoms in magnetic field Zeeman spliting, Stark Effect.**Practical Lab**
9	MARCH	**Previous Year Paper Solved in class room of Unit I,II and III**
10	APRIL	**Previous Year Paper Solved in class room of Unit IV and V and Unit Test-II (Unit-3,4)**

B.Sc. Part-III Subject Name : Mathematics
Paper I : LINEAR ALGEBRA AND COMPLEX ANALYSIS

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Definition and examples of a vector space, Subspace of a vector space.
2	SEPTEMBER	**Unit-I** Linear combination and Linear span, Linear dependence and independence of vectors, direct sums of subspaces.
3	OCTOBER	**Unit - II** Basis and dimension of finitely generated spaces. Quotient space, Linear transformation, Rank and nullity of linear transformation.
4	NOVEMBER	**Unit - III** Characteristic values and characteristic vectors of matrices .
5	NOVEMBER	**Unit Test-I**
6	DECEMBER	**Unit- IV** Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection, Limit, Continuity and differentiability of a complex valued function.
7	JANUARY	**Unit - IV** Analytic functions. Cauchy-Riemann equations. Harmonic functions. Determination of conjugate function.
8	FEBRUARY	**Unit - V** Mapping or Transformation, Isogonal and conformal mappings neccessary and sufficient conditions for a conformal mapping. Mobious Transformation, Fixed points, Cross ratio, Inverse points, Mapping by elementary functions. the inverse transformation.
9	MARCH	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-III Subject Name : Mathematics
Paper II : Mathematical Statistics and Linear programming

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Central moments, First four central moments in terms of raw moments and vise-versa. Karl-Pearson's Beta and Gamma coefficients. Measure of skewness and kurtosis.
2	SEPTEMBER	**Unit-I** Random experiment. Sample space, Event, Types of events, Probability and Conditional probability of an event. Independent events, Theorems of compound and total probabilities, Baye's Theorem and its simple applications.
3	OCTOBER	**Unit- II** Random variable, discrete and continuous random variables, Probability distribution of a discrete random variable, Probability density function of a continuous random variable. Distribution functions, Mathematical expectation of a random variable and of a function of random variable, Moments and Moment generating function, Cumulant generating function and cumulants, Characteristic functions.
4	NOVEMBER	**Unit - III** Discrete and continuous distributions with properties : Bernouli, Binomial, Poisson and Normal.
5	NOVEMBER	**Unit Test-I**
6	DECEMBER	**Unit- IV** Linear programming, Variables , Objective function, Constraints and Mathematical form of a LPP. Graphical method of solution of two variable linear programming problems. Line and line segment in the Euclidean space Rn, Convex set, Hyperplane convex combination, Convex polyhedron, Extreme point of a convex set. Basic solution of a system of linear equations.
7	JANUARY	**Unit - IV** Slack and surplus variables. Standard form of a LPP. Feasible solution, BFS and optimal BFS of a LPP. Replacement of basis vector. Improved BFS. Unbounded solutions, Conditions of optimality. Simplex algorithm, Artificial variable, Charne's Big M-method.

8	FEBRUARY	**Unit - V** Dual and primal. Problem Standard form of a primal problem. Formation of dual of a standard primal problem. Fundamental theorem of duality. Solution of a LPP by solving its dual by simplex method. Assignment problems.
9	MARCH	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc. Part-III Subject Name : Mathematics
Paper III : NUMERICAL ANALYSIS AND C-PROGRAMMING

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**Unit-I** Principles of C Programming : Algorithms, Flowcharts, Constants, Variables, Data type, Declaration of storage class, assigning values of variables, symbolic constant. Operators and Expressions. Common I/O operators decision making, branching and loops : if, if-else, Nested if-else, WHILE, DO, for loop, while statement, switch-case statement.
2	SEPTEMBER	**Unit-I** Array : One dimensional, Two dimensional. Initialization of two dimensional arrays
3	OCTOBER	**Unit - II** User defined function in C: function declaration, calling a function, Category of function, nesting of functions recursion, Pointers.
4	OCTOBER	**Unit Test-I**
5	NOVEMBER	**Unit - II** Operators : forward difference , backward difference, Shift E, Inverse shift E-1, Differentiation D, Central -Difference , Mean difference , Central sum , Divided difference, Inter relation between various operators, Forward and backward difference table. Factorials notation.
6	DECEMBER	**Unit- III** Interpolation with equal and unequal intervals, Central difference interpolation, inverse interpolation.
7	JANUARY	**Unit - IV** Numerical differentiation and Numerical –Integration: Trapezoidal rule, Weddle rule, Simpson's rules, Gauss quadrature formula.
8	FEBRUARY	**Unit - V** Solution of equations : Bisection method, regula-falsi method and Newton- Raphson method. Solution of ordinary differential equations : Picard's method and Euler's method.
9	MARCH	**Revision Classes and Unit Test-II**
10	APRIL	**University Exam**

B.Sc.Part-III Subject: Zoology
PAPER-I: ANIMAL DIVERSITY
(PART-III:VERTEBRATES) AND EVOLUTION

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I Cyclostomata and Pisces** 1. Classification of Vertebrates. 2. Cyclostomata: Classfication and characters with suitable examples. Petromyzon: General morphology and Ammocoete larva. 3. Pisces-I:Classification and characters with suitable examples; differences between cartilagenous and bony fishes; Dipnoans.**Practical Lab**
2	SEPTEMBER	**UNIT I** 4. Pisces-II: General morphology of Scoliodon ; types of scales and caudal fin; electric organs; aquatic adaptations in fishes. 5. Pisciculture: Introductory knowledge of Psciculture; **UNIT-II Tetrapoda** 1. Amphibia: Classification and characters with suitable examples, adaptations for amphibious life. 2. Reptilia: Classification and characters with suitable examples, difference between lizards and snakes, identification of poisonous and non- poisonous snakes, biting mechanism in snakes, snake venom.**Practical Lab**
3	OCTOBER	**UNIT II** 3. Aves: General classification and characters with important examples; difference between Ratitae and Carinatae; flight muscles, flight mechanism, flight adaptations, Archaeopteyx as a connecting link. 4. Mammalia-I: Classification and characters with suitable examples; 5. Mammalia-II: Dentition.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**UNIT-III Comparative Anatomy of Vertebrates-I** Comparative anatomy of the following organ systems of Scoliodon, Rana, Uromastix / Varanus, Collumba and Oryctolagus: 1. Integument and integumentary derivatives. 2. Alimentary canal and accessory digestive glands.**Practical Lab**

6	DECEMBER	**UNIT III** 3. Respiratory organs 4. Heart, aortic arches and their evolution.**Practical Lab**
7	JANUARY	**UNIT-IV Comparative Anatomy of Vertebrates-II** Comparative anatomy of the organ systems of Scoliodon, Rana, Uromastix / Varanus, Collumba and Oryctolagus and miscellaneous: 1. Comparative structure of urinogenital system (pro, meso and metanephric kidney and genital ducts in males and females). 2. Brain and cranial nerves. 3. Comparative anatomy of eye and ear. 4. Parental care in vertebrates.**Practical Lab**
8	FEBRUARY	**UNIT-V Evolution** 1. Basics and origin of life: Definition, pre-darwinian theories of evolution; Oparin- Haldane concept of origin of life; Miller- Urey experiment; molecular evolution of RNA, proteins and DNA; 2. Micro-evolution: Work and theories of Lamarck, Weisman and Darwin; theory of natural selection of Darwin and Wallace, neo-darwinism. 3. Evidences of evolution: Various evidences favouring evolution: Homology, analogy, vestigial organs; palaentological, embryological, biogeographical and biochemical evidences; adaptive radiations, mimicry.**Practical Lab**
9	MARCH	**UNIT V** 4. Genetic basis of evolution and speciation : Hardy-Weinberg law, gene frequency, genetic drift, factors affecting Hardy-Weinberg law, Founder effect, bottle neck effect, Sewall -Wright effect; speciation; role of various isolating mechanisms in speciation. 5. Macro-evolution: Geological time scale and imperfection of geological record, continental drift, human evolution.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part-III Subject: Zoology
PAPER-II: MAMMALIAN PHYSIOLOGY AND IMMUNOLOGY

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I Physiology** 1. Digestion: a. Nutrients: Carbohydrates, lipids, proteins, vitamins. b. Digestive enzymes and hormones of GIT. c. Digestive mechanism: Mechanical and chemical digestion. d. Absorption and assimilation of end products of digestion. e. Balanced diet, malnutrition (PEM), obesity; endoscopy.**Practical Lab**
2	SEPTEMBER	**Unit-I** 2. Respiration: a. Aerobic and anaerobic respiration. b. Structure of respiratory organs. c. Mechanism and regulation of breathing. d. Transport of O2 and CO2. e. Respiratory disorders: Emphysema, asthma, occupational disorders, spirometry.**Practical Lab**
3	OCTOBER	**UNIT-II Physiology** 3. Circulation: a. Circulatory fluids: Blood, lymph; blood cells; structure of haemoglobin. b. Blood circulation through heart, arteries, arterioles, capillaries, venules and veins. c. Cardiac cycle and its regulation. d. Blood clotting mechanism, blood pressure. e. Cardiac disorders, ECG, heart transplantation (an introductory idea).**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**Unit II** 4. Excretion: a. Excretory products: NH3, urea, uric acids, amino acids. b. Structure of kidney, nephron; mechanism of urine formation; micturition. c. Autoregulation, counter-current mechamism, renin-angiostatin system. d. Accessory excretory organs: Skin, liver, lungs etc. e. Excretory disorders, dialysis, Kidney transplant.**Practical Lab**

6	DECEMBER	**UNIT-III -Physiology** 5. Muscle and Neural Physiology: a. Structure of smooth, skeletal and cardiac muscles; myofibrils. b. Isotonic and isometric contraction of muscles, sliding- filament theory of musle contraction; relaxation of muscle fibres; Properties of muscles (muscle twitch, fatigue, summation, treppe, tetanus, rigor mortis), myopathy. c. Kinds of neuron, structure of myelinated and nonmyelinated nerve fibres. d. Origin and propagation of nerve impulse through defferent types of neurons and synapse. e. Reflex action, types.**Practical Lab**
7	JANUARY	**Unit III** 6. Sensory Physiology: a. Tactile receptors, pain receptors, thermoreceptors, chemoreceptors. b. Structure of human eye; image formation and colour vision. c. Eye disorders, lenses used in eye care. d. Structure of human ear, mechanism of hearing, kinds of deafness. e. EEG, MRI, CT-scan, mental health (epilepsy, neurosis, psychosis). **UNIT-IV- Immunology** 7. Basics of Immunity: a. Types of immunity: Active, passive, innate and aquired immunity. b. Antigens and antibodies. c. Types of antibodies and their structure. d. Interferons, cytokines (haptens). e. Mechanism of reactions: Precipitation, agglutination, neutralisation, opsonisation.**Practical Lab**
8	FEBRUARY	**UNIT IV** 8. Cells and Organs in Immunity: a. Humoral and cell- mediated immunity. b. B and T cells. c. Lymphocytes: Helper, killer, memory and suppressor cells. d. Complement system, secondary lymphoid organs; tonsils, adenoids, thymus, bone marrow, bursa fabricus, macrophages. e. Antigen - antibody reaction. **Practical Lab**

9	MARCH	**UNIT-V- Immunology** 9. Immune disorders and techniques: a. Basic idea of immune disorders. b. Auto-immune diseases c. AIDS, mechanism of HIV infection. d. Monoclonal antibodies and their poduction. e. Applications of monoclonal antibodies; ELISA. 10. Vaccines and Transplants: a. Vaccination and immunisation. b. Surface antigens; vaccines; hepatitis vaccine, attenuation (oral polio vaccine). c. Antivenoms. d. Organ transplants: Various types of transplant (allograft, xenograft, autograft). e. Major histocompatibility complex.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**

B.Sc.Part-III Subject: Zoology
PAPER-III: DEVELOPMENTAL BIOLOGY

S.NO.	MONTH	NAME OF TOPIC
1	AUGUST	**UNIT-I- Basics of Embryology** a. Histoical perspective and scope of developmental biology. b. General idea of asexual reproduction (fission, budding, gemmule formation, metagenesis, polyembryony etc.). c. An introduction to animal development in sexually reproducing animals. d. Neuroendocrine regulation of reproductive organs; estrous and menstrual cycles.**Practical Lab**
2	SEPTEMBER	**UNIT-II - Gametogenesis and fertilization** a. Gametogenesis: Definition; structure of gametes (sperm and egg). b. Spermatogenesis and oogenesis. c. Types of eggs; detailed structure of amphibian, avian and mammalian egg. d. Fertilization: Events of fertilization, polyspermy and preventing mechanism.**Practical Lab**
3	OCTOBER	e. Significance of fertilization; parthenogenesis; evolution of viviparity. **UNIT-III - Cleavage and Gastrulation** a. Cleavage, creating multicellularity;definition of embryonic cleavage, morula; blastula, patterns and planes of cleavage; blastulation, types of blastula. b. Types of gastrulation mechanisms.**Practical Lab**
4	October	**Unit Test (Unit-1,2)**
5	NOVEMBER	**UNIT III** c. Fate maps (with suitable examples); cell lineage d. Reorganization of embryonic cells, gastrulation in amphibians, birds and mammals. e. Morphogenetic cell movements and their significance in gastrulation.**Practical Lab**
6	DECEMBER	**UNIT-IV- Induction, Differentiation, Organogenesis and Regeneration** a. Embryonic induction, organizers, competence. b. Mechanism of cellular differentiation; sex determination during development. Government rules against sex determination during pregnancy.**Practical Lab**
7	JANUARY	**UNIT IV** c. Neurula formation, growth and organogenesis. d. Regeneration: types and mechanism. Senescence and ageing.**Practical Lab**

8	FEBRUARY	**UNIT-V- Embryonic adaptation** a. Salient features of development of frog/toad; amphibian metamorphosis and its endocrine regulation.**Practical Lab**
9	MARCH	**UNIT V** b. Extraembryonic membranes in chick, salient features of development of chick upto 72 hours of incubation. c. Placentation in mammals: Definition, types; classification on the basis of morphology and histology; functions of placenta.**Practical Lab**
10	APRIL	**Revision Class, Unit Test (Unit-3,4,5)**