राजस्थान सरकार

आयुक्तालय कालेज शिक्षा, राजस्थान, जयपुर

क्रमांक : एफ 7(4)अकाद/आकाशि/2019/362-70 दिनांक: 27.9.19

प्राचार्य,
समस्त राजकीय महाविद्यालय,
राजस्थान।

विषय :– अक्टूबर, 2019 का नियमित कक्षाओं में पढ़ाये जाने वाले विभिन्न विषयों के पाठ्यक्रम के टॉपिक्स महाविद्यालयों को भिजवाये जाने बाबत।

संदर्भ :–आयुक्तालय के पत्र क्रमांक एफ7 (4)अकाद/आकाशि/2019/57 दिनांक 31.05.2019 के अनुसरण में।

महोदय,

उपर्युक्त संदर्भित पत्र के अनुसरण में सत्र 2019–20 में राजकीय महाविद्यालयों में संबंधित विश्वविद्यालयों के विभिन्न विषयों के पाठ्यक्रम के अक्टूबर माह में पढ़ाये जाने वाले टॉपिक्स को आयुक्तालय एवं राजकीय महाविद्यालय स्तर पर विषय विशेषज्ञों की सहायता से चिह्नित एवं अनुमोदन करवाया गया है। आपको इस पत्र के द्वारा इन्हे प्रेषित किया जा रहा है।

महाविद्यालय स्तर पर अक्टूबर माह के टॉपिक्स की मासिक समय–सारणी बनाकर विद्यार्थियों को सूचनार्थ महाविद्यालय के नोटिस बोर्ड पर चस्पा करवाया जाना है। उक्त संबंध में किसी भी प्रकार के मार्गदर्शन अथवा सहायता हेतु डॉ0 आर0सी0 मीना, संयुक्त निदेशक (अकादमी) को उनके मोबाईल न0 9414344597 पर तथा अपने संबंधित प्रभारी अधिकारी (महाविद्यालय समूह – आयुक्तालय) से संपर्क करें।

प्रदीप कुमार बोरड़,
आयुक्त, कॉलेज शिक्षा एवं
विशिष्ठ शासन सचिव, उच्च शिक्षा,
राजस्थान जयपुर

क्रमांक : एफ 7(4)अकाद/आकाशि/2019/362-70 दिनांक: 27.9.19

प्रतिलिपि :– सूचनार्थ/पालनार्थ

1. निजी सचिव, आयुक्त, कॉलेज शिक्षा, राजस्थान, जयपुर।
2. निजी सचिव, अतिरिक्त आयुक्त, कॉलेज शिक्षा, राजस्थान, जयपुर।
3. संयुक्त निदेशक, HRD/PI/RUSA/ACAD/P&C/RVRES आकाशि, जयपुर।
4. सहायक निदेशक, क्षेत्रीय कार्यालय कॉलेज शिक्षा अजमेर, जयपुर, उदयपुर, कोटा, जोधपुर, बीकानेर, भरतपुर को इस कार्य की मॉनिटरिंग हेतु।
5. प्रभारी अधिकारी, कॉलेज समूह, आकाशि, जयपुर को निर्देशानुसार प्रति भेजकर लेख है कि अपने संबंधित महाविद्यालयों से संपर्क कर इस आदेश की क्रियान्विति सुनिश्चित करें।
6. प्रभारी अधिकारी, नवाचार एवं कौशल विकास प्रकोष्ठ, आकाशि, जयपुर।
7. वेब प्रभारी को अपलोड/ई–मेल करने हेतु।
8. रक्षित पत्रावली।

27/9/19

(डॉ0 आर0सी0 मीना)
संयुक्त निदेशक, अकादमिक

अक्टूबर 2019 बी.एससी.– पार्ट प्रथम पाठ्यक्रम महर्षि दयानंद सरस्वती विश्वविद्यालय, अजमेर

	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper-I	**MECHANICS** Rotational motion, equation of motion of a rotating body, inertial coefficients, case of J not parallel to ω, kinetic energy of rotation and idea of principles axes, Euler's equations, Precessional motion of Spinning top, Spin precession in constant magnetic field.	**Inorganic Chemistry** p-block elements - Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides and halides of groups 13-16, hydrides of boron-diborane and higher boranes, bonizine, properties homohydrides. Fullerene, carbides, fluorocarbons; silicones, silicates (Structural principle) tetrasulphurtetranitride, basic properties of halogens, interhalogens and polyhalides.	**Higher Algebra** Complete quotient, relation between convergents and fraction, the difference. Recurring Series : Order and sum of a recurring series.	**MICROBIOLOGY MYCOLOGY & PHYTOPATHOLOGY** C. Ascomycotina - Peziza D. Basidiomycotins - Puccinia, Agaricus	**Diversity of Animals and evolution** History of evolutionary thought - Lamarckism, Neo - Lamarckism, Darwinism and Neo-Darwinism.
B.Sc. I Paper II	**WAVES & OSCILLATIONS** Superposition's of waves linear homogenous equations and the superposition principle, non linear superposition and consequences. Standing wave : Standing waves as normal modes of bounded systems, Harmonics the quality of sound examples. Chladni's figure and vibrations of a drum. Production and detection of ultrasonic and infrasonic waves and applications.	**Organic Chemistry** Alkenes - Mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff rule, Hoffman elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanism involved in hydrogenation, electrophilic and free radical additions. Markownikoff's rule hydroboration-oxidation, oxymercuration -reduction, Epoxidation, oenolysis, hydration hydroxylation and oxidation with $KMno_4$ Polymerization of alkenes, Substitution at the allyclic an vinylic positions of alkenes. Industrial applications of ethylene and propene.	**CALCULUS** Beta and Gamma functions. Double and triple integrals, Dirichlet's integrals.	**ALGAE, LICHENS AND BRYOPHYTA** Mycorrhizae, ectomycorrhizae and endomycorrhizae (phylograph) and their significance. General characters and classification of Bryophyta	**Cell Biology and Genetics** RNA transcription (elementary edea about polymerases, capping, poly A tail, exon and introns) Transcription and Translation. (Protein synthesis): Mechanism of transcription . Genetic code and its characteristics. Translation.
B.Sc. I Paper-III	**ELECTROMAGNETISM** Electrostatic field - Conductors in electric field. Boundary conditions for potential and field at dielectric surface, uniqueness theorem, method of images and its applications for system of a point charge near a grounded conducting plane. Poissions and Laplace's equation in Cartesian cylindrical and spherical polar coordinates (without derivation) solution of Laplace's equation in Cartesian coordinates, potential at a point inside a rectangular box.	**Physical Chemistry** Dilute solution, colligative properties, Raoult's law, 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 molar mass, degree of dissociation and association of solutes.	**Geometry and Vector Calculus** Cone, reciprocal cone, right circular cone, enveloping cone. Cylinder, right circular cylinder, enveloping cone.	**PTERIDOPHYTA & PALEOBOTANY** PTERIDOPHYTA - Structure and reproduction in Plteris and Morsilea PALEOBOTANY - History and general account of Paleobotany in India, Geo logical time scale.	**Developmental biology** 3. Regeneration, Teraogenesis, Sensescene and Ageing. 4. Extraembryonic membrane of chick.

अक्टूबर 2019 बी.एससी. – पार्ट द्वितीय पाठ्यक्रम महर्षि दयानंद सरस्वती विश्वविद्यालय, अजमेर

	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**Thermodynamics and statistical physics** Production of low temperature and application : Joule theorem expansion and J.T. coefficients for ideal as well as Vander waal gas. Porous plug experiment. Temperature inversion, Regenerative cooling, Cooling by adiabatic demagenetization liquid helium, He-I and He-II Super fluidity. Refrigeration through helium dilution. Quest for absolute Zero, Nernst heat theorem.	**Inorganic Chemistry** Chemistry of Actinides - General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthinides.	**Abstract Algebra** Ring, Example of rings, ring with unity, zero divisors, integral domain and fields, their examples and properties, characteristic of a ring and integral domain	**Diversity of seed plants** Fossil gymnosperms and cycas	**Structure and Functions of Invertebrate types** Parapodia (Nereis), gills (Palaemon, Lemelliderns, Pila), aerial, pulmonary sac (Pila), trachea (Insect), anaerobic (Fasciala, Taenia) Excretion : General body surface (Protozoa, Sycon, Obelia)
B.Sc. II Paper II	**Electronics** Transistor and transistor bias circuits: Notations and volt ampere characteristics for bipolar junctions transistor concept of load line and operating point, Hybrid parameters. Use of transistor as amplifier : CB, CE, CC configurations and their equivalent circuit. Analysis of transistor amplifiers using hybrid parameters and its gain frequency response.	**Organic Chemistry** Aldehydes and Ketones - Mechanism of nucleophilic addition to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knocvenagel condensations. Condensation with ammonia and its derivatives. Witting reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer villiger oxidation of ketones. Cannizzaro reaction. MPV Clemmensen. wolff-Kishner, $LiAlH_4$ and $NaBH_4$, reductions. Halogenation of enolizable ketones. An introduction to α, β- unsaturated aldehydes and ketones.	**Differential Equations** Method of variation of parameters, ordinary simultaneous differential equations, total differential equations, exact differential equations	**Systematics of Angiosperms** Classification of Anglosperms : Brassicaceae, Malvaceae, Rutaceae, Ranunculaceae	**Animal physiology and biochemistry** Types of Endocrine Glands, their secretions and functions: Pituitary, Adrenal, Thyroid, Islets of Langerhans, Testis and Ovary. Elementary idea about mechanism of hormone action
B.Sc. II Paper III	**Optics** Fresnel Diffraction : Half periods zones, circular aperture, circular disc, Straight edge, rectilinear propogation of light, cornu's spiral, zone plate, phase reversible zone plate. Fraunhoffer diffraction : Single slit, N slit, Intensity distribution, Plane diffraction grating, reflection grating concave grating, different mounting of grating. Resolving power, Reyleigh criterion, Resolving power: telescope, grating prism.	**Physical Chemistry** Phase Equlibrium Statement and meaning of the terms- phase, component and degree of freedom, thermodynamic deviation of Gibbs phase rule, phase equilibria of one component system - water , CO_2 and S system. Phase equlibrium of two component system - solid-liquid equilibria, simple catectic Bi-Cd, Pb-Ag systems, desilverisation of lead. Liquid-Liquid mixture ideal liquid mixture, Raoult's and Henry's law , Non - ideal system azeotropes - HCL-H_2O and ethanol water systems.	**Mechanics** Rectilinear motion under variable laws, Hook's law, related problems on horizontal and vertical clastic string	**Structure, development and reproduction in flowering plants** The shoot system: Secondary phloembast fibers structure, function, relationship, periderm. The root system : Root apical meristem, differentiation of primary and secondary tissues and their roles.	**Immunology, Microbiology and Biotechnology** Reproduction in Bacteria, asexual reproduction : binary fission, budding, endospore formation, exposure and cyst formation, sexual reproduction, conjugation. Microbial nutrition culture of Bacteria - (a) Carbon and energy source (b) Nitrogen and minerals

डॉ. आर. डी. मीना
संयुक्त निदेशक
(अकादमिक)

अक्टूबर 2019 बी.एस.सी. – पार्ट तृतीय पाठ्यक्रम महर्षि दयानंद सरस्वती विश्वविद्यालय, अजमेर

	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**Quantum Mechanics and Spectroscopy** **Simple solutions of Schrodinger's equations :** Particle in one dimensional box, eigen function and eigen values, discrete energy levels, extension of results for three dimensional case and degeneracy of levels. Potential step and rectangular potential barrier, calculation of reflection and transmission coefficient, Qualitative discussion of the application to alpha decay (tunnel effect), square well potential problem, calculation of transmission coefficient.	**Inorganic Chemistry** Nuclear Chemistry - Stability of nucleous n/p ratio, Einstein mass-energy relation. Types of radioactivity , Group displacement law, Disintegration series, Q-values, nuclear cross- section, spallation, Applications of radio activity.	**Real Analysis** Taylor's theorem for functions of two variables, definition of a sequence theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence criterion.	**Plant physiology and Biochemistry** Mineral Nutrition : Essential macro and micro elements and their role; mineral uptake; deficiency and toxicity symptoms. Respiration : ATP - the biological energy currency; aerobic and anaerobic respiration; Kreb's cycle	**Structure and function of chordates** Comparative study of Pisces, Amphibians, Reptiles, Aves and Mammals 3. Alimentary canal 4. Heart and aortic arches
B.Sc. III Paper II	**Nuclear Physics** **Nuclear Fission :** Barrier Penetration - Theory of Spontaneous Fission, Nuclear Energy Sources, Nuclear Fission as Source of Energy, The Nuclear Chain Reaction, Condition of Controlled Chain Reaction, The Principle of Nuclear Reactors, Classification of Reactors, Typical Reactors, Power of Nuclear Reactors, Critical size of Thermal Reactors, The Breeder Reactors, Reprocessing of the Spent Fuel, Radiation Damages and Fission Products Poisioning, Uses of Atomic Energy	**Organic Chemistry** Carbohydrates - Configuration of Monosaccharides, Erythreo and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides , ethers and esters, Determination of ring size of monosaccharides. Cyclic structure of D(+) glucose. Mechanism of mutarotation. Structure of ribose and deoxyribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose)without involving structure determination.	**Complex Analysis** Fixed points: Cross ratio, inverse point, elementary maps - $F(z)= z^2$, vz, $1/2(z+1/z)$, sin z, log z	**Cytology, Genetics and Bio-technology of plants** Gene expressions : Regulation of gene expression in prokaryotes and eukaryotes; proteins structure. Genetic variations : Mutations : spontaneous and induced. transposable genetic elements.	**Environmental Biology** Habitat Ecology- terrestrial and major biomes of the world. Adaption of animals to various types of habitats. Ecology and human future : Growth rate, role of man kind in modifying natural communities. Natural resources : Present status and future needs
B.Sc. III Paper III	**Solid State Physics** **Band theory of solids :** Velocity of the Bloch electrons and Dynamical Effective Mass, Momentum, Crystal Momentum and Physical Origin of the Effective Mass, Negative Effective Mass and Concept of Holes, The distinction between metals, insulators, and intrinsic semiconductors. Electrical Conductivity : Drude-Lorentz Theory of Electrical Conductivity; Boltzmann Transport Equation.	**Physical Chemistry** Vibrational Spectrum - Infrared spectrum, Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of and harmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups. Raman spectrum concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.	**(a) Mathematical Statistics** Continuous distribution : Rectangular and normal distribution, properties of these distribution and moments up to fourth order. **(b) Linear programming and optimization techniques** Transportation problem, North-West corner method, lowest cost entry method, Vogel's approximation method, degeneracy and optimal solution of transportation problem.	**Ecology and Utilization of plant** Ecosystems: Ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen and phosphorus.	**Applied Zoology, Ethology and Biostatistics** Ethology - Methods of studying behaviour : Neuroanatomical neurophysiological, neurochemical techniques. Territory and Home range - Role of pheromones.

डॉ. आर. पी. मीना
संयुक्त निदेशक
(अकादमिक)

अक्टूबर 2019 पार्ट प्रथम पाठ्यक्रम महाराजा गंगासिंह विश्वविद्यालय, बीकानेर

	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper I	**FRAME OF REFERANCE, MECHANICS AND OSCILLATIONS** Kepler's law, Gravitational law and field. Potential due to a spherical body, Gauss and Poisson equations for gravitational self energy. System of particles, centre of mass, equation of motion of single stage and multistage rocket, concepts of elastic and inelastic collisions.	**INORGANIC CHEMISTRY** (b) Weak interaction-Hydrogen bonding, Vander waals forces. (a) s- Block Elements - Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in biosystems and introduction to alkyls and aryls.	**ALGEBRA** General properties of groups, subgroups, cyclicgroups, cosets decomposition, Lagranges theorem and its consequences, Fermats and Eular's theorems.	**ALGAE,LICHEN AND BRYOPHYTES** Lichens - General characters. Habitat, structure, reproduction (with special reference to Parmelia and Usnea) and economic importance of Lichens specially as colonisers and indicators of environment	**TAXONOMY, DIVERSITY AND FUNCTIONAL ANATOMY OF LOWER NONCHORDATA (FROM PROTOZOA TO NEMATODA)** Coelenterata: Habit, habitat, structure, function and life history of Aurelia. Polymorphism in coelenterata. A brief account of coral and coral reefs
B.Sc. I Paper II	**MATHEMATICAL BACKGROUND, PROPERTIES OF MATTER AND ELECTROMAGNETIC WAVES** Viscous fluids, Streamline and Turbulent flow, Reynold's number, Poiseulle's law, Capillary tube flow, Stoke's law, Surface tension and surface energy, molecular interpretation of surface tension, Pressure on a curved liquid surface, wetting.	**ORGANIC CHEMISTRY** Isomerism in alkanes, sources, methods of formation (With special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids). physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes : orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions. Baeyer's strain theory and its limitations, ring strains in small rings (cyclopropane and cyclobutane), Theory of strainless rings, the case of cyclopropance ring : banana bonds. (a) Alkenes, Cycloalkenes, Dienes and Alkynes-Nomenclature of alkenes, methods of formation. Mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides	**CALCULUS** curve tracing in Cartesian and polar coordinates (standard curves). Differentiation and Integration under the sign of integration	**MYCOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY** Characteristics, structure, nutrition and reproduction of Bacteria. Gram staining, economic importance of Bacteria, Mycoplasma	**TAXONOMY, DIVERSITY AND FUNCTIONAL ANATOMY OF HIGHER NON-CHORDATA (FROM ANNELIDA TO ECHINODERMATA)** Lamellidens-habit, habitat, external features, anatomy(digestive, circulatory, respiratory, reproductive, nervous systems and sense organs)
B.Sc. I Paper III	**ELECTROSTATICS, ELECTRICITY AND MAGNETISM** Charging and discharging of condenser through resistance, Determination of high resistance by leakage method. Rise and decay of current in LR and CR circuits, Decay constant, transients in LCR circuits, AC circuits, Complex number and their applications in solving AC circuits, Complex impedance and reactance, Series and parallel resonance.	**PHYSICAL CHEMISTRY** Liquid State: Classification, structure of nematic and cholestric phases. Thermography and seven- segment cell. (b) Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols) properties - Kinetic, optical and electrical stability of colloids, protective action, Hardy - Schultze law, gold number. Liquids in liquids (emulsions) : Type of emulsions, preparation and properties of Emulsions. Liquids in solids (gels) : Classification, preparation and properties, inhibition, general applications of colloids.	**VECTOR CALCULUS AND GEOMETRY** asymptotes, chord of contact, pole and polar. Sphere	**PTERIDOPHYTES, GYMNOSPERMS & PALAEOBOTANY** Occurrence, structure and life history of Marsilea, Homospory, heterospory and origin of seed habit.	**CELL BIOLOGY, BIOCHEMISTRY AND MICROBIOLOGY** Various forms of proteins, lipid and their conjugates, nucleic acids, hormones, vitamins and enzymes.

संयुक्त निदेशक
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अक्टूबर 2019 पार्ट द्वितीय पाठ्यक्रम महाराजा गंगासिंह विश्वविद्यालय, बीकानेर

	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**STATISTICAL PHYSICS AND THERMODYNAMICS** THERMODYNAMICS - The laws of thermodynamics: internal energy as state function and other applications. Reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics Different versions of the second law, practical cycles used in internal combustion engines. Entropy,, principle of increase of entropy.	**INORGANIC CHEMISTRY** (a) Chemistry of Lanthanide Elements : Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.	**Higher Calculus** Lower and Upper integrals, Integrability of continuous and monotonic functions. the fundamental theorem of Integral Calculus, Mean value theorems of Integral Calculus.	**TAXONOMYAND EMBRYOLOGYOF ANGIOSPERMS** Range of vegetative and floral characteristics and economic importance of Asclepiadaceae, Solanaceae, Lamiaceae(Labiatae), Euphorbiaceae, Liliaceae and Poaceae (Gramineae)	**CHORDATA AND EVOLUTION** Comparison of the following organ systems of vertebrates with special reference to evolutionary aspects Scoliodon, Rana, Uromastix(or any lizard), Columba, Oryctolagus (or any mammals) Alimentary canal, Heart and evolution of aortic arches
B.Sc. II Paper II	**WAVES, ACOUSTICS AND KINETIC THEORY OF GASES** Distribution of speeds and of velocities, experimental verification, distinction between mean, rms and most probable speed and velocity values. Doppler broadning of spectral lines. Applied acoustics: The acousticity of a hall, reverberation period, Sabine's formula.	**ORGANIC CHEMISTRY** (a) Ethers and Epoxides Nomenclature of ethers and methods of their formation, physical properties. Chemical reactions-cleavage and autoxidation, Ziesels 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. (b) Aldehydes and Ketones Nomenclature and structure of 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 acid. Physical properties.	**DIFFERENTIAL EQUATIONS** Methods of variation of parameters. Series solution of differential equations, Power series method, Bessel, Legendre and Hyper geometric equations	**ANATOMY OF ANGIOSPERMS AND ECO NOMIC BOTANY** Periderm Heart wood sap wood,tylosis annual ring & secondary anomalous growth in roots and stems.	**MAMMALIAN PHYSIOLOGY AND IMMUNOLOGY** Sensory physiology- Physiology of vision, hearing, pain and touch. Origin and Functional architecture of a neuron. propagation of nerve impulse, synaptic transmission, central control of reflex action, reflex arc. Elementary idea of common sensory and nervous disorders
B.Sc. II Paper III	**OPTICS** Interference: Newton's ring; Interference in thin films. Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines, Fabry-Perot interferometer and etalon.	**PHYSICAL CEMISTRY** Phase equilibria of two component system-solid-liquid equilibria .simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCI-H2O), (FeCI3-H2O) and (CuSO4-H2O) system. Freezing mixtures, acetone-dry ice. Liquid-liquid mixtures-Ideal liquid mixtures, Raoult's and Henrys law. Non ideal system-azeotropes-HCl-H_20 and ethanol-water systems.	**MECHANICS** Velocities and accelerations along radial and transverse directions, and along tangential and normal directions, Simple Harmonic Motion	**CYTOGENETICS, PLANT BREEDING, EVOLUTION AND BIOSTATISTICS** Replication of DNA. Evidences of DNA as genetic material. Synaptonematal complex, crossing over, chiasma, linkage and mapping of genes	**DEVELOPMENTAL BIOLOGY** Differentiation and organogenesis- Differentiation, growth and organogenesis, regeneration.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**Quantum Mechanics, Atomic and Molecular Physics** Simple Solutions of Schrodinger equation : particle in one dimensional box. eigen function and eigen values . discrete energy levels, extension of results for three dimensional case and degeneracy of levels. Potential step and rectangular potential barriar. Calculation of reflection and transmission cofficient. Qualitative discussion of the application to alpha decay (tunnel effect).	**INORGANIC CHEMISTRY** Nuclear Chemistry Stability of nucleous n/p ratio, Einstein mass – energy relation. Types of Radioactivity, Group displacement law, Disintegration series, Q-values, nuclear corss-section, spallation, Applications of radio activity	**Advanced Algebra** Vector Spaces : Definition and examples of a vector spaces, subspaces, sum and direct sum of subspaces, linear span, linear dependence, Independence and their basic properties, Basis, finite dimensional vector spaces	**ECOLOGY AND PHYTOGEOGRAPHY** management problem of depletion of natural vegetation; endangered plants. Red data book. National parks and sanctuaries.	**MAMMALIAN NEUROENDOCRINOLOGY AND BEHAVIOUR** Reproductive disorders, birth control devices. Pheromones and their role in reproductive functions and behaviour
B.Sc. III Paper II	**Nuclear and Solid State Physics** Working of nuclear detectors G.M. counter, proportional counter, scintillation counter cloud and spark chamber, Linear accelerator. cyclotron, synchrocyclotron. Betatron. Electron synchroton.	**ORGANIC CHEMISTRY** Amino Acids, Peptides, Proteins and Nucleic Acids Classification, structure and stereochemistry of amino acids. Acid base -amino acids,αbehavior, electrophoresis. Preparation and reactions of 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, level of protein structure. Proteins denaturation/renaturation. Nucleic acids: Introduction, Constitution of nucleic acids-Ribnonucleosides and ribonucleotides. The double helical structure of DNA. '	**Analysis** Limit of a function, Continuous function, theorem on necessary and sufficient conditions for continuity of a function, Uniform continuity, Contracting mapping, Banach Fixed Point theorem	**PLANT PHYSIOLOGY AND BIOCHEMISTRY** Oxidative phosphorylation, Photo-respiration factors affecting respiration. Fats: synthesis and degradation	**GENETICS AND BIOTECHNOLOGY** Genetic disorders in Human beings (Down's, Turner's, klinefelter's and Edward Syndromes). Molecular genetics: Nucleic acids, structure, function and types of DNA, Structure, function and types of RNA.
B.Sc. III Paper III	**Electronics and Solid State Devices** Transistors : CB.CE.CC configuration. their characteristics curves and their equivalent circuits, Analysis of a transistor amplifier using h-parameter (A_i , A_v, Z_{in}, Z_o), fixed and emitter bias, bias stability in transistor circuit. FET, its characteristics and constants, biasing JFET and operation of JFET.	**PHYSICAL CHEMISTRY** Vibrational spectrum Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups. Raman Spectrum concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selction rules.	**Numerical Analysis and Optimization Techniques** Solution of algebraic Transcendental equations. Bisection method. Regular Falsi method. Newton-Raphson method.	**MOLECULAR BIOLOGY & BIOTECHNOLOGY** Brief account of vectorless gene transfer (Particle gun, liposomes, chemical methods)	**ANIMAL ECOLOGY AND BIOSTATISTICS** Aquatic ecology-Physicochemical nature of fresh water habitat, lentic habitat(Lake and ponds), lotic(stream and river). Fresh water fauna and their adaptations. Characteristics of marine habitat, zonation of marine environment.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper I	**Mechanics and Oscillations** **Rigid Body :** Kinetic Energy of rotation and idea of principal axes, Processional motion of a spinning top **Motion under Central Forces :** Introduction about Central Forces, Motion under central forces, Gravitational interaction, Inertia and gravitational mass. General solution under gravitational interaction.	**Inorganic Chemistry** Periodicity of p-block elements : Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electro negativity diagonal relationship, catenation.	**Discrete Mathematics** Truth tables, Tautologies and contradictions, Propositional Functions, quantifiers. Discrete numeric functions and Generating functions, Recurrence relations and Recursive Algorithms Linear Recurrence relations with constant coefficients.	**Cell Biology, Genetics Plant Breeding** Extra nuclear genome : Mitochondrial and Chloroplast genome, plasmids Chromosomal aberrations : Deletion, duplication, translocation, inversion, Aneuploidy and polyploidy.	**Diversity of Animals** Tryanosoma, Leishmania, Porifera : Sycon, Leucosolenia
B.Sc. I Paper II	**Electromagnetism** **Electric field in matter :** Electric field due to a dielectric sphere placed in a uniform electric field (a) outside the sphere (b) inside the sphere, Electric field due to a charge placed in dielectric medium and Gauss law, Clausius Mossotti relation in dielectrics **Magnetostatics and Magnetic field in matter** Lorentz force, properties of magnetic field, Ampere's law	**Organic Chemistry** Alkanes , Cycloalkenes, Dienes and Alkynes : Chemical reactions of alkenes - mechanism involved in hydrogenation, electrophilic and free radical addtions. Markownikoff'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. Classification and Nomenclature of isolated, conjugated and cumulated dienes. Structure of allenes and butadiene. Method of formation, properties, Chemical reactions - 1,2 and 1,4 additions. Diels-Alder reaction and polymerization.	**Calculus** Envelopes and evolutes, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.	**Microbiology, Mycology and Plant Pathology** Plant diseases : MLO's (blights, mildews - downy and powdery), rusts, smuts, canker, mosiac, little leaf galls etc. Brief account, structure, importance and life history and/or disease cycle and control of the following : Hego and white rust	**Cell Biology and Genetics** Folded fiber model and nuecleosome concept. Nucleic Acids, DNA structure, polymorphism (A,B and Z type), Replication (semi conservative mechanism) experiments of Messelson Stahi
B.Sc. I Paper III	**Optics** **Diffraction :** Plane Diffraction grating and its use in determining wavelength. Dispersion by a grating. Reyleigh's criterion of resolution. Resolving power of a telescope and a Grating.	**Physical Chemistry** Basic concept of X-Ray diffraction by crystals. Derivation of Bragg's equation, Determination of Crystal structure of NaCl and CsCl (Laue's method and powder method), band theory of solids Defects in solids.	**Analytical Geometry and Optimization Theory** Central Conicoids - Ellipsoid, Hyperboloid of one and two sheets. tangent lines and tangent planes. Direct sphere, Normals.	**Algae, lichens and Bryophyta** Classification (Eichler) : Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual); Alternation of generations; Economic importance.	**Gamete and Development Biology** Development of chick up to 96 hours stage, Embryonic adaptations : Extra embryonic membrane in chick, their development and functions.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**Thermodynamics and Statistical Physics** **Transport phenomena :** Mean free path, distribution of free paths, coefficients of viscosity, thermal conductivity, diffusion and their interaction.	**Inorganic Chemistry** Oxidation and Reduction : Use of redox potential data - analysis of redox cycle, redox stability in water Frost, Latimer and Pourbaix diagrams. Application of redox diagram, extraction of element.	**Real Analysis and Metric Space** Notion of limit, continuity and differentiability for functions of two variables. Riemann integration - Lower and Upper Riemann integrals, Riemann integrability	**Molecular Biology and Biotechnology** Basal medium media preparation and aseptic culture technique, Concept of cellular totipotency: Callasing diffrentiation and morphogenesis.	**Structure and function of invertebrate types** Echinus Cucumaria Hemichordata : Balangossus and its phylogenic significance
B.Sc. II Paper II	**Mathematical Physics and Special Theory of Relativity** Kinematics of decay products of unstable particles and reaction thresholds; Pair production, inelastic collision of two particles, Compton effect. Transformation of electric and magnetic fields between two inertial frames. Electric field measured in moving frames. Electric field of a point charge moving with constant velocity.	**Organic Chemistry** Ethers and Epoxides - Synthesis of epoxide, Acid and Base catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organnolithium reagents with epoxides. Aldehydes and Ketones - Structure of the carbonyl group. 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.	**Differential Equations** Simultaneous differential equations. Exact linear differential equations of n^{th} order. Existence and uniqueness theorem.	**Plant physiology and Biochemistry** Carbohydrates : Introduction, importance, nomenclature, classification molecular structure and function of mono, di and poly saccharides. their properties glycosidic linkages and glycoprotien.	**Animal physiology and biochemistry** Types of Endocrine glands, their secretions and functions : Pituitary, adrenal, thyroid, pancreas. Testies and ovary
B.Sc. II Paper-III	**Electronics and Solid State Devices** **Transistors :** Transistor biasing and amplifiers - Transistor biasing : Need of bias and stability of Q point, stability factors and various types of bias circuits for thermal bias stability, fixed bias, collector to base feedback bias and four resistor bias.	**Physical Chemistry** 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 sulphur systems. Phase equlibria of two component system - Solid-liquid equlibria simple eutectic Bi-Cd, Pb-Ag systems, desilverization of lead. Solid Solutions - Compound formation with Congruent melting point (Mg-Zn)and incongruent melting point. ($NaCl-H_2O$) system. Freezing mixtures acetone dry ice.	**Numerical Analysis and Vector Calculus** Relation between the roots and coefficients of general polynomial equation in one variable, transformation of equations, Descarte's rule of signs, solution of cubic equations by Cardon's method, biquadratic equations by Ferari's method.	**Pteridophytes, Gymnosperms & Palaeobotany** Morphology, anatomy, reproduction and life cycle of Cycas, Pinus.	**Immunology, Microbiology and Bio Technology** Exospores and cyst formation, sexual reproduction, conjugation Microbial Nutrition : Culture of Bacteria (a) Carbon and energy sources (b) Nitrogen and Minerals (c) Organic Growth Factors (d) Environmental factors : Temperature and pH

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**Quantum Mechanics and Spectroscopy** Schrodinger equation solutions in special cases - 1. Symmetric square well potential, reflection and transmission coefficients, resonant scattering: Bound state problems: particle in one dimensional infinite potential well and finite depth potential well, energy eigen values and eigen functions, transcendental equation and its solution.	**Inorganic Chemistry** Organo metallic Chemistry - Definition, nomenclature and classification of organo metallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti.	**Algebra** Morphism of rings Embedding of a ring, integral domain and field. Characteristics of a Ring and Field. Ideals	**Plant morphology and anatomy** Stomata-Structure and types. stomatal index. vascularisation of leaf - nodal structure and venation. Sensescene and abscission.	**Structure and function of Chordate types** Respiratory system Urinogenital System
B.Sc. III Paper II	**Nuclear and Particle Physics** **Nuclear Fission and Fusion :** Nuclear Fusion, Energy released in Nuclear Fusion, Fusion in stars. Nuclear Reactions : Types of Reactions, Conservation Laws, Kinematics of Reactions, Q - value. Threshold Energy, Reaction rate, Reaction cross section.	**Organic Chemistry** Carbohydrates - Nomenclature and structure of disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose); Glycosidic linkage.	**Complex Analysis** Morera's theorem, Poisson integral formula, Liouville's theorem. Taylor's theorem. Laurent's theorem. Maximum modulus theorem.	**Ecology and Economic Botany** Ecological succession types (primary and secondary : mechanism nudation, migration, ecesis reaction and climax : xerosere, hydrosere, Ecosystems structute - abiotic and biotic componentstrophic level.	**Ecology , Environmental Biology And Evolution** Community ecology : Composition, stratification Ecological succession : Types of patterns, concept of climax, details of xerosere and hydrosere succession, Habitat Ecology : Brief account of fresh water, marine, terrestrial and Estuarine Ecosystem Ecology of human future : Growth rate of human kind in modifying natural communities in term of public health and welfare with respect to use of pesticides conservation and pollution
B.Sc. III Paper III	**Solid State Physics** **Thermal properties of Materials :** Elastic waves, Phonon, Phonon dispersion relations in mono atomic and diatomic linear lattice. Lattice heat capacity. Classical theory of specific heat. Dulong-Petit's law. Einstein and Debye's theory of specific heat of solids and limitations of these models. Concept of Thermoelectric power	**Physical Chemistry** Raman Spectrum : Basic principles and applications, concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules. Electronic Spectrum : 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 M.O. their energy levels and the respective transitions.	**Mechanics** Central orbits - p-r equations, Apses, Time in an orbit, Kepler's law of planetary motion. Moment of inertia - M.I. of rods, Circular rings, Circular disks	**Angiosperm : Taxonomy and Embryology** Convolvulaceae, Solanaceae, Acanthaceae, Euphorbiaceae, Chenopodiaceae, Euphorbiaceae.	**Applied Zoology, Ethology and Biostatistics** Pheromones and their role in alarm spreading, Societies : Characteristics and advantages with special reference to honey bee.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper I	**MECHANICS** Oscillations : normal coordinates of two linear coupled oscillators, damped harmonic motion, Forced oscillations and resonances, Resonance width and quality factor.	**INORGANIC CHEMISTRY – I** **S-Block elements** Cement: Composition and types of Cement, Manufacture of Portland cement. Lime: Industrial preparation, Properties and Uses. :P-Block elements Periodicity in properties of III A, IV A, V A, VI A and VII A group elements.	**ALGEBRA AND CO-ORDINATE GEOMETRY OF TWO DIMENSIONS** Cauchy's root test, Logarithmic Ratio Test. Raabe's test, De Morgen and Bertrand's test, Cauchy's condensation test, Gauss's test. Alternating series, Leibnit'z test (Derivation of above tests not required)	**ALGAE, LICHENS AND BRYOPHYTES** **Lichens** Morphology and structure of the two components; biological, ecological and economic importance. Vegetative multiplication methods with special reference to Parmelia and Usnea	**ANIMAL DIVERSITY AND EVOLUTION** Natural Selection, genetic basis of evolution, speciation, Evidences of organic evolution.
B.Sc. I Paper II	**OPTICS** Diffraction : Fresnel's class of diffractions, Zone Plate; Phase reversal Plate; Cylindrical wave front and its effect at an external point and geometrical construction, diffraction at a straight edge; thin wire; rectangular slit and circular aperture.	**Organic Chemistry** Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization.Chemical reactions – 1, 2-and 1, 4-additions, Diels-Alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation.Chemical reactions of alkynes, acidic nature of 1-alkynes.Mechamism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, oxidation and polymerization..	**CALCULUS** double points, curve tracing, Envelopes and evolutes	**MYCOLOGY, MICROBIOLOGY AND PHYTOPATHOLOGY** Structure, multiplication and transmission of plant viruses. Tobacco mosaic virus and yellow vein mosaic virus disease. General account of Viroids, AIDS and Prions	**BIOLOGY OF NONCHORDATES** Hirudinaria: Digestive, haemocoelomic, excretory, nervous and reproductive systems, sense organs
B.Sc. I Paper III	**ELECTROMAGNETICS** Poisson's and Laplace equation in Cartesian, cylindrical and spherical polar coordinates (without derivation). Solution of Laplace equation in Cartesian coordinates, potential at a point inside a rectangular box.	**PHYSICAL CHEMISTRY** Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, Hardy-Schulze law, protective action, Gold number. Liquids in liquids (emulsions): types of emulsions, preparation, Emulsifier, Theory of Emuloion. Liquids in solids (gels): classification, preparation and properties, imbibitions and syncresis. General applications of colloids.	**CO-ORDINATE GEOMETRY OF 3-DIMENSIONS AND VECTOR CALCULUS.** Cone through six normals, Conjugate diameter and diametrical planes and their properties. Cone as a Central surface.	**PALAEOBOTANY, PTERIDOPHYTES AND GYMNOSPERMS** Characteristics of seed plants, evolution of the seed habit. General features of gymnosperms and their classification	**CELL BIOLOGY AND GENETICS** Meiosis: Phases and process of meiosis, synaptonemal complex, formation and fate of chiasmata recombination and significance of crossing over.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**STATISTICAL AND THERMAL PHYSICS** Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein Statistics, Fermi gas at 0K temperature; thermionic emission, strongly degenerate boson gas; Bose-Einstein Condensation, liquid helium.	**Inorganic** Chemistry of actinides: General characteristics, comparative treatment with lanthanides in respect to ionic radii, oxidation states, Magnetic behaviour and spectral properties.	**Numerical Analysis and Linear Programming** Solution of Algebraic and Transcedental equations, Iterative, Regula Falsi and Newton Raphson methods	**TAXONOMY AND EMBRYOLOGY OF ANGIOSPERMS** phytochemistry and taximetrics to taxonomy. Diversity of flowering plants as illustrated by members of the families Ranunculaceae, Papaveraceae, Caryophyllaceae, Capparidaceae	**CHORDATE STRUCTURE AND FUNCTION** Jaw suspensorium, limbs and girdles of Rana, Uromastix, Columba and Oryctolagus.
B.Sc. II Paper II	**QUANTUM MECHANICS AND SPECTROSCOPY** Simple solution of Schrodinger equation (Restricted to one dimensional case), Particle in one dimensional infinite well, Particle in one dimensional finite well (one or both sides of well may be non-rigid), Calculation of reflection and transmission coefficient for potential step and potential barrier.	**ORGANIC CHEMISTRY** Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$. Carboxylic Acid Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation, esterification and hydrolysis of esters (acidic and basic).	**DIFFERENTIAL EQUATIONS** Exact Linear differential equations of nth order. Exact Non-Linear differential equations. Differential equations of the various forms e.g., (i) $d^2y/d^2x = f(y)$ (ii) Equations not containing y directly (iii) Equations not containing x directly and other forms.	**ANATOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND ETHNOBOTANY** Leaf: Internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission. Economic Botany, Food plants: Rice, wheat,	**DEVELOPMENTAL BIOLOGY** development of placenta in rabbit, types and functions of placenta in mammals.
B.Sc. II Paper III	**(A) ELECTRONICS** Large signal amplifiers, class A, B and C operations and efficiencies; distortions; determination of second harmonic distortion; push-pull amplifiers; impedance matching. **OR** **(B)COMPUTER SYSTEMS AND NETWORKING** Word processing, MS word preparing and printing documents in MS word, MS excel, using formulas and functions, plotting graphs.	**Physical Chemistry –** Phase equilibria of two component system – solid-liquid equilibria, simple eutectic – Pb-Ag systems, desiliverisation of lead. Solid solutions – compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ($FeCl_3$-H_2O)system. Freezing mixtures. Nernst distribution law – deviations from Nernst Law, applications to study of complex ion and solvent extraction.	**MECHANICS – I (STATICS AND DYNAMICS OF A PARTICLE** common catenary. Velocities and accelerations along radial and transverse directions	**CELL BIOLOGY, GENETICS, PLANT BREEDING AND EVOLUTION** Nature of inheritance; Laws of Mendelian inheritance and its exceptions. Crossingover and linkage analysis DNA - Genetic mat, structure, replication.	**IMMUNOLOGY, MICROBIOLOGY AND BIOTECHNOLOGY** Effect of environmental factors on bacterial culture: Temperature, hydrogen ion concentration; Medical importance of Gram-negative and Gram-positive bacteria

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**SOLID STATE PHYSICS** Fermi energy at absolute zero temperature and low temperature. Electron heat capacity. Thermionic emission. Boltzmann transport equation, Sommerfeld theory of electrical conductivity, Thermal conductivity, Wiedmann-Franz Law. Hall effect.	**INORGANIC CHEMISTRY – III** pi accepter ligands, experimental determination of stability constant and composition of complex (Job's Method and Bjerrum's Method). Organometallic Chemistry: Definition, nomenclature and classification of organometallic compounds	**ABSTRACT ALGEBRA** Definition and kinds of rings, Integral domain, Division ring, Field, Subring of a ring,	**ECOLOGY AND ENVIRONMENTAL BIOLOG** food chain, food web, ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen, phosphorus and Sulphur	**ANIMAL PHYSIOLOGY AND BIOCHEMISTRY** exchange and transport of oxygen and carbon dioxide. Nervous System: Structure of neuron and its classification, Nerve impulse, impulse conduction and reflex action.
B.Sc. III Paper II	**NUCLEAR PHYSICS** Types of nuclear reactions (only qualitative statement). The balance of Mass and energy in nuclear reactions. Q equation. Solution of the Q equations, concept of centre of mass in nuclear reaction, view of proton-proton collision and neutron-nucleus collision in CM frame.	**ORGANIC CHEMISTRY** Carbohydrates - Conversion of glucose into mannose. , mechanism of osazone formation, Formation of glycosides, ethers and esters. Cyclic structure of D(+)-glucose. Determination of ring size of monosaccharides, Mechanism of mutarotation. Structures of ribose and deoxyribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides(starch and cellulose)without involving structure determination.	**ANALYSIS AND LAPLACE TRANSFORMS** Orthogoanl system, Construction of analytic functions. Power Series: Absolute convergence of power series, circle and radius of convergence of power series, sum function of a power series	**PLANT PHYSIOLOGY AND BIOCHEMISTRY** redox potential; oxidative phosphorylation pentose phosphate pathway Basics of enzymology: Discovery and nomenclature; Characteristics of enzymes.	**ECOLOGY AND BEHAVIOUR** Ecology in relation to Thar desert, Brief account of environmental pollution, global warming and its impact upon Human race
B.Sc. III Paper III	**REIATIVITY AND ELECTRODYNAMICS** Thomson, resonant and Rayleigh's scattering cross-section. Polarization of scattered light. Coherent and incoherent scattered light. Dispersion in liquids and solids, Claussius Mossotti equation and Lorentz-Lorentz formula.	**PHYSICAL CHEMISTRY – III** Vibration and Raman Spectroscopy - Raman Spectroscopy: concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules. Numericals. Electronic Spectrum: Origin of electronic spectrum, Selection rules, vibrational course structure and rotational fine structures considering no interaction of rotational and vibrational energies. qualitative description of selection rules and Franck-Condon principle.	**MECHANICS – II (DYNAMICS OF RIGID BODIES AND HYDROSTATICS)** Surface of equal pressure, fluid at rest under action of gravity, Fluid pressure on Plane surfaces	**PLANT BIOTECHONOLOGY AND MOLECULAR BIOLOGY** Cryopreservation of germplasm. Various types of bioreactors. Industrial production of secondary metabolites with special reference to Ephedra alkaloids, shikonin, diosgenin and Vinca alkaloids	**APPLIED ZOOLOGY** Extraction and processing of honey from the comb, Utility and economics of production of honey, Honey bees and pollination strategy in agricultural crops

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper I	**MECHANICS** 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.	**Inorganic Chemistry** 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.	**Number theory and Abstract Algebra** Simple groups, Quotient groups. Group homomorphism with its kernel and properties. Isomorphism, Cayle's theorem, automorphism, Fundamental theorem of homomorphism.	**-Diversity of Microbes and Cryptogams (Thallophyta)** Sargassum,Rhodophyceae - Polysiphonia. Fungi : General characters, classification and economic importance;	**Animal Diversity Part-I (Protozoa to Annelida)** Coelenterata: - Habit, habitat, structure, function and life history of Aurelia. Polymorphism in coelenterata, coral reef.
B.Sc. I Paper II	**Electromagnetism** Poisson's and Laplace equation in Cartesian, cylindrical and spherical coordinates (without proof) solution of Laplaces equation in cartesian coordinates, boundary conditions. Rise and decay of current in LR and CR circuits, decay constants	**Organic Chemistry** Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. Cycloalkanes: Nomenclature, methods of preparation, chemical reactions, Baeyer's strain theory and its limitations, ring strains in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.	**Advanced Calculus** 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.	**Diversity of Cryptogams (Bryophyta, Pteridophyta and Paleobotany)** Classifiacation of Pteridophytes Structure and reproduction in Lycopodium, Selaginella	**Genetics and Biotechnology** Multiple allele-ABO, Rh and MN blood groups and their inheritance, polymorphic genes. Gene structure (Recon. muton, cistron) and regulation of gene (lac operon: inducible and repressible system)
B.Sc. I Paper III	**Optics** Diffraction due to N slits with intensity distributions. 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. Fresnel class of diffraction, half period zones, zone plate.	**Physical Chemistry** Liquid Crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell. Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): kinetic, optical and electrical properties; stability of colloids. Protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, emulsifier.	**Vector Calculus and Coordinate Geometry** Hyperbola : Standard equation, parametric co-ordinates, asymptotes, equation referred to asymptotes as axes, conjugate diameters and rectangular hyperbola. Polar Equation : Standard equation, directrix, tangent, normal, polar and asymptotes.	**Cell Biology, Genetics and Plant breeding** Genetic Inheritance : Mendelian laws of segregation and independent assortment Linkage analysis, allelic and non allelic interaction	**Cell Biology, Biochemistry and Microscopy** Genetic code, transcription and translation. Protein synthesis: - Genetic code, transcription, translation, Role of RNA,

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**Thermal and Statistical Physics** Regenerative cooling and cooling by adiabatic expansion and demagnetization, Liquid He, He –I and He-II, super fluidity, quest for absolute zero, Nernst heat theorem.	**Inorganic Chemistry** Chemistry of Lanthanides: Electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.	**REAL ANALYSIS** 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. Definition of limit of a function. Continuity of a function - Cauchy's and Heine's definitions with their equivalence.	**Diversity & Systematics of Seed Plants-Gymnosperms** Morphology of Vegetative and reproductive parts : Anatomy of root, stem, leaf and reproduction and life cycle of cycas, pinus and ephedra	**ANIMAL DIVERSITY (Part-2) Arthropoda to Protochordata** Autotomy and regeneration in Echinoderms. Chordata : Primary chordate characters, invertebrate chordates (Protochordata), concept of invertebrate and nonchordates.
B.Sc. II Paper II	**ELECTRONICS** characteristic curves and their equivalent circuits, Biasing of transistors, 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.	**Organic Chemistry** 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. 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	**DIFFERENTIAL EQUATIONS** Method of variation of parameters, Exact differential equations and certain particular forms of equations. Partial differential equations of first order, Lagrange's solution.	**Diversity & Systematics of Seed Plants-Angiosperms** Major contributions of cytology, phytochemistry and taximetrics to taxonomy	**ENDOCRINOLOGY AND ETHOLOGY** Hormonal control of menstrual cycle, implantation, pregnancy, parturition and lactation. Different types of contraceptives, their composition and effects.
B.Sc. II Paper III	**Relativity and Mathematical Physics** Kinematics of decay products of an unstable particle and reaction thresholds, pair production, inelastic collision of two particles, Compton effect. Electromagnetic field tensor, transformation of four potentials, four currents, electric and magnetic field between two inertial frames of reference.	**Physical Chemistry** 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, CO2 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-H2O) 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.	**MECHANICS** Horizontal and vertical elastic strings Rectilinear motion in a resisting medium.	**Structure Development and Reproduction of Flowering Plants** Leaf : Origin, development arrangement and diversity in size and shape, internal structure in relation to photosynthesis and water loss; adaptation to water stress, senescence and abscission.	**ANIMAL ECOLOGY AND BIOSTATISTICS** estuarine habitat and biota, terrestrial habitat, forest and desert ecosystem and biomes, ecology and human future, growth rate, role of man in modification of natural communities.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**Solid State Physics** Crystal Momentum and Physical Origin of the Effective Mass, Negative Effective Mass and Holes, The distinction between metals, insulators and intrinsic semiconductors. Electrical Conductivity, Drude-Lorentz Theory of Electrical Conductivity.	**Inorganic Chemistry** 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.	**LINEAR ALGEBRA AND COMPLEX ANALYSIS** Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection, Limit	**PLANT PHYSIOLOGY AND BIOCHEMISTRY** pentose phosphate pathway Basics of enzymology : Discovery and nomenclature characteristics of enzymes, concept of enzyme, apo enzyme and cofactors, regulation of enzyme activity, mechanism of action.	**ANIMAL DIVERSITY (PART-III:VERTEBRATES) AND EVOLUTION** 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. 3. Respiratory organs
B.Sc. III Paper II	**Nuclear Physics** Nuclear Fusion: 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	**Organic Chemistry** 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.	**MATHEMATICAL STATISTICS AND LINEAR PROGRAMMING** Discrete and continuous distributions with properties : Bernouli, Binomial, Poisson and Normal.	**ECOLOGY AND PHYTOGEOGRAPHY** Ecosystems : structure, abiotic and biotic components, food chain, food web	**MAMMALIAN PHYSIOLOGY AND IMMUNOLOGY** Muscle and Neural Physiology:. 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.
B.Sc. III Paper III	**Elementary Quantum Mechanics and Spectroscopy** 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).	**Physical Chemistry I** 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. Raman Spectroscopy: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.	**NUMERICAL ANALYSIS AND C-PROGRAMMING** Inter relation between various operators, Forward and backward difference table. Factorials notation. Interpolation with equal and unequal intervals, Central difference interpolation, inverse interpolation	**BIOTECHNOLOGY AND UTILIZATION OF PLANTS** 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.	**DEVELOPMENTAL BIOLOGY** Cleavage and Gastrulation. 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.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. I Paper I	**Mechanics of Particles, Rigid Bodies and Continuous media** System of variable mass, elastic and inelastic collisions, rigid body, degrees of freedom, Euler's theorem. Molecular rotations (as rigid bodies), moment of inertia, di and tri atomic molecules, intrinsic spin, precessional motion, motion of top, gyroscope.	**Inorganic Chemistry** Group 13 - General properties, oxides, hydroxide, halides and hydrides of boron, diborane and higher boranes, borohydrides, borazine, oxyacids of boron, borax and borax bead test. Group 14 - General properties, inert pair effect, halides, oxides, silicates, silicones, graphitic compounds, carbides, cyanides and carbonyls, brief idea of fullerenes.	**ALGEBRA** Groups and defining theorems. Various examples, order of an element and related theorems, Permutation Groups, even and odd permutations, cyclic groups, subgroups, union, intersection of two and finite subgroups	**ALGAE, LICHENS AND BRYOPHYTES** Economic importance of algae. Recent advances in genetics of Chlamydomonas. Lichens: Important features, structure, habitat, importance as colonisers and indicators of environment. Vegetative multiplication and life cycle of Parmelia and Usnea.	**LIFE AND DIVERSITY OF ANIMALS-I (INVERTEBRATES)** General characters and classification of Nematoda (upto classes) Type study: Ascaris Endoparasites in relation to human diseases, parasitic adaptations of trematodes, cestodes, and nematodes.
B.Sc. I Paper II	**Oscillations, waves and Acoustics** Wave velocity, boundary conditions and normal modes, dispersion relations, dispersion waves. Waves in continuous media: Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, dispersion in waves, group velocity and phase velocity Superposition of waves: Linear homogenous equations and the superposition principle, interference in space and energy distribution; beats and combination tones.	**Organic Chemistry** Alkanes : General methods of formation, physical & chemical properties, Mechanism of free-radical substitution in alkanes with reference to halogenation, orientation, reactivity and selectivity. Cycloalkanes - Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitation, ring strain in small rings (cyclopropane and cyclobutane) theory of strainless rings, the case of cyclopropane ring : banana bond. Alkenes, Dienes and Alkynes - Brief introduction of alkenes,their formation with reference to mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides.	**CALCULUS** Rectification. Degree and order of a differential equation. Equations of first order and first degree, Equations in which the variables are separable	**MYCOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY** Salient features of Microbiology of water, soil and food. Bacterial identification through molecular techniques	**CELL BIOLOGY** Chemical nature and structure of various types of RNAs and basic concept of transcription.
B.Sc. I Paper III	**ELECTRICITY AND MAGNETISM** Electrical current: current density and current; non-steady currents and continuity equations. Electrical conductivity, resistivity, conductance and their temperature dependence. Thermo electric current and dark current, non-ohmic circuitry, thermistor. Varying current. Rise and decay of currents in LR and CR circuits, time constant, integrating and differentiating circuits, electrical shielding. Study of a discrete LC transmission line	**Physical Chemistry** Liquid State - Intermolecular forces, structure of liquid (a qualitative description). Liquid Crystals - Difference between liquid crystal, solid and liquid, classification, structure of smetic, nematic and cholestric phases, theory of liquid crystals and its applications, thermography and seven segment cell. Solid State - Definition of space lattice, unit cell, Bravias lattices. Laws of crystallography - (i) Law of constancy of interfacial angles (ii) Law of rationality of indices, Weiss and Miller indices (iii) Law of symmetry.	**GEOMETRY** Plane and straight line: Equation to represent two planes and angle between them, projection on a plane area of a triangle and volume of tetrahedron. Equations of line intersecting two lines, skew lines, shortest distance between two lines	**PALAEOBOTANY, PTERIDOPHYTES AND GYMNOSPERMS** Homospory, heterospory and origin of seed habit.	**DEVELOPMENTAL BIOLOGY** Elementary knowledge of fate of three germ layers. Primary organizer and embryonic induction.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. II Paper I	**Kinetic Theory, Thermodynamics and Statistical Physics** Thermodynamic relationships: Thermodynamic variables; extensive and intensive, Maxwell's general relationships; applications to J-T cooling and adiabatic cooling in a general system, Van der Waals gas, and the Clausius-Clapeyron heat equation. Thermodynamic Potentials: Relation to the thermodynamic variables, Equilibrium of thermodynamic systems, Cooling due to adiabatic demagnetization.	**Inorganic Chemistry** Gravimetric Analysis - Principles, solubility, formation and preparation of precipitation, colloidal properties, ageing and contamination of the precipitates, co-precipitation and post - precipitation.	**ADVANCED CALCULUS** volume and surface of solid of revolution. Jacobians, change of independent variables. Vector Calculus: Direction of derivatives, gradient of scalar functions, irrotational Vectors, definition of gradient	**TAXONOMY AND EMBRYOLOGY OF ANGIOSPERM** Asteraceae, Primulaceae, Solanaceae, Asclepiadaceae	**LIFE AND DIVERSITY OF ANIMALS-II (VERTEBRATES)** Type study- Calotes. Identification of poisonous and non-poisonous snakes, venom, antivenom, medicinal significance of venom. Sphenodon: Characteristics and affinities.
B.Sc. II Paper II	**OPTICS** Fraunhofer diffraction : Diffraction at a slit, a circular aperture and a circular disc, resolution of images ; Rayleigh criterion. Resolving power of a telescope and microscope, out line of phase contrast microscopy. Diffraction grating : Diffraction at N parallel slits, plane diffraction grating, concave grating resolving power of grating and prisms.	**Organic Chemistry** Substituted Acids - Methods of formation and chemical reactions of halo acids, hydroxy acids, malic, tartaric, citric and salicyclic acids. Unsaturated Acids - Acrylic and cinnamic acid. Introduction to acids derivatives - Preparation, properties and uses of acid halides, amides, anhydrides and esters. Interconversion of acid derivatives by nucleophilic acyl substitution. Mechanism of HVZ reaction, Hofmann bromamide reaction and esters hydrolysis.	**DIFFERENTIAL EQUATIONS** Integral surfaces passing through a given curve, orthogonal surfaces, Geometric description of Pp+Qq=R. Non-Linear partial differential equations of order one. Special methods of their solutions applicable to certain standard forms.	**ANATOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND ETHNOBOTANY** Boerhaavia, Mirabilis, Chenopodium Dracaena, Tinospora. Study the economic botany of the following : Cereals : Triticum, Zea	**GENETICS AND BIOTECHNOLOGY** Genetic Engineering : Restriction enzymes, Palindrome sequences, cloning vehicle, C - DNA. Application of genetic engineering
B.Sc. II Paper III	**ELECTRONICS** Feedback amplifiers: Basics of Negative feedback, Merits and demerits of negative feedback and its applications, Voltage series amplifier (Emitter follower) and Current series amplifier (CE amplifier with and without bypass capacitor). Oscillators: Positive feedback, Barkhausen criterion, Phase shift oscillator, Colpitt's and Hartley oscillators, and Crystal oscillator.	**Thermodynamics II** Chemical Equilibrium - Equilibrium constant and free energy, thermodynamic derivation of law of mass action, distribution law and phase rule. Le Chatelier's principle. Nernst's distribution law for solute, principle of extraction of solute from solution and washing of precipitates. Reaction isotherm and reaction isochore - Clapeyron equation and Clausius -Clapeyron equation, applications, partial molar quantities, partial molar volume and its distribution, chemical potential and its physical significance, Gibbs - Duhem equation.	**MECHANICS** Hooke's law and motion of horizontal and vertical strings.	**CYTOGENETICS, PLANT BREEDING, EVOLUTION AND BIOSTATISTICS** Principles of plant breeding. Selection, introduction, clonal propagation, hybridization, mutation breeding.	**APPLIED ZOOLOGY AND MICROBIOLOGY** Concepts of basic microbiology and its significance, theory of spontaneous generation, gram theory of fermentation and disease, work of Louis Pasteur.

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	Physics	Chemistry	Mathematics	Botany	Zoology
B.Sc. III Paper I	**Quantum mechanics and Atomic & .Molecular Physics** Angular momentum and spin Central force ; orbital angular momentum, operators for its cartesian components, commutation relations, mutual as well as with L^2 , operators L^+ and L^- , their interpretation as step operators eigen values of L^2 , half integral values for quantum numbers. Angular momentum operators in spherical polar coordinates ; evaluation of their eigen functions explicitly in terms of the coordinates, their degeneracy .	**Inorganic Chemistry** Volumetric Estimation - Theory of oxidation - reduction titrations. Theory of complexometric titrations. Organometallic Chemistry - Definition, nomenclature and classification of organometallic compounds, Preparation, properties, bonding and applications of alkyl and aryl of Li, Al, Hg, Sn and Ti, a brief account hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.	**REAL ANALYSIS** Series: Convergence and divergence of an Infinite series of real numbers, the necessary and sufficient conditions, various tests of convergence problems and their illustrations with regard to infinite series of positive terms. Series: Alternating series and Leibnitz test, absolute and semi (or conditional) convergence. Riemann Integration: Upper and Lower Darboux sum, Upper and Lower Riemann integrals, Riemann integrability of a bounded function in a closed interval	**ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY** Pollution : air, water, land, noise and their control. Conservation and management of natural resources, endangered plants and their conservation;	**ANIMAL PHYSIOLOGY, BIOCHEMISTRY AND IMMUNOLOGY** dissociation curve of oxyhaemoglobin and control of respiration, chloride shift. Blood: structure and functions of blood cells, ABO blood troups and Rh factor, mechanism of blood clotting.
B.Sc. III Paper II	**ELECTRODYNAMICS, ELECTROMAGNETIC WAVES AND RELATIVITY** Radiation from accelerated charges: Modification (Conceptual only) of Coulomb"s law to include velocity and acceleration dependent terms in E field. Radiation from an oscillating dipole and its polarization. Radial and spherical power of electromagnetic radiation, Radiation pressure equation in free space and medium	**Organic Chemistry** Photo chemistry - Principles: electronic excitation, excited states, modes of dissipation of energy, energy transfer and quantum efficiency, photoreduction and photochemistry of butadienes Organic Synthesis via Enolates - Acidity of alpha hydrogen, alkylation of diethylmalonate and ethylacetoacetate, synthesis of ethyl adetoacetate, Claisen acetoacetate, alkylation of 1,3 - dithianes, alkylation and acylation of enamines.	**ABSTRACT ALGEBRA** Quotient field of an integral domain. Definition and various examples of vector spaces, subspaces and examples, Intersection, sum and direct sum of two subspaces, Linear span, Linear dependence, independence and their basic properties and problems.	**PLANT PHYSIOLOGY AND BIOCHEMISTRY** Isozymes. Respiration - glycolysisKrebs cycle, electron transport system and oxidative phosphorylation, factors affecting respiration.	**ECOLOGY AND BIOSTATISTICS** Air pollution: Source, nature, prevention and control, green house effect, ozone depletion and global warming. Water pollution: Source, nature and abatement.
B.Sc. III Paper III	**SOLID STATE, NUCLEAR AND PARTICLE PHYSICS** Charge transport in semi-conductors: Ionization energy of impurity atoms, carrier concentration in doped semiconductors at high and low temperatures, control of conductivity of semiconductors by impurities and current flow in semi-conductors.	**Physical Chemistry** Electronic Spectrum - Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ, π and n M.O., their energy levels and the respective transitions. Photo chemistry - Interaction of radiation with matter, difference between thermal and photochemical processes, laws of photochemistry, Grotthus - Drapper law. Stark-Einstein law, Jablonski diagrma depicting various processes occuring in the excited state, qualitative description of fluorescene, phosphoresecence, non-radiative process (internal conversion, intersystem crossing)	**(A) DISCRETE MATHEMATICS** - Trees (Elementary Theorems): Rooted trees, Binary tree, spanning tree, minimal spanning tree. Pumping lemma. Finite state machine. Elementary ideas of Equivalent machines, Finite state machine as Recognizers. Analysing Algorithms– Time complexity. **(B) NUMERICAL ANALYSIS AND OPERATIONS RESERCH** - Gauss Quadrature formulae, Estimation of errors in quadrature formula, location of roots by Descarte's method of sign, Newtons theorem on multiple roots, Numerical solution of Algebraic and Transcendental equations, Bisection method, **(C) MATHEMATICAL STATISTICS** - Covariance, Expectation and Variance of linear combination of two variables, Moment generating, cumulant generating & characteristic functions.	**MOLECULAR BIOLOGY AND BIOTECHNOLOGY** Basic tools and techniques of plant tissue culture, maintenance of aseptic conditions,Laminar Air Flow Bench, Autoclave, Growth Chamber, methods of sterilization, culture media and their preparation.	**ETHOLOGY AND EVOLUTION** Origin of life History of evolutionary thought Lamarckism and Neo-Lamarckism Darwinism and Neo-Darwinism

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