

**SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE AND SCIENCE, AKOLA**

**COURSE OUTCOME (CO)[Subjects covered under faculty of Science & Home Science]**

<b>Subject- Botany</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Diversity and applications of microbes and cryptogams</b>	General account on diversity of microbes and cryptogams with respect to their habitats, habits and nutrition & applications to mankind.
		Classification and characters of algae, fungi, bryophytes and pteridophytes and differences and affinities among these plant groups.
		Economic importance of algae & fungi, bacterial, fungal and viral plant diseases and ecological & economic importance of bryophytes.
<b>B. Sc. I, 2S</b>	<b>Gymnosperms, Morphology of Angiosperms and Plant Utilization</b>	Geological time scale, process of fossilization, fossil types, classification gymnosperms, their affinities and economic importance.
		Diversity of plant habitats and habits, characteristic features of different plant parts and their types.
		Types of inflorescence, flowers, flower parts and types of pollination.
		Morphology of fruits, morphology and economic importance of different food plants, fiber yielding plants and oil yielding crop plants
		General account & economic importance of spices, essential oils and other forest produce and pharmacognosy of some medicinal plants.
<b>B. Sc. II, 3S</b>	<b>Angiosperm Systematics, Anatomy and Embryology</b>	Concept and types of biodiversity and biodiversity conservation.
		Origin, nomenclature and classification of Angiospermic plants
		Systematic study of some selected plant groups and their economic importance.
		Tissue types in plants, characteristic features of different plant parts in different plant groups. Primary and secondary growth in plants.
		Microsporogenesis, megasporogenesis, fertilization, types of embryo & endosperms.

<b>B. Sc. II, 4S</b>	<b>Cell Biology, Genetics and Biochemistry</b>	Cell concept and structural and functional details of different cell organelles.
		Chromosomal morphology, types, structural and numerical aberrations, Mendelism and interaction of genes.
		Concept of linkage & crossing over, gene mutations and extra nuclear genomes
		Concept, nomenclature and characteristics of enzymes and structure and functions of carbohydrates.
<b>B. Sc. III, 5 S</b>	<b>Plant Physiology and Ecology</b>	Properties, importance of water, absorption and transport of water, transpiration and mineral uptake.
		Details of photosynthesis and respiration.
		Nitrogen metabolism, growth, senescence and abscission.
		Photoperiodism, vernalization and plant movements.
		Concept of environment, ecological factors, atmosphere, soil formation, soil biota and ecological adaptations in hydrophytes and xerophytes.
<b>B. Sc. III, 6S</b>	<b>Molecular Biology and Biotechnology</b>	Historical account of DNA as genetic material, Structure & properties of DNA, DNA replication, DNA packaging and repetitive, satellite DNA and transposons.
		Concept of Gene, gene expression and endomembrane system.
		Gene regulation in prokaryotes & eukaryotes, protein structure & folding mechanism, protein sorting and targeting.
		Tools and techniques of r-DNA technology, Restriction enzymes, Gene cloning methods and gene amplification.
		Basics of plant tissue culture and tissue culture techniques.
		Applications of biotechnology in agriculture, medicine and industry.
<b>Subject- Botany</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to-)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Cell Biology, Cytology and</b>	Cell, cell types, structure and functions of cell organelles and some advanced techniques

	<b>Genetics</b>	in cell biology.
		Cell cycle, apoptosis, cell-cell interactions, protein sorting pathways and PCD.
		Chromosome organization, specialized chromosome, structural aberrations of chromosome and karyotype analysis.
		Genetics of chloroplast and mitochondria, mutations, transposable genetic elements, physiology and genetics of cancer.
		Genetic code, gene expression and genetics of nitrogen fixation.
	<b>Paper- II: Resource Utilization and Conservation</b>	Concept, origin, values, types and loss of biodiversity, Biodiversity in agriculture, bioprospecting and conservation of biodiversity.
		World's primary centers and secondary centers of origin of crop plants. NWFPs, Green revolution, innovations regarding food security.
		Strategies for biodiversity conservation, protected areas and conservation of wild germplasm, in vitro repositories, role of National institutes.
	<b>Paper- III: Biology and diversity of Algae and Bryophytes</b>	Range of thallus and habit in algae, its classification and reproduction. Phylogenetic considerations of some algal groups.
		Economic importance of algae as biofertilizer, bioindicator and algal fossils.
		Classification and distribution of bryophytes, fossil bryophytes and economic importance.
		Morphology and phylogeny of some bryophytic groups.
	<b>Paper- IV: Plant Development and Reproduction</b>	Unique features of plant development, seed germination, metabolism of nucleic acid, seed dormancy.
		Organization of SAM, types of meristems, wood and leaf development.
		Plant reproduction and genetics behind it.
		Flower structure, pollination, double fertilization, fruit growth dynamism.
		Polyembryony, apomixes, metabolic changes associated with senescence and factors affecting this process.
<b>M. Sc. I, 2S</b>	<b>Paper- V: Cytogenetics and Molecular</b>	Cytogenetics of Polyploids, Breeding of Polyploids, plant breeding, heterosis and

	<b>Biology</b>	inbreeding depression.
		Molecular cytogenetics, Physical mapping of gene, SNP, multigene family evolution.
		Gene expression and regulation in eukaryotes. Genetic recombinations and genetics of yeast.
		Genetic and restriction mapping, molecular markers and techniques of genetic engineering.
		DNA sequencing methods, biostatistics and bioinformatics.
	<b>Paper- VI: Biology and Diversity of Microbes and Fungi</b>	Archibacteria, Eubacteria, Viruses, Phytoplasma; classification, properties, examples and few illustrations with pathogenesis.
		Classification of fungi, detail accounts of some important fungal species at order level, major species with local availability.
		Homothalism & heterothallism, Mycorrhiza, types, structures and applications and fungi as biocontrol agent.
	<b>Paper- VII: Plant Physiology</b>	Principles of thermodynamics, energy sources, enzymology.
		Water absorption and transport and stress biology especially water and salt stress response of plants.
		Photochemistry, photosynthesis and photobiology.
		Respiration, photorespiration and PCD.
		Growth regulators, Flowering process and plant movement.
	<b>Paper- VIII: Plant Metabolism</b>	Carbohydrate properties, metabolism, and importance. Amino acid synthesis, metabolism, protein biosynthesis and modifications.
		Classification, structure, function and metabolism of lipids.
Nitrogen and sulphur fixation, availability and metabolism		
Primary and secondary metabolites and phytochemical techniques.		
<b>M. Sc. II, 3S</b>	<b>Paper- IX: Biology and Diversity of Pteridophytes and Gymnosperms</b>	Geological time scale, Fossilization, origin and concept of telome theory, stellar organization and heterospory and seed habit.

		Classification of pteridophytes and morphology, anatomy, reproduction & evolutionary trends in some pteridophytes.
		Classification, Characters, distribution, economic importance, evolutionary trends in gymnosperms.
		Characters and evolutionary trends in Pteridospermales, pentoxylales, cycadales, cordaitales.
		Account and affinities of Ginkgoales, coniferales, taxaes, Ephedrales.
	<b>Paper -X: Taxonomy of Angiosperms</b>	Phenetic and phylogenetics systems of Angiosperm classification
		Origin of species, ecades, ecotypes, different models.
		Taxonomic hierarchy, concept of species, genus, families and other categories. ICBN
		Evolutionary trends in angiosperms with special reference to some monocot and dicot families.
	<b>Paper- XI: Angiosperm Taxonomy, Phytochemistry and Pharmacognosy-I (Elective)</b>	Basic principles of Phytochemical techniques. Working and applications of related equipments. Study of plant secondary metabolites.
		Aims and concepts of plant taxonomy, typification, ICBN and different theories of evolution.
		Pharmacognostic study of locally available medicinal plants.
	<b>Paper- XII: Angiosperm Taxonomy, Phytochemistry and Pharmacognosy-II (Elective)</b>	Pre-Darwinian and Post- Darwinian theories of plant classification and taxonomic evidences.
		Living fossils of angiosperms. Comparative account of vegetative and floral morphology, inter-relationships; phylogeny and distribution of plant families belonging to different subclasses as per Cronquist's system.
	<b>Paper- XI : Applied Mycology (Elective)</b>	Fungal symbiosis, mycorrhiza, rhizosphere and phyllosphere, AM fungil.
		Medical and Industrial mycology. Industrial and non-industrial fungal metabolites.
		Role of fungi in biodegradation and edible mushrooms.
	<b>Paper- XII : Plant Pathology (Elective)</b>	Principles and Mechanism of Plant diseases.

		Disease management and Forecasting.
		Fungal diseases of cereals and oil seed crops, vegetables and fruits
		Important bacterial and viral diseases of crop plants.
<b>M. Sc. II, 4S</b>	<b>Paper- XIII- Plant Ecology</b>	Basic concept and scope of plant ecology, population dynamics.
		Vegetation development and ecosystem organization
		Functional aspects of ecology and major biomes & terrestrial biodiversity.
	<b>Paper- XIV: Environmental Ecology</b>	Concept and scope of environmental ecology, climate change, green house gases and environmental impact assessment.
		Major types of environmental pollutions and their control measures.
		Different types of conservation strategies and sustainable development.
	<b>Paper- XV : Plant Biotechnology</b>	Basic concept, principles and scope of plant biotechnology.
		Protoplast culture, hybrid, cybrid production, Clonal propagation and production of secondary metabolites.
		Plant transformation methods applied in agriculture and industry and application of plant biotechnology and gene manipulation.
	<b>Paper- XVI: Genetic Engineering</b>	Microbial genetic manipulation, methods of gene cloning, construction of gene libraries,
		Strategies for transgenic development, RE, Vectors and alien gene transfer.
		High throughput technologies, knock out technology and gene therapy.
<b>Subject: Biotechnology</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to-)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Cell Biology and Biomolecules</b>	Cell theory, Pre-cellular evolution, types of cells, cellular diversity, cellular biomolecules to biotechnology.
		Structure, nature and functions of carbohydrate, lipids, nucleic acids and proteins.
		Structure and function of cell organelles, cell transport and fractionation, cytoskeleton, cell division and stem cells.

<b>B. Sc. I, 2S</b>	<b>Paper- II: Biotechnology (Microbiology)</b>	Structure, types of bacteria, microscopic studies, staining techniques & sterilization methods.
		Details of bacterial classification, their nutrition & energy sources, bacteria in extreme environments.
		Microbial photosynthesis, symbiosis and application in agriculture.
		Pathogenic bacteria, mycoplasma, host parasite relationship and defense.
		Basic techniques in microbiology.
<b>B. Sc. II, 3S</b>	<b>Paper- III: Essential Mathematics, Biostatistics, Bioinformatics and Biophysical methods</b>	Essential maths- sets, matrices, limits, functions and differentiation & Integration
		Sampling types and probabilities.
		Measures of central tendencies, test of significance and ANOVA
		Different biophysical methods including radiobiology.
		Laws of thermodynamics in biological systems and introduction to bioinformatics.
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Genetic Engineering and Microbial Biotechnology</b>	Structure of DNA, Replication, DNA damage & Genetic code
		Protein synthesis, processing and regulation of gene expression.
		Gene cloning methods, requirements, gene libraries.
		Applications of microbial biotechnology in agriculture, medicine and industry.
<b>B. Sc. III, 5 S</b>	<b>Paper- V: Animal Biotechnology</b>	Major types of animal tissues, their origin and lineages, structural and specialized proteins, history of animal cell culture.
		Design and set up of animal cell culture labs, required instrumentation, biohazards and ethics of good lab practices.
		Preparation of different animal cell culture media, requirement and maintenance.
		Types of animal cell/ tissue cultures, establishing cell lines.
		Special techniques of animal cell culture and its applications.
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Plant Biotechnology</b>	Understanding different growth and metabolic responses in plants.
		Details of different growth substances and their applications.
		Basics of plant tissue culture, lab design and media preparations.

		In vitro techniques of plant tissue culture.
		Single cell suspension culture and protoplast culture
		Somatic hybridization and different techniques of gene manipulation in plants.
<b>Subject- Chemistry</b>		
Class	Course	Outcome (Students will be able to-)
<b>B. Sc. I, 1S</b>	<b>Paper- I: Periodic Properties and Ionic bonding, s-Block element and p-Block elements, Electron displacements, Reactive intermediate and Aliphatic hydrocarbon, Aromatic hydrocarbons, Thermodynamics, Gaseous state and Phase Rule</b>	Acquire basic knowledge about elements and the periodic table
		Differentiate between covalent radius, ionic radius, Van der Waal's radius
		Explain the concept of lattice energy, solvation and hydration energy.
		Understand how the concept of electronegativity and its variation over the periodic table can be used to rationalize the nature of the bonding in substances
		Explains the formation of ionic bond and covalent bond
		Understand the common themes running through ionic, covalent and metallic descriptions of chemical bonding. EC of various elements in periodic table
		Compare 1 <sup>st</sup> and 2 <sup>nd</sup> group elements. Explain Inert pair effect & diagonal relationship
		Identifies the periodic trends in physical and chemical properties of elements.
		Apply the concept of Inductive effect, electromeric effect, resonance effect and hyperconjugation to explain the stability of organic compounds.
		Differentiate between reactive intermediates like carbocation, carbanion, free radicals.
		Recall method of preparations and chemical reactions of aliphatic hydrocarbon like alkane, alkene
		Write the IUPAC names of aromatic hydrocarbon
		Recognize aromatic, non-aromatic and anti aromatic compounds.
		Classify <i>ortho</i> , <i>meta</i> and <i>para</i> directing groups. Recall laws of thermodynamics and concepts
Write down the statements of laws of thermodynamics		

		Give the concept of Entropy from Carnot cycle and the significance of Gibb's free energy
		Derive the expression for work done during isothermal and adiabatic process
		Solve numerical based on Carnot cycle & entropy
		Differentiate RMS velocity, average velocity & most probable velocities & their relationship. Give explanation of <i>Andrews isotherm</i> of CO <sub>2</sub>
		Apply phase rule to water and sulfur system
<b>B. Sc. I, 2S</b>	<b>Paper- II:</b> <b>Polarization, Covalent bonding, Acids &amp; Bases, P-block elements, Noble gases and Non-aqueous solvent, Alkyl halides, Aryl halides and Alcohols, Phenol, ether and epoxides, Physical properties &amp; Molecular structure, Chemical Kinetics</b>	Understand Fajan's rule and its application. Identify acids & bases
		Classify the type of hybridization of various molecules.
		Apply SHAB Principle.
		Write down the electronic configuration of oxygen, halogen family and noble gases
		Understand the requirement of good solvent. Write the reactions of liquid NH <sub>3</sub>
		Recall the reactions of vinyl chloride & allyl chloride, benzyne mechanism
		Give explanation about the preparation of ethylene glycol, glycerine
		Understand the preparations, reactions and properties of phenol, ether and epoxide
		Discuss the structure and bonding in ether. Find out the polar and non-polar molecules
		Give details of magnetic properties of substances
		Make a distinction between order and molecularity of reactions
		Understand the concept of activation energy, factors affecting rate of reactions.
		Define rate, rate constant, order and molecularity of reaction and derive the integrated rate equations. describe effect of temperature on reaction rate and theories of reaction rates
<b>B. Sc. II, 3S</b>	<b>Paper- III:</b> <b>Covalent Bonding, Metallic Bonding, VSPER Theory, Volumetric Analysis, Gravimetric Analysis , Aldehydes and Ketones, Carboxylic Acids, Optical isomerism . Geometric isomerism &amp; Conformational isomerism, Thermodynamics &amp; Equilibrium Phase Equilibrium, Liquid state &amp;</b>	Understand the concept of molecular orbital theory and able to illustrate MO structure of homonuclear diatomic molecules
		Band theory to explain nature of conductors, insulators and semiconductors
		Know about Free electron theory & VB theory of metals.
		Study the energy level diagram, bond order in some molecules.
		Understand various rules under VSEPR theory

<b>Electrochemistry</b>	Distinguish between VB and MO theories; free electron theory, properties in metals
	Study the band theory to explain the nature of conductors, insulators and semiconductors
	Understand the VSEPR theory and its limitations.
	Distinguish about the geometries of some molecules.
	Understand the volumetric analysis, Study the standard solution
	Know about Acid base titrations, pH variations, indicators used.
	Study the redox titrations & redox indicators, use of I <sub>2</sub> in Iodometry
	Study about the gravimetric analysis, co precipitation and post precipitation.
	Differentiate between volumetric analysis and gravimetric analysis and different types of titrations. Learn the preparation, structures and reactions of aldehydes and ketones.
	Study the mechanism of Cannizzaro's, Reformatsky, Perkin, Mannich, Benzoin and Aldol condensation, reactions
	Study the structure and reactivity of carboxylic acids and their preparations.
	Understand the terms elements of symmetry, chirality, asymmetric carbon atom, enantiomers, diastereoisomers in chemical compounds
	Know about the conformation, configuration and Geometrical isomerism in the compounds and different types of isomerism
	Know about the Cis-trans nomenclature, E-Z nomenclature, Methods of structure determination
	Understand the conformations, stability and projection in some alkanes.
	Understand the concept of different thermodynamic parameters of chemical systems
	Study some partial molal properties
	Learn some immiscible liquids, Nernst distribution law, applications to association, dissociations of solute in solvent
	Learn about the phase transition Clausius –Clayperon Equation
	Learn the surface tension in liquids, effect of temperature on ST and applications

		Learn about the viscosity of liquids, temperature on viscosity and application
		Understand the principle of electrochemistry
		Know about the conductance of electrolytic solutions, conductometric titrations and it's applications
		Determination of transport number by hottor's method and moving boundary methods
<b>B. Sc. II, 4S</b>	<b>Paper- IV:</b> <b>Chemistry of elements of Transition Series &amp; Exaction of elements, Inner transition elements &amp; General properties of Metallurgy, Polynuclear Hydrocarbons &amp; Reactive Methylene Compounds, Aromatic Nitro comounds, Amino compounds, Diazonium salts&amp; Amino acids and Proteins, Colligative properties of dilute solutions, Crystalline state</b>	Know about the elements of transition series of Periodic table
		Learn the general characteristics, properties and complex formation , behavior of transition series.
		Learn the principles, methods of exaction of elements.
		Recognize the properties of inner transition elements.
		Understand principles of metallurgy and its various process
		Understand the properties of inner transition elements.
		Principles of metallurgy and its various process
		Understand the structures ,reaction and mechanisms of aromatic nitro, amino compound , diazonium salts , amino acids and proteins
		Understand the concept of colligative properties of dilute solutions .
		Know about osmotic pressure, lowering of vapour pressure, elevation in the boiling point & depression in freezing point
		Learn the methods to find out the molecular weight of solute
		Learn about the crystallography, various symmetries of solid state molecules.
		Know the X-ray diffraction techniques for determination of crystal structure.
<b>B. Sc. III, 5S</b>	<b>Paper- V:</b> <b>Coordination Compounds and Chelates, Crystal Field Theory (CFT) Electronic Spectra of Transition Metal Complexes, Heterocyclic compounds, Organometallic</b>	Study the nomenclature of co-ordination compounds.
		Understand the different theories and magnetic properties
		Study the chelates in co-ordination chemistry
		Stability of co-ordination compounds in analytical chemistry.
		Understand the magnetism of co-ordination compounds

	<b>compounds, Dyes:, Drugs and Pesticides, Photochemistry, Molecular Spectroscopy</b>	<p>Enlist the factors affecting the magnetism of co-ordination compounds.</p> <p>Study the selection rule in spectrochemical series</p> <p>Study the different inorganic heterocyclic reactions.</p> <p>Differentiate the basicity and orientation of compounds.</p> <p>Understand the synthetic application of organometallic compounds.</p> <p>Study the synthesis, benefits and application of dyes, drugs and pesticides.</p> <p>Study the photochemical reactions and kinetic aspects.</p> <p>Involvement of photochemistry in biological processes.</p> <p>Structural elucidation of energy level diagram.</p> <p>Understand different selection rule and conditions of spectroscopy.</p>
<b>B. Sc. III, 6S</b>	<p align="center"><b>Paper- VI:</b></p> <p><b>Kinetic Aspects of Metal Complexes and Analytical Chemistry, Organometallic Chemistry, Inorganic Polymers, Bio-inorganic Chemistry, Electronic spectroscopy and Infrared spectroscopy, NMR spectroscopy and Mass spectroscopy, Elementary Quantum Mechanics, Electrochemistry and Nuclear Chemistry</b></p>	<p>Thermodynamic and kinetic stability of the complexes and brief idea about the different inorganic reactions.</p> <p>Study the different mechanism and structures of complexes.</p> <p>Study and applications of different analytical techniques.</p> <p>Bonding and synergism of organometallic compounds.</p> <p>Classification of organometallic compounds and silicon polymers and their reactions.</p> <p>Study of bioinorganic chemistry</p> <p>Explain the principle and instrumentation of electronic spectroscopy and analyze the electronic spectra of different species</p> <p>Explain the principle and instrumentation IR spectroscopy and its interpretation.</p> <p>Explain the principle and instrumentation of nuclear magnetic and apply the knowledge in characterizing the molecules and also their use in medical diagnostics</p> <p>Understand the application of spectral data for structural elucidation</p> <p>Determine chemical structure by UV-Vis, IR &amp; <sup>1</sup>HNMR spectral data</p> <p>Hypothesis of different theories of atomic orbital's</p> <p>Introduction of electrochemistry including electrode and titrations.</p>

		Understand the basics of voltaic cells
		Introductions of nuclear models and nuclear reactions
		Applications of radio isotopes in medicines, industries, agriculture and bio-sciences.
		Explain the different kinds of radioactive decay.
		Interpret a radioactive decay series.
<b>Subject: Chemistry</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Inorganic Chemistry-I prediction of shapes of molecules</b>	Understand the molecule on the basis of MOT and application of CFT
		Understand the structure and bonding in boron hydrides and metal clusters
		Understand the basic concept about e.g. spin magnetic moment, crystal field stabilization energy related to weak and strong field, limitation of theory.
		Learn Synthesis and application of macrocyclic complexes
		Understand the behaviour and role of non-aqueous solvent in chemical reaction
		Learn complex equilibria and their physical parameters
		Understand the symmetry of molecules and group theory
		Find out point group of element and construction of character table
	<b>Paper- II: Organic chemistry-I</b>	Understand and interpret the nature and bonding in organic molecules
		Learn the stereochemistry of organic molecules
		Understand the concept of isomers
		Learn about the stereoselectivity in organic molecules and asymmetric synthesis
		Learn the structure, reactivity, types and methods of determining reaction mechanism
		Understand the nucleophilic substitution and elimination reaction in aliphatic and aromatic compounds ie. SN1, SN2, E1, E2, E1CB, SNi, SET, SNAr,
		Understand the Electrophilic substitution reaction in aromatic compounds-Name reactions and their stereochemistry

	<p><b>Paper- III: Physical chemistry-I</b></p>	<p>Understand the quantum chemistry in that Schrödinger equation in 1D-BOX,3D-BOX, Harmonic oscillator, rigid rotator, variation theorem and applications</p> <p>Understand the classical thermodynamics, Partial Molar properties, significance, concept of fugacity, Debye Huckel theory, activity coefficient</p> <p>Know the thermodynamic criteria for non-equilibrium states, microscopic reversibility , Onsagers reciprocity relation and solve the numerical.</p> <p>Learn the Nuclear chemistry, radioactive decay, <math>\alpha</math>-particle energy spectrum, Geiger Nutta low, theory of band g process</p> <p>Understand the nuclear reactor, fission energy processes, nuclear waste management</p> <p>Understand the theories of reaction rates in chemical dynamics, collision theory, transition state theory and their assumptions</p> <p>Learn the unimolecular reactions, solvent effect on reaction rate and factors affecting on rate of reactions, numerical based on these concept</p>
<p><b>M. Sc. I, 1S</b></p>	<p><b>Paper- IV: Modern methods of separation</b></p>	<p>learn the role of analytical chemistry, qualitative analysis, quantitative analysis, classification of analytical methods, instrumental analysis</p> <p>Learn the application and types of titrations for quantitative analysis of the samples</p> <p>Understand the purification and separation techniques for solids and liquid organic compounds</p> <p>Learn the good laboratory practices, their introduction and principal of GLP</p> <p>Learn the principals and methods of sampling, stoichiometric calculations based on gravimetry and titrimetry.</p> <p>Emphasis on numerical problems based on statistical analysis, collection of dada, errors, accuracy and precession, tests for rejection of data, regression analysis etc</p> <p>Understand the separation techniques- ion exchange separation, solvent extraction, numerical</p> <p>Understand the Gas Chromatography, HPLC,GC-MC,LC-MC applications and problems</p>

		Learn the chemical safety and handling of chemicals, explosives, chemical weapons.
<b>M. Sc. I, 2S</b>	<b>Paper- V: Co-ordination Chemistry</b>	Understand the electronic spectra of transition metal complexes
		Learn the fundamentals of molecular magnetism, paramagnetic, diamagnetic, high spin, low spin, magnetic moment, angular momentum, magnetic properties of polynuclear complexes
		Know the reaction mechanism of transition metal complexes, classification, reactivity, inert and labile complexes according to VBT and CFT
		Learn the molecular rearrangement of complexes, ligand stereospecificity
		Learn the substitution reaction in square planer complexes, cis-trans effect, electron transfer reactions, photochemical reactions of chromium and ruthenium complexes.
		Understand the Metal pi-complexes in metal carbonyls and Metal Nitrosyl, structural elucidation by IR, <sup>13</sup> C-NMR spectra, vibrational spectra, Reactions.
		Learn the Metal clusters, EAN, application of Wilkinson's catalyst and Vaska's compound.
		Understand the fluxional behaviour in organometallic compounds, dynamic equilibria in compounds.
		Learn bioinorganic chemistry of Fe, Co and their biological role, structure, coordination geometry, ion transportation, mechanism of action, Bohr effect.
<b>M. Sc. II, 2S</b>	<b>Paper- VI: Organic chemistry-II</b>	Learn the mechanism and stereochemical aspects of addition reaction to C-C & C-X multiple bond.
		Know the mechanism of molecular rearrangement to electron rich carbon, electron deficient carbon, electron deficient nitrogen.
		Learn the types of free radical reactions of aromatic and aliphatic substrate their reactivity, some name reaction related to this.
		Understand the photochemical reactions, types of excitation, Norrish type-I, Norrish type-II, Paterno-Buchi, photoreduction, photochemistry of enone, parabenzoquinone, aromatic

		compounds, rearrangements, solar photovoltaic cell.
		Learn the pericyclic reactions, their molecular orbital symmetry, FMO approach, Types of pericyclic reactions.
		Design how to synthesize material and safer chemical in a green way.
		Know the microwave induced green synthesis reactions.
	<b>Paper- VII: Physical chemistry-II</b>	Learn Kinetics of complex reactions and fast reactions in Chemical dynamics.
		Understand the construction of MO by LCAO for $H_2^+$ , energy level, characteristics, Hybrid orbital formation of $sp, sp^2, sp^3$ compounds, solve numerical
		Understand the concept of Macromolecules, their types, configurational, confirmation in polymer, stability, applications.
		Determine number average & mass average molecular mass by physical parameter
		Learn the electrochemistry of solutions, bio electrochemistry, the rate of charge transfer, types of corrosion, prevention techniques, and solve the numerical
		Understand the concept, application of thermodynamic probability, Maxwell-Boltzmann distribution law, Bose-Einstein statistics in statistical thermodynamics.
		Understand the concept, application and numerical of partition function.
	<b>Paper- VIII: Optical Methods and Environmental chemistry</b>	Understand the Theory, Principle, Methods, Application & Problems of Spectrophotometry and Colorimetry, Fluorimetry, Nephelometry, turbidimetry, Polarimetry & Refractometry. Qualitative and Quantitative analysis
		Understand principal, instrumentation, experimental techniques flame emission and atomic spectrometry.
		Know the water pollution, types, effect, techniques of analysis, BOD, COD their significance
		Brief idea on coagulation and flocculation.
		Understand the sources, classification, effect, analysis, monitoring of Air pollution.
		Learn the chemistry of soil, types of soil pollution, pesticides and pollution, techniques of

		analysis.
		Know the Classification, Effects, Radioactivity, Protection and control from radiation pollution.
<b>M. Sc. II, 3S</b>	<b>Paper- IX: Spectroscopy-I</b>	Get advanced knowledge about the interactions of electromagnetic radiation and matter and their applications in spectroscopy
		Apply formalisms based on molecular symmetry to predict spectroscopic properties
		Analyse and interpret spectroscopic data collected by the methods discussed in the course
		Solve problems related to the structure, purity and concentration of chemicals and to study molecular interactions by choosing suitable spectroscopic methods and interpreting corresponding data
		Interpret UV-visible spectroscopy and its basic principle and applications in terms of organic compounds
		Interpret IR spectroscopy and its basic principle and applications in terms of functional group analysis
		Understand NMR spectroscopy and its basic principle and applications in terms of structural analysis
		Interpret elemental analysis by using mass spectrometry.
		Combine information from the techniques in determination of molecular structures in organic chemistry.
		<b>M. Sc. II, 3S</b>
Understand theory, instrumentation, applications, advantages and disadvantages of high frequency titrations, electrogravimetry and coulometry		
Learn about principle, types and uses of chemical sensors, biochemical sensors, biosensors and ion selective electrode		
Understand different electroanalytical techniques like polarography, voltammetry,		

		chronopotentiometry and amperometric titrations
		Understand concept of bio-analytical chemistry along with applications of spectrophotometry, spectrofluorimetry, ultracentrifugation, gel electrophoresis and toxicology.
	<b>Paper- XI: Special Paper-I Organic Synthesis-I</b>	Know and recall the fundamental principles of organic chemistry that includes chemical bonding, stereochemistry, reaction mechanism and stereochemistry.
		Synthesize organic compounds itself involves large part of synthetic reagents
		Recognize the basic practical skills for the synthesis and analysis of organic compounds
		Learn about functional group addition & functional group elimination.
		Predict the reactivity of an organic compound from its structure.
		Justify a reasonable mechanism for a chemical reaction.
		Develop basic skills for the multi-step synthesis of organic compounds.
		Illustrate chemical structures stereochemistry and mechanism of modern named reactions
		Apply synthesis methodology to perform advanced organic synthesis.
		Explain basic chemo-, regio-, and stereoselective concepts and apply these in synthesis, as well as construct reactions pathways of complex organic compounds using retro synthetic analysis
		Understand about organic-chemical reactions with a focus on principles for effective synthesis strategies, stereo selectivity, catalysis, as well as metal organic chemistry
		Understand research-based in-depth understanding in the field of design and production (synthesis) of complex molecules
	<b>Paper- XII: Special Paper-II (Natural Products)</b>	Investigate types as well as general methods of structure and ring size determination of different sugars. Study types as well as structures and function of various lipids
Know structures, stereochemistry, synthesis and reactions of amino acids, proteins and peptides		
Understand mechanism of action, orientation, steric effect and reactions of enzymes		

		Study classification, nomenclature, occurrence, isolation and general methods of structure determination of alkaloids and terpenoids
		Learn occurrence, nomenclature, structure, stereochemistry, synthesis and reactions of steroids and hormones
		Know occurrence, classification, biogenesis, physiological effects and synthesis of prostaglandins, pyrethroids, rotenones and pheromones
		Study structure, synthesis, and chemistry of Vitamins and Natural Pigments
<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Spectroscopy-II</b>	Explain the principle and instrumentation of Raman spectroscopy and interpret vibration-rotation Raman spectra for chemical analysis
		Explain the principle of Photoelectron spectroscopy
		Understand basic principle of X-ray diffraction , Electron diffraction and Neutron diffraction
		Explain the principle and instrumentation of electron spin resonance spectroscopy and apply the knowledge in characterizing the molecules
		Explain the principle, instrumentation, and application of Mossbauer spectroscopy to study bonding in iron derived complexes.
		Determination of Structures of Complex Organic Molecules by Spectroscopic Means: Problems based on IR, Mass, UV, PMR, $^1\text{H}$ NMR, $^{13}\text{C}$ NMR data and structure determination of organic molecules / inorganic compounds
	<b>Paper- XIV: General Analytical Chemistry</b>	Understand principle, working and applications of various radiation detector along with neutron activation analysis, isotopic dilution analysis and radiometric titrations
		Understand theory, instrumentation and applications of molecular photo fluorescence and phosphorescence spectrometry
		Understand basic principle, instrumentation and applications of X-Ray Fluorescence, Inductively Coupled Plasma Atomic Emission Spectroscopy and flow injection analysis
		Learn about chemical analysis of food and cosmetics including face powder, deodorants

		and antiperspirants
		Understand classification, characterization and estimation of poisons and fuels.
	<p><b>Paper- XV: Special Paper-III Organic Chemistry-III</b></p>	Familiarize the organometallic reagents and its applications in organic synthesis. Learn about the Catalysis, hydrogenation of olefins and oxoprocess, Wilkinson catalyst etc. Learn about organometallic compounds and Alkyls and Arene complexes
		Understand the bonding in olefin, acetylene and allyl systems. Concepts of synthesis, structure and bonding in metallocenes
		explain and rationalize the synthesis, structure, bonding, properties and reactivity of both main group and transition metal organyls rationalize industrially important catalytic processes through the application of organometallic principles
		Learn about transformations for C-X and C-C bond-formation, functional group reactivity, chemoselectivity, regioselectivity, and the strategy of multistep synthesis will be the core topics that are covered
		Learn about concepts include strategy/retrosynthesis, advanced aromatic chemistry, protecting groups, stereochemistry, enolates and other carbonyl chemistry, alkene synthesis, reduction/oxidation (introductory), heterocycles, cross-coupling reactions and other modern methods of synthesis
		Identify, analyse and evaluate synthetic routes to target molecules using retrosynthesis Describe the recent increase in the structural complexity of drug molecules.
		Describe and apply stereochemical concepts such as chirality, stereoisomerism, and stereoselectivity in relation to chemical transformations and apply organometallic reagents and reactions in organic synthesis
		Plan and design experimental setups for various types of laboratory tests, perform transformations of importance for organic synthesis.
		Understand the functional group protection and know the protection of important

		functional groups.
		Learn about heterocyclic compounds are very interesting due to their distinct structure and the availability of this kind of heterocyclic structures in medicinal drugs.
		Learn about technique of synthesis of heterocyclic compounds is important in the synthesis of different drugs
		Gives the quantitative ideas about the synthesis, properties and uses of such heterocyclic compounds like pyrrole, pyridine, quinoline, thiophene, furan etc
		Understand detailed chemistry of Pyrrole, imidazole, oxazole, thiazole, thiazine, diazines, triazines, pyrimidines, pyrazines and zepines, oxepines, Indoles, Benzofurans, Quinolines, Flavones, Chromones, Coumarines, Phenothiazines, Azetidines and its importance.
	<b>Paper- XVI: Special Paper-IV: Applied and Medicinal Chemistry</b>	Learn the different terms, nomenclature, classification, synthesis, mechanism and assay of drugs
		Understand classification of drugs and also procedures, types, various theories as well as concepts of drug designing
		Learn classification of different drugs on the basis of applications and also their synthesis, mode of actions, pharmacokinetics, pharmacodynamics data and secondary metabolism
<b>Subject: Microbiology</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>B. Sc. I, 1S</b>	<b>Fundamentals of Microbiology and Microbial Physiology</b>	Get an idea about the historical events in microbiology, Understand the diversity in microbiology and its scope.
		Know parts of microscope, type and its principle. Understand Principle, working, ray diagram and application of advance microscopes. Also, familiar with various instruments
		Get the theoretical concepts of related stain, Understand different staining techniques.
		Understand the taxonomic classification of microorganisms. Know prokaryotes and

		eukaryotes.
		Understand nutritional requirements of bacterial, Cultivate bacteria with different cultivation technique.
		Acquainted with various sterilization techniques, Understand concepts of growth and reproduction of bacteria and their control. fermentation process.
		Various techniques to estimate size of microbes,
		Understand concepts of Preparation of Media
		Get aware about cultivation & Demonstration of Yeast, Mold, Algae, Protozoa
		Acquainted with various Pure culture Isolation techniques
<b>B. Sc. I, 2S</b>	<b>Microbiology, Biochemistry, Biostatistics &amp; Computers</b>	Characters and significance of virus, different cultivation technique & Classification.
		Acquainted with various sterilization techniques and how to control them.
		Bioremediation and biodegradation of xenobiotic compound, Antibiotics and synthetic antimicrobial agents
		Regulations aspects in pharma industry, Production of biopharmaceuticals. drug design
		Structure and properties of Biomolecules, Transport and energy metabolism
		Metabolism of carbohydrates, lipids, amino acid, nucleotide.
		Metabolic pathways and Bioenergetics, basic biostatistics, bioinformatics.
		Biological databases for protein and nucleic acid
		Multivariate analysis in biostatistics
		Get to know Components of Computer System, Computer operation, E- mail
		Understand concept of genes and chromosomes.
		Demostration of Antibiotic Resistance & Sensitivity pattern
		Aware about the Computer Technology
<b>B. Sc. II, 3S</b>	<b>Molecular Biology and Genetic Engineering</b>	Concept of central dogma of molecular biology, Basic concept of molecular biology
		Process of DNA replication transcription, translation, Virus genome replication
		Concept of gene regulation, Gene regulations in bacteria, Genome organization

		DNA damage and repair, Develop fundamental knowledge about mutation & its types
		Various method used for genetic recombination, rDNA technology
		Concept of microbial genome, Viral genetics
		Gene library and gene mapping, Gene Cloning, DNA amplification using PCR technique
		Isolation of plasmid and fungal DNA, Protein and DNA separation techniques
		applied Aspect of Genetic Engineering in various Field including Agriculture, Environment, Health care & Industrial Biotechnology
<b>B. Sc. II, 4S</b>	<b>Medical Microbiology</b>	Understand the concept of Infection, its Types.
		Understand basics of immunology, cells and organs related to immune system
		Different modes of transmission of the diseases
		Concept of Communicable Diseases & their preventive measures
		Immune response and mechanism, Immunological disorders, Immunodeficiency
		Various antigen antibody reaction, Concepts of transplantation, tumor immunology,
		Immune system and immune response, Immuno-diffusion techniques
		Immune response to infections and diseases,
		Concept of Serological reactions, Antigen Antibody reaction
		Various viral disease, bacterial, protozoal diseases, their causative agent, mode of infection, epidemiology, treatment, lab diagnosis, prophylaxis
		Perform MIC of antibiotics, ELISA, Antibiotics sensitivity and resistance test etc.
		Role of international organizations such as CDC and WHO
<b>B. Sc. III, 5S</b>	<b>Environmental Microbiology and Bioinstrumentation</b>	Understand the effect of various environmental factors.
		Get an idea regarding microbes and their relation with environment
		Understand symbiotic interaction. Various plant pathogens and disease
		Check portability of water, microflora of air. Concepts related to Plant pathology
		Soil microbiology and xenobiotics. Microbial waste treatment methods.
		Tests in waste water treatment, Bacteriological analysis of water and waste water

		Principles of biophysical chemistry. Methods of separation techniques
		Perform the basic techniques related to screening, isolation and cultivation of microorganisms from various sources
		Classify the microbes to certain extent. Enumeration of soil microorganism
		Separation of molecules by paper chromatography
<b>B. Sc. III, 6S</b>	<b>Industrial Fermentation, Food Microbiology and Metabolism</b>	Industrial sterilization, Strain improvement , Scale up of production
		Bioreactors, Design and application of bioreactor in fermentation industries
		Industrial production, fermentation condition, recovery , uses, mechanism of beer, wine, ethanol, acetone, vinegar
		Industrial production,of bakers yeast, SCP, antibiotics, enzymes, vitamins
		Basic Enzymology, Concept of EMP, TCA,ETC
		Microbial technique used in milk industry & food industries, Microbial food poisoning
		Concepts related to geo-microbiology and nanotechnology
		Understand microorganisms and their relationship with the environment,
		Produce and analyze the microbial products at laboratory level
		Microbiological examination of milk, demonstration of microbes in curd
		Lab scale production of citric acid and amylase.

**Subject: Microbiology**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>M. Sc. I, 1S</b>	<b>Microbiology Instrumentation, Microbial enzymology, Microbial Physiology &amp; Environmental microbiology</b>	Principles of biophysical chemistry, separation techniques , Radio-labeling techniques, electron microscopy
		Basic Enzymology, Enzyme kinetics and inhibitions, Catalytic mechanisms and regulation,
		Industrial applications of enzymes and extremozymes.
		Concept of bioenergetics, Anabolism and catabolism with examples, thermodynamics

		Bacterial photosynthesis
		Method of sampling, investigation and examination of food.
		Different techniques used to treat waste water
		Bioremediation and biodegradation of xenobiotics, biomarkers and bioreporters
		Microbial ecology and microbial interaction
		Study of antagonism in microorganism from soil.
		Isolation, Identification, Enumeration of Nitrogen fixing
		microorganism from soil, rhizosphere, phylosphere and root nodule.
		Preparation of biofertilizer/Biopesticides, enumeration of titer inoculum
		Application of bioinoculant through seed, seedling and soil test under pot condition.
		Paper chromatography of amino acids, sugars.purine and pyrimidine bases
		Separation of proteins by paper electrophoresis. gel electrophoresis.
		Separation of pigments by adsorption chromatography, Thin layer chromatography
		Estimation of DNA,RNA
<b>M. Sc. I, 2S</b>	<b>Paper- V: Biostatistics, Bioinformatics and Computer Applications,</b>	Different computational methods used in basic biostatistics
		Software used in the bioinformatics, Biological databases for protein and nucleic acid
	<b>Paper- VI: Enzyme Technology,</b>	Multivariate analysis in biostatistics.
		Qualitative and quantitative enzyme assay, Effect of environmental factors on enzyme
	<b>Paper- VII: Microbial Metabolism,</b>	Enzyme kinetics and immobilization, Purification of enzymes
		Structure and properties of Biomolecules, Transport and energy metabolism, Metabolism of carbohydrates, lipids, amino acid, nucleotide. Metabolic pathways and Bioenergetics
	<b>Paper- VIII: Environmental Microbiology and Extremophiles</b>	To do sampling, investigation and examination of food
		Enumeration of coliform and faecal <i>Streptococci</i> by MF/MPN technique.
		Examination and estimation of water for: a) Ammonical nitrogen b) nitrate c) nitrite d) dissolved oxygene) chlorides f) sulphates
		Assay of different microbial enzymes. Effect of different parameters on enzymes activity

		Immobilization of enzymes. Effect of inhibitors on enzyme activity.
<b>M. Sc. II, 3S</b>	<b>Paper- IX : Molecular Biology</b>	Genome organization and vocabulary
		Virus genome replication
		DNA damage and repair
		Gene regulations in bacteria, virus and eukaryotes
	<b>Paper- X: Virology</b>	Historical aspects, General properties of Viruses
		Virus-host Interaction: Epidemiology, pathogenesis, Host response to virus Infections,
		Laboratory Diagnosis of Viral Infections:
		Structure, Pathogenesis, Laboratory Diagnosis & immunology of various DNA and RNA viruses, Interferons and Antiviral Agents
	<b>Paper- XI: Fermentation Technology</b>	Principals in upstream process in fermentation industries.
		Design and application of bioreactor
		Downstream processing and recovery
		Production of few microbial products
	<b>Paper- XII: Immunology</b>	Immune system and immune response
		Detail procedure of hyper immune response
		Immune response to infections and diseases
		Histochemical and immune techniques
<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Biotechnology</b>	Approaches used in agriculture to control disease in plant
		Tools of molecular biology for rDNA technology, Methods in r DNA technology
		Concept of microbial genome
		Protein engineering and proteomics, DNA fingerprinting, GFP marker
	<b>Paper- XIV :Clinical Virology</b>	Plant Viruses
		Bacterial Viruses
		Oncogenic Viruses
		Retro viruses,

		Viroids and Prions
	<b>Paper- XV: Microbial Technology</b>	Modern trends in Microbial Productions
		Enzyme biotechnology
		Fuel Biotechnology
		Biofertilizers and Biopesticides
	<b>Paper- XVI: Medical Microbiology</b>	Various concepts of medical microbiology : Role of international organizations such as CDC and WHO
		Various viral disease, bacterial disease, fungal disease, protozoal disease their causative agent, mode of infection, epidemiology, treatment, lab diagnosis, prophylaxis
		Various clinical syndromes.
<b>Subject: Mathematics</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Algebra, Trigonometry, Differential and Integral Calculus</b>	Understand about the Root of complex number, Circular and Hyperbolic function, Trigonometric series, Elements of Quaternion, Cubic and biquadratic equations, Cayley-Hamilton theorem and its application in matrices.
		Understand about the Limit, Continuity and, Differentiability, Leibnitz theorem, L'Hospital rule, Rolle's theorem, Lagrange's and Cauchy's mean value theorem, Partial derivatives, Euler's theorem, Different formulae for Integration, Walli's formula.
<b>B. Sc. I, 2S</b>	<b>Differential Equations (Ordinary and Partial), Vector Analysis and Solid Geometry</b>	Understand about the Linear and Exact differential equations, Clairaut's form, Second order DE, Homogeneous Linear Ordinary DE, Ordinary simultaneous DE, Formation of DEs, Lagrange's method, Compatible DE, Charpit's general method.
		Understand about the Vector product, Differentiation and Integration of vectors, Space curve t, n, b vectors, Frenet- Serret formulae, Gradient, divergence and curl, Work done, Greens theorem, Sphere, Orthogonal sphere, Cone and Cylinder.
<b>B. Sc. II, 3S</b>	<b>Advanced Calculus and Elementary</b>	Understand about the Sequence, Cauchy sequence, Convergence of series, test for series,

	<b>Number Theory</b>	<p>Limit and Continuity of function of two variables, Taylor's theorem, Maxima and minima, Jacobians, Double and triple integrals, Gauss and Stoke's theorem.</p> <p>Understand about the Divisibility, gcd and lcm, Prime number, Fermat number, congruence, Chinese remainder theorem, Arithmetic functions, Euler's theorem, Primitive roots for prime.</p>
<b>B. Sc. II, 4S</b>	<b>Modern Algebra: groups and rings and Classical Mechanics</b>	<p>Understand about the group, subgroup, cyclic group, permutation, Normal subgroup, quotient group, Homomorphism and Isomorphism, kernel of homo. Natural homo, Ring, sub-ring, integral domain, field, subfield, Ideal, prime, maximal, principle ideal, quotient ring.</p> <p>Understand about the Constraints, D'Alembert's principle, Lagrange's equations of motion, Central force motion, Virial theorem, Kepler's laws of motion, Brachistochrone problem, Euler-Poisson and Euler-Ostrogradsky equation, Hamilton's principle, least action principle. Rigid body, Euler's theorem.</p>
<b>B. Sc. III, 5S</b>	<b>Mathematical Analysis and Mathematical Methods</b>	<p>Understand about the Riemann Integral, Improper integrals, Beta and Gamma functions, Analytic function, Cauchy-Riemann equation, Milne-Thomson method, Elementary function, Mobius transformation. Metric spaces, Cauchy sequences.</p> <p>Understand about the Legendre's equation, recurrence formulae, Rodrigue formula, Bessel's equation, Strun-Liouville boundary value problem, Fourier series, Laplace transforms of derivatives and integrals, Finite and infinite Fourier sine and cosine transform its applications.</p>
<b>B. Sc. III, 6S</b>	<b>Linear Algebra and Graph Theory</b>	<p>Understand about the Vector Space, subspace, linear span, basis and dimension, Linear transformation, its representation as matrices, rank nullity theorem, Dual Spaces, bidual space, Eigen values and eigen vector of a linear transformation, Inner Product spaces, Cauchy-Schwarz inequality, Bessel's inequality, Modules, submodules, quotient modules.</p> <p>Understand about the Graph, different definitions, isomorphism, Euler graph, Hamiltonian paths, Trees, centres in a tree, Rooted and binary trees, spanning trees, Cutsets,</p>

		Fundamental circuits and cutsets, planar graph, Vector space associated with a graph, circuit and cutset subspaces, Incidence, circuit, cutset, path, adjacency matrices.
<b>Subject: Mathematics</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Real Analysis</b>	Understand Riemann Stieltjes Integral and its properties. Learn Sequence and its properties. Know Rearrangement of Series and its properties. Understand Functions of Several variables and Differentiation. Learn Inverse function theorem and Implicit function theorem.
	<b>Paper- II: Advanced Abstract Algebra</b>	Understand Normal Subgroups, Automorphism. Learn Permutation groups and Sylow theorem. Learn Ideals and its properties. Learn Unique factorization domain and its properties. Know Modules and its properties.
	<b>Paper- III: Complex Analysis</b>	Learn Complex Integration and Fundamental theorem of Algebra. Understand Taylor's theorem , Open mapping theorem and Cauchy Goursat theorem. Learn Singularities and its types. Learn Residue and its properties. Learn Analytic continuation.
	<b>Paper- IV Topology – I</b>	Learn Cardinal and Ordinal numbers. Understand Topological Spaces. Learn Connectedness and Compactness. Learn Separation and Countability Axioms. Understand Separation and Countability Axioms contd.
	<b>Paper- V: Differential Geometry</b>	Understand Local intrinsic properties of surfaces. Know Families of curves. Learn Geodesics curvature and its properties. Learn Tensor calculus and tensor product of vector spaces. Explain Differential Manifolds and its properties.

M. Sc. I, 2S	<b>Paper- VI: Measure &amp; Integral Theory</b>	<p>Understand Lebesgue outer measure and measurable functions.</p> <p>Understand Integration of non negative function and Lebesgue Integral.</p> <p>Understand The Four derivatives and Lebesgue differentiation.</p> <p>Understand Measures and outer measures and extension of measures.</p> <p>Understand uniqueness of extension and its properties and inequalities.</p>
	<b>Paper- VII: Advanced Linear Algebra and Field Theory</b>	<p>Learn Canonical forms, Eigen values and Eigen Vectors</p> <p>Learn Quadratic forms and normal form of real quadratic form.</p> <p>Understand Algebraic extension of fields.</p> <p>Understand Normal and separable extension and its properties</p> <p>Learn Galois theory and applications.</p>
	<b>Paper- VIII: Integral Equation</b>	<p>Understand Definition of Integral equation and its types.</p> <p>Learn Eigen Values and Eigen function, Iterated Kernels, resolvent kernels</p> <p>Learn Neumann Series and method of successive approximation of solving Volterra integral equation. Understand Applications of Integral equations and Greens function.</p>
	<b>Paper- IX: Topology – II</b>	<p>Understand Metric spaces as topological spaces. Complete metric spaces.</p> <p>Understand Product spaces. Understand Functions and Quotient spaces.</p> <p>Understand Metrization and pracomactness.</p>
	<b>Paper- X: Riemannian Geometry</b>	<p>Understand Riemannian metric, Christoffel symbol and its properties.</p> <p>Understand Parallel vector fields and Geodesic, Curvature tensor and its properties.</p> <p>Understand Ricci tensor and Einstein tensor and its properties.</p> <p>Understand Riemannian curvature and space of constant curvature.</p>
M. Sc. II, 3S	<b>Paper- XI: Functional Analysis – I</b>	<p>Differentiate Normed linear spaces and Banach Spaces.</p> <p>Learn Basic properties of finite dimensional normed linear spaces and compactness.</p> <p>Understand Boundedness theorem and Hahn Banach theorem.</p> <p>Learn Reflexive spaces and solvability of linear equations in Banach spaces.</p> <p>Understand Inner product spaces and Hilbert spaces.</p>

	<p><b>Paper- XII: Advanced Mechanics</b></p>	<p>Understand Variation principle and Lagranges equations.  Understand)Generalized coordinates, Halonomic and non Holonomic system.  Learn Legendre transformations and the Hamiltonian equations of motions.  Learn Canonical transformations and its examples.  Understand the Hamiltonian Jacobi equation for Hamilton’s principle function.</p>
	<p><b>Paper- XIII: Operational Research</b></p>	<p>Understand Operation research and its scope.  Learn Integer programming. Learn Parametric linear programming.  Learn Queing systems and basic properties.  Understand Game and strategies and its properties.</p>
	<p><b>Paper- XIV: Fluid Mechanics</b></p>	<p>Learn Kinematics of Fluid in motion.  Know Pressure of motion of fluidLearn Sources sinks and doublets and its properties.  Understand the Milne Thomson circle theorem and its applications.  Understand Elements of thermodynamics.</p>
	<p><b>Paper- XV: General Relativity</b></p>	<p>Understand Einstein Relativity.  Understand Schwarzschild exterior solution and its isotropic form.  Understand Schwarzschild interior solution.  Understand Gravitational collapse of spherical body and Black hole.  Understand Gravitational waves and its properties.</p>
<p><b>M. Sc. II, 4S</b></p>	<p><b>Paper- XVI: Functional Analysis –II</b></p>	<p>Understand Riesz representation theorem and reflexivity of Hilbert spaces.  Learn Spectral properties of bounded linear operators and Compact linear operator  Learn Spectral properties of bounded self adjoint linear operators.  Learn Positive operators and spectral family.</p>
	<p><b>Paper- XVII: Partial Differential Equation</b></p>	<p>Learn Curve and surfaces,genesis of first order PDE. Quasi linear equations  Know One dimensional wave equation and its properties.  Understand Laplace equation and its types  Understand Heat conduction problem and Kelvin inversion theorem.</p>

	<b>Paper- XVIII: Numerical Analysis</b>	Understand Solution of Algebraic and transcendental equations. Learn Finite differences and its properties. Learn Numerical differentiation and Integration. Understand Solution of system of linear equation. Understand Numerical solution of Ordinary Differential Equation.
	<b>Paper- XIX: Fluid Dynamics- II</b>	Understand Gas dynamics. Learn Viscous Flow. Learn the Navier Stokes equations of motion of viscous fluid Understand Magnetohydrodynamics. Understand Dynamical similarities and its properties.
	<b>Paper- XX: Relativistic Cosmology</b>	Understand Einstein field equation with cosmological term. Understand Cosmological principle. Understand Motion of particle and light rays in R-W model. Understand Fundamental equation of dynamical cosmology and Gravitational lensing.

**Subject: Physics**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Mechanics, Properties of Matter, Waves and Oscillation</b>	The first semester is design and developed to understand various laws physics. Mechanics plays important role to understand basic laws of Kepler's laws of planetary motion, Newton's law of gravitation, Numerical based on topics.
		Understand the Motion of a Rigid body; rotational motion, Numerical based on topics.
		Understand concept of Waves and Oscillation, Linear S.H.M, Angular S.H.M, Differential equations and solutions. Numerical based on topics. Superposition of two SHM of same frequency, Numerical based on topics.
		Understanding the Elasticity; Hooke's Law of Elasticity, Numerical based on topics.
		Understand the Kinematics of moving fluids; Variation of viscosity with temperature. Surface tension, Numerical
		Understand theory and its application various practical's designed and every student will have to perform at least ten Experiments based on mechanics and properties materials.

<b>B. Sc. I, 2S</b>	<b>Paper- II: Kinetic theory, Thermodynamics and electric currents</b>	Second Semester is designed to build a strong foundation of knowledge in different areas of basics of Thermodynamics and Ideal Gas - Kinetic theory of Gases
		Students understand the basics laws of thermodynamics – study of various fundamental laws. Numerical based on topics.
		Understand the Liquefaction of Gases - Joule-Thomson effect, Thomson effect, Joule's coefficient, Boyle, thermodynamic system.
		Concepts of Motion of Charged Particles in Electric and Magnetic fields: Numerical based on topics.
		Understands various Network theorems such as Thevenin's, superposition, Maximum power. Numerical based on topics.
		Concepts of Alternating Currents and theory of transformer its losses and uses. Numerical
		In order to understand theory and its application various practical's designed Practical's. Every student will have to perform at least 10 experiments based on Thermodynamics, transformer and Networks theorems. Numerical based on topics. Each student also assigned project and assignment for each semester
<b>B. Sc. II, 3S</b>	<b>Paper- III: Mathematical background and Electrostatics and Magneto statics ,Solid state electronics, relativity and Geophysics</b>	Third semester students should learn mixed topics of physics, such as Electrostatics and Magneto statics, Solid state electronics, relativity, Atmosphere and Geophysics. Mathematical background and Electrostatics Gradient, divergence and curl of a vector fields Numerical based on electrostatics and magneto statics.
		Understand the concepts of Solid-State Electronics Devices, basics of semiconductor and its applications such as diode, transistors, FET and operational amplifier and its types and its operations.
		Understand the concepts of study of theory of relativity its postulate etc. and Structure of earth – The crust, mantle, core and atmosphere and Geophysics.
		In order to understand theory and its application various practical's designed Practical of

		semiconductors devices. Numerical based on topics Diode, transistors, FET and OPAMP at least every student perform ten experiments.
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Optics, Interference, Diffraction, Polarization, Laser, Fiber Optics and renewable energy sources</b>	Fourth semester is based on basics study of Geometrical optics, where in students expected understand various properties of light and its related properties such as interference, diffractions etc. also problems associated with it.
		Understand the concepts of Study of diffraction and Concept of polarization, Numerical based on topics
		Understand the concepts Laser Optics, basic principle of Laser its production, types and application and uses. Numerical based on topics
		Understand the concepts, Fiber optics its type and its application in modern communication systems. Numerical based on topics
		In depth study of Renewable energy sources and non-conventional energy sources is need of todays. Numerical based on topics
		Experiments based on optics studied by every student also on laser study. Each student also assigned project and assignment for each semester.
<b>B. Sc. III, 5S</b>	<b>Paper- V: Quantum Mechanics, Atomic and Molecular spectroscopy, Nuclear physics, amplifiers</b>	This fifth semester students is encounter with modern theory which leads twentieth century. Previous old classical theory unable to explained particle nature of light hence quantum mechanics is being introduced.
		Understand the Phenomenon like photoelectric effect, Compton effect, Heisenberg uncertainty principle, wave and particle duality. Numerical based on topics.
		Next Quantum mechanics theory developed by Schrodinger for time and time independents equations, its problems. Numerical based on topics
		Quantum mechanics approach to understand atomic and molecular spectroscopy ex. Raman effect and Raman Spectroscopy. Numerical based on topics
		Next Nuclear physics aspects G.M. Counter, binding energy and alpha, beta particles, nuclear fission-fusion, nuclear energy and nuclear reactor.

		<p>Classification of Amplifier, hybrid parameter low, mid and high frequency application, Feedback in amplifier Hartley and Colpitts oscillator</p> <p>Experiments based on modern aspects and amplifiers, every student also on laser study. Each student also assigned project and assignment for each semester</p>
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Statistical mechanics and solid state physics</b>	<p>This sixth semester students are encounter with modern Statistical theory and Solids state theory crystallography, Superconductivity and Nano. Thermodynamics, prior, probability, Maxwell Boltzmann statistics, rms and most probable velocity.</p>
		<p>Understand the concepts of Distinguishable &amp; indistinguishable particles. Bose-Einstein statistics, Fermi- Dirac distribution.</p>
		<p>Crystallography, its type single, polycrystalline, Miller indices, X-rays diffraction, determination lattice parameter, Defects and dislocation .</p>
		<p>Study of electrical properties, band suture and di, Ferro and para magnetic properties of materials and Curie Wiess law.</p>
		<p>Modern concept of Superconductivity and its types, Meissner effect and application superconductivity.</p>
		<p>Twentieth century belongs to Nano technology, Nano concept and history of nano materials, quantum size effect, application of nano materials.</p>
		<p>Experiments based on crystallography, x-rays lattice parameter, Planck's Constant every student also on laser study. Each student also assigned project and assignment for each semester</p>
		<b>Subject: Forensic Science</b>
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Basics of Forensic Science</b>	<p>Understand the Development, history, growth and scope of forensic science.</p>
		<p>Understand the establishments of FSL and significance of blood stain spatter analysis.</p>
		<p>Understand the crime and crime scene management procedure.</p>
		<p>Understand the significance and collection methods of different prints and</p>

		impressions.
		understand the significance of document analysis in forensic science
		understand the medico legal importance of various criminal cases
<b>B. Sc. I, 2S</b>	<b>Paper- II: Forensic Chemistry</b>	Understand the Sampling methods and qualitative, quantitative analysis of organic-inorganic products.
		Understand the various instrumental techniques
		Understand the Basic concept of toxicological examination and its significance
		Understand the analysis of narcotic drugs and psychotropic substances and NDPS act
		Understand the analysis of various types of alcoholic and nonalcoholic beverages.
		Understand the chemistry of fire, arson and various acts related to NDPS, drugs and cosmetics act etc.
<b>B. Sc. II, 3S</b>	<b>Paper- III: Forensic Physics</b>	Understand the Detail study of LASER
		Understand the concepts of radioactivity, radiometric dating
		Understand the basic concepts of internal external and terminal ballistics
		Understand the basics of photography and crime scene photography
		Understand the various factors affecting path of projectile in exterior ballistics
		Understand the basics of microscopy and different types of microscopes and their working
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Forensic Biology</b>	Understand the cell biology, components of blood and its function
		Understand the concept of bioterrorism and crime scene investigation process
		Understand the analysis of various biological fluid and rDna technology
		Understand the DNA extraction methods, profiling, bone morphology and basics of forensic pathology
		Understand the concept of forensic entomology, and identification of various plant specimens
		Understand the concept of wild life forensics, wild life protection act and various

		types of blood groups.
<b>B. Sc. III, 5S</b>	<b>Paper- V: Forensic Psychology</b>	Understand the basic principles of psychology, its research methodology and code of conduct of psychology
		Understand the theories of personality
		Understand the basic concept of forensic psychology and legal aspect of forensic psychology
		Understand the personality disorder, its symptoms and treatment
		Understand the criminal behavior and psychological theories
		Understand the investigative psychology including Narco analysis, Polygraphy, criminal profiling, psychology of violence, stalking, etc.
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Digital and cyber Forensics</b>	Understand the operating system, internet, cybercrime and digital evidence
		Understand the incident response method and cyber forensic investigation tool
		Understand the evidence collection and analysis tool and biometrics
		Understand the data and evidence recovery
		Understand the cyber forensic investigation
		Understand the information technology law

**Subject: Biochemistry**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Biomolecules And Nutrition</b>	Define and classify terms like asymmetric carbon, optical isomerism, structure of pentoses & hexoses anomers, mutarotation.
		Understand reactions of aldehyde, ketone & hydroxyl groups, amino sugars, deoxy sugars.
		Explain, types of glycosidic bonds, structure, occurrence & biological importance
		Define and classify Fatty acids, structure & properties of saturated & unsaturated fatty acids and biological significance of fats
		Classify Amino acids on the basis of solubility, shape composition & function.

		<p>Discuss Physiochemical properties, glucogenic &amp; ketogenic amino acids, non proteinoids amino acids, protein structure and its denaturation &amp; renaturation.</p>
		<p>Discuss the Energy value &amp; nutritional importance of carbohydrates, lipids &amp; proteins, Classify complete &amp; incomplete proteins, Balance diet.</p>
		<p>Understand RQ, BMR &amp; SDA.</p>
		<p>Recognize the importance of Minerals in Nutrition.</p>
		<p>Understand Structure of nitrogenous bases, nucleosides, nucleotides, structure of DNA &amp; RNA. denaturation &amp; annealing of DNA</p>
		<p>Understand Chemistry, sources, daily allowances function &amp; deficiency of water soluble &amp; fat soluble vitamins.</p>
		<p>Define, Classify and understand the chemistry and functions of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads &amp; Corpus luteum.</p>
<p><b>B. Sc. I, 2S</b></p>	<p><b>Paper- II: Biophysical and Biochemical techniques</b></p>	<p>Understand the Concepts and Principles of thermodynamics, free energy, equilibrium constant, redox reaction &amp; their applications in Biochemistry.</p>
		<p>Understand concept of water as a biological solvent. Henderson-Hasselbalch equation</p>
		<p>Understand Principles of glass &amp; reference electrodes. Understand how to measure pH</p>
		<p>Describe Structure &amp; characteristics of biological membranes. Dialysis &amp; osmosis, Sedimentation velocity, preparative &amp; analytical ultra-centrifugation</p>
		<p>Understand general principles and applications of Adsorption, Ion Exchange, Thin layer, Molecular sieve, Gas liquid, HPLC, Affinity and Paper chromatography.</p>
		<p>Understand Basic principles of agarose, paper electrophoresis, PAGE, SDS-PAGE, 2-D electrophoresis &amp; its importance.</p>
		<p>Understand Basic principles of Isoelectric focusing, blotting techniques, visible &amp; UV spectroscopic techniques. NMR, ESR, Mass spectroscopy, Fluorometry &amp; flame photometry</p>
		<p>Explain principle and working of Immunodiffusions, immune electrophoresis, RIA,</p>

		ELISA, Immunofluorescence. Understand Isotopic tracer techniques
<b>B. Sc. II, 3S</b>	<b>Paper- III: Intermediary Metabolism</b>	Explain Glycogen synthesis in liver and muscles, Glycolysis and its regulation
		Explain Glycogenolysis, TCA and its regulation. HMP pathway, Gluconeogenesis, Glyoxylate bypass.
		Understand hydrolysis of triacylglycerols, transport of fatty acid into mitochondria. Understand $\beta$ -Oxidation of saturated fatty acids, ATP yields from fatty acid oxidation, biosynthesis of saturated and unsaturated fatty acid.
		Explain Biosynthesis of Phospholipids, glycolipids, sphingolipids.
		Understand general reactions of amino acid metabolism such as transamination, oxidation deamination and decarboxylation.
		Explain Urea cycle and its regulation. Degradation and biosynthesis of amino acids.
		Identify Sources of atoms in purines and pyrimidine molecules.
		Describe Biosynthesis and degradation of purines and pyrimidines.
		Explain Regulation of purines and pyrimidine biosynthesis
		Describe Biosynthesis and degradation of porphyrins
		Describe Production of bile pigments
		<b>B. Sc. II, 4S</b>
Define holoenzymes, apoenzymes, coenzymes, cofactors, activators, inhibitors, active site, metallo enzyme, marker enzyme, monomeric and oligomeric enzymes.		
Discuss Isolation, purification and crystallation of enzymes, test for homogeneity.		
Factors affecting enzyme activity-Substrate concentration, enzyme conc., pH, temp		
Derive Michaelis Mentone equation, $K_m$ , $V_{max}$ and its significance		
Understand Line Weaver Burk plot and its limitation. Kinetics of zero and first order reaction, Significance of energy of activation and free energy		
Understand Reversible and irreversible inhibition, competitive, noncompetitive and uncompetitive inhibition. Determine $K_m$ and $V_{max}$ in presence and absence of inhibitors		

		Define Allosteric enzymes and describe role of cofactors in enzyme catalysis
		Explain Acid- base catalysis, covalent catalysis, Understand Mechanism of action- Lock and Key hypothesis, Induced fit model. Application of immobilized enzymes in industry.
		Describe Production of glucose from starch, glucose- fructose syrup from sucrose. Knows Use of lactose in dairy industry. Use of proteases in food, detergents and leather industry.
		Learn Medical applications of enzymes.
<b>B. Sc. III, 5S</b>	<b>Paper- V: Biochemistry</b>	Explain experimental of Nucleic acids as genetic information carriers.
		Understand Central dogma of molecular genetics
		Explain Salient features of eukaryotic, prokaryotic and viral genomes
		Explain Waston and Crick model and A, B and Z types of DNA
		Understand conservative, semiconservative and dispersive types of DNA Replication.
		Explain DNA Replication in prokaryotes. Explain Inhibitors of DNA replication.
		Understand Transcription in prokaryotes, Understand post transcriptional processing of RNA in eukaryotes. Understand Translation and Regulation of Gene Expression
		Understand Basic features of genetic code and Operon concept.
		Describe r- DNA technology, Describe Restriction and modification system; sequencing of DNA and RNA.
		Comprehend about History of Development of Cell cultures. Understand primary cultures, secondary cultures and Transformed cells.
		Explain Totipotency and cell suspension culture. Understand Induction of callus, ovary and ovule cultures, in vitro pollination and fertilization.
		Practical applications of genetic transformation in plants.
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Biochemistry</b>	Understand Concept of immunity classification, humoral and cellular immunity
		Concept of antigen and antibodies.
		Understand mechanism and application of precipitation, agglutination, & complement fixation. Hybridoma technology

		Describe Classical and Alternative Pathway of Compliment fixation
		Explain Cell and coombs classification and type I- IV of hypersensitivity.
		Understand Basic concepts of clinical biochemistry, Collection and preservation of biological fluids and biochemical tests.
		Understand functional and non-functional plasma enzymes, isoenzymes and its diagnostic applications.
		Demonstrate Enzyme pattern in health and diseases with reference to plasma lipase, amylase, choline esterase, alkaline and acid phosphatase, SGOT and SGPT, LDH and CPK.
		Define Hypo and Hyper glycemia, glycogen storage diseases.
<b>Subject: Biochemistry</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will able to .....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Biomolecules</b>	Describe Isolation and Purification Techniques of protein, Assay methods.
		Understand structure of Peptide bond, Ramchandran Plot & Modern approach
		Discuss conformation of proteins, Explain the structural levels of proteins, denaturation & renaturation of proteins and protein sequencing
		Learn Importance of glycoproteins and glycolipids and blood sugar compounds. characteristics and uses of lecithin and structure of glycogen & starch
		Discuss the occurrence and structure of cholesterol, chemistry of bile acids & bile salts and derivation of testosterone, progesterone, estrogen and Vit D.
		Understand Structure of nitrogenous bases, nucleosides, nucleotides, structure of DNA & RNA. classification, isolation and separation assay methods of nucleic acids
		Explain Chemistry of porphyrins nucleus. Importance of hemoglobin, chlorophyll and their structure.

	<b>Paper- II: Plant Biochemistry</b>	Understand free energy and standard free energy, thermodynamics & its applications and High energy phosphate bond ATP & potential.
		Understand mitochondrial organization, oxidative phosphorylation, electron transport particles, Redox potential & phosphate group transfer potential, reversible ETC
		Explain AT synthetase complex, ATPase coupling factors, Understand the theories of oxidative phosphorylation and Learn the uncouplers and inhibitors of energy transfer
		Describe the ultra structure of chloroplast, Understand Photosystem I & II and Explain Photosynthetic Electron Transport & photorespiration
		Describe cyclic & Non-cyclic photophosphorylation and Learn Photoregulation
	<b>Paper- III: Advance Enzymology</b>	<b>Learn and understand the concept of enzyme kinetics in detail.</b>
		Understand the concept of enzyme action. Learn various theories of enzyme action.
		Understand the aspects of control of enzyme catalyzed reactions.
		Learn and understand allosteric mechanism and enzyme regulation.
		Learn mode of action of hormone on enzymes.
	<b>Paper- IV: Bioenergetics and Biological Oxidation</b>	Understand the concept of free energy, applications of thermodynamics and energy rich molecules.
		Understand mitochondrial electron transport, electron transfer system, reversible ETC and factors affecting.
		Understand Oxidative photophosphorylation.
		Learn Photosynthetic electron transport.
		Learn Photophosphorylation in detail.
<b>M. Sc. II, 2S</b>	<b>Paper- V: Clinical Biochemistry</b>	Explain disorders of gastric function, pancreatic diseases and steatorrhea & malabsorption syndrome.
		Explain mechanism of blood coagulation and abnormalities, structure & functions of various plasma proteins.

		Understand facts of anemia, hemoglobinopathies and clinical significance of faecal & urine analysis
		Learn Jaundice & Fatty liver, Understand Liver & renal function tests, role of isoenzymes in health & diseases.
		Understand Human genome, genetic diversity, chromosomal & autosomal disorders
		Discuss Pathogenesis of genetic diseases, Understand diagnosis of metabolic diseases
		Learn galactosemia, Hemophilia, Sickle cell anemia, hypercholesterolemia, muscular dystrophy, Gout, Turners syndrome.
	<b>Paper- VI: Endocrinology &amp; Neurochemistry</b>	Learn Hyperglycemia & Diabetes Mellitus & its types, Understand GTT and Radioimmunoassay
		Explain Calcium & Phosphorus & Iodine metabolism, Hypo & Hyperthyroidism
		Discuss BMR & test for Thyroid evaluation, Learn Biochemistry of Reproductive disorders & Birth control and influence of prostaglandins & gonadotropins.
		Describe biochemistry of fertilization & methods of birth control, Neuronal membrane, excitability & Ion channels, Nerve & Synapse structures & functions
		Explain membrane & action potential, Understand Pre & Post synaptic events, Understand EEG patterns.
		Explain chemistry, synthesis & storage of Neurotransmitter, modulation of neuronal integration and Neuropeptides
	<b>Paper- VII:</b>	Describe Structure & organization of Membranes, membrane junction & types
		Explain cell antigen & cell-cell recognition, mitochondrial & chloroplast membrane
		Explain plasma membrane & membrane models, Liposomes & drug Targetting, Discuss Receptors, ligand binding & cell signaling, Understand schatchard plot.
		Discuss muscle contraction & organization, sliding filament & cross bridge cycle,
		Learn energy transduction & Spasmonemes. Describe Microtubules, Microfilaments & vesciles, Describe dynamics of cytoskeleton
		Explain amoeboid movements, pseudopod formation, sperm motility and cytoplasmic transport of vesicles
	<b>Paper -VIII : Bioinformatics, Biostatistics &amp; Research Methodology</b>	Discuss history of development of computers. Understand basic components of computer Hardware, Software, CPU, Input, Output, Storage devices.
		Describe Operating systems & programming Languages, MS-EXCEL & MS WORD

		Learn various statistical functions & graphical tools, Internet, searching of database
		Explain BLAST/FASTA, protein modeling, Genes, Primer designing, Genomics & Proteomics
		Understand statistical evaluation of results, Probability, Linear regression, variance & covariance, t- test, chi square, F test, & correlation coefficient
		Discuss Methodology of scientific Research.
		Understand significance of statistical methods of biological investigations, sampling techniques.
		Understand Preparation of scientific report, proper use of grammar, preparation of review, objective, design, data & interpretation of experiment
<b>M. Sc. II, 3S</b>	<b>Paper- I X: Basic Immunology</b>	Describe the cells of immune system, Learn hematopoiesis & differentiation of B & T lymphocytes & types of Macrophages, lymphocyte trafficking
		Describe Immunogenicity nature, history & kinetics, thermodynamics of Ag-Ab reaction & Particulate Ag
		Learn phage neutralization, RIA, ELISA, Agglutination, Immunofluorescence, Immunoelectron microscopy
		Describe Immunological organs & cells, Learn methods of separation of immune cells
		Explain Immune response and Discuss structure & biology of MHC
		<b>Paper- X : Applied Immunology</b>
	<b>Paper- XI: Fermentation Technology</b>	Describe structure, isotypes, allotypes, diotypes & paratope and monoclonal antibodies
		Understand Concept of immunity classification, humoral and cellular immunity.
		Describe Ab production, regulation of Immune response and immune network concept
		Describe In vivo immunity to viruses, fungi, bacteria, protozoa, worms, Autoimmunity & Immunological tolerance and Transplantation, Tumour Immunology & Immunostimulation
		Describe AIDS, Hybridoma technology & Monoclonal antibodies Hypersensitivity & Transplantation
		Describe Microbial culture & use of mutants. rDNA technology & cloning, gene amplification.
		Discuss equipment & instrumentation of fermentation, measurement of volume, mass, Temperature, pH ETC, isolation & purification of fermentation products

		Describe fermentation rate, product yields & state. Understand kinetics of antibiotic fermentation and fermentation process
		Describe Batch & semi-batch, CSTF, TFR, Fluid bed Reactors etc
		Discuss Reactor analysis –Flow rate, time, volume, concentration.
		Describe Bacterial & eukaryotic expression vectors, Learn recombinant proteins, Mammalian cell cultures (Hela) and Discuss Immobilization Techniques
	<b>Paper- XII: Recombinant DNA Technology</b>	Discuss Basics concept in rDNA Technology, Learn RAPD, RFLP, FLP, DNA fingerprinting, DNA Manipulation, Vector & Plasmid, methods for cloning
		Explain microinjection & transfection, Gene synthesis, gene libraries, cDNA library & radioactive probes and Learn Applications in Medicine, gene therapy.
		Learn Applications in Agriculture-Plant resistance to viruses, herbicides etc
		Learn operon hypothesis, LAC, arabinose, tryptophan & histidin operons
		Discuss expression vectors
		Discuss gene regulation Mechanism- Transcriptional, Post transcriptional regulation- RNA editing & splicing, translational regulation & modifications of RNA
Discuss regulation of plant genes		
Describe gene rearrangement & amplification		
<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Physiology</b>	Describe flow of information & genetic order messages, Describe Ionic triggers & ionic currents of development
		Learn cAMP facet, phosphorylation of proteins, Ca messenger system, CGMP & intersection signals and control of metabolism by pancreatic endocrines
		Explain Membrane transport, Types of diffusion, Types of transport, carrier concept and protein targeting
		Describe Pumps & Channels- Na pump, proton pump. Explain receptor operated channels, Ionophores & depolarization. Understand Group translocation
		Learn different aspects & of Aging and different factors for control of aging

	<b>Paper- XIV :Advanced Molecular Biology</b>	Discuss The RNA world ,The DNA World, Human gene map, genetic Diversity, genetic disorders.
		Describe structure of genes, gene analysis, chromosomal theory & eukaryotic chromosome mapping
		Understand conservative, semiconservative and dispersive types of DNA Replication, DNA Replication in Eukaryotes
		Explain Reverse transcriptase, Light & Dark repair
		Replication of plasmids, DNA Replication in prokaryotes, Replication of extra chromosomal DNA
		Describe components of transcription machinery, transcription in prokaryotes and eukaryotes. Inhibitors of nucleic acid synthesis.
		Understand Basic features of genetic code, deciphering the Code, variation in genetic Code.
		Discuss editing, reading & ribosomal frame shifting
		Understand Translation- Activation of amino acids, Initiation of synthesis, Elongation determination of polypeptide chain
		Discuss rate & inhibitors of protein synthesis
	<b>Paper- XV: Plant Biochemistry</b>	Learn the structure & functions of plant cell organelles, plant cell wall, Describe the structure & functions of chloroplast, Learn Development of plastids, photosynthetic pigments and C4, Calvin & Hatch Pathways.
		Understand role of carbohydrates, proteins & Lipids in respiration, Explain electron transport & energy coupling systems, inhibitors of respiration
		Explain structure of root nodules & organization of plant nitrogenase system, formation & assimilation of ammonia and Nitrogen fixation & reduction
		Describe sulfur activation & reduction, Respiratory & photosynthetic sulfur metabolism and inorganic sulfur oxidation
	<b>Paper- XVI : Plant Nutrition &amp;</b>	Learn physiology of flowering & seed formation, fruit development & ripening , seed dormancy & germination

	<b>Reproduction</b>	Describe hormonal regulation of growth & development, translocation mechanism
		Discuss biochemical mode of auxins, GBA, cytokins, Abscisic acid & Ethylene
		Discuss mineral nutrition in plants, translocation of elements in soil & plants,
		Learn the Biochemistry of plant diseases, resistance & defensive mechanisms
<b>Subject: Statistics</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I</b>	Firstly they learned classification tabulation, diagrammatic & graphical representation data.
		Learn various measures of central tendency, measures of dispersion, measures of skewness & kurtosis. Acquainted with measures used in practice for initial analysis of statistical data
		Understand concepts of correlation & regression
<b>B. Sc. I, 2S</b>	<b>Paper- II</b>	Understand basic discrete & continuous distributions.
		Learn to analyze qualitative data
<b>B. Sc. II, 3S</b>	<b>Paper- III</b>	Learned more applicable parts of Statistics.
		Learn to analyze time series data.
		Understood the economic barometer i.e. index numbers, which is of great use for analyzing price & quality variations over a period of time
<b>B. Sc. II, 4S</b>	<b>Paper- IV</b>	Learn the statistical tools like large sample tests, chi- square test, t- test, F- test, Z- test which are of great use of analysis of data in various research works.
		Well verse about the techniques of non parametric tests
<b>B. Sc. III, 5S</b>	<b>Paper- V</b>	Learn the other important applied topics
		Understand about the linear programming problem (LPP), assignment problem, sequencing problem etc.
<b>B. Sc. III, 6S</b>	<b>Paper- VI</b>	Learn important applied topic in Statistics is Sampling theory, various methods of sampling along with their applicability in different situations.

<b>Subject: Geology</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: General Geology, Physical Geology, Minerology, Crystallography and Field Geology.</b>	To understand the general Geology and its different branches and their scopes.
		Understanding the physical geology which includes such the different weathering and the geological work done by the rivers, wind, underground water.
		To make the expert in identifying the different minerals which are present in the rocks.
		Make student to understand the different crystallographic models and their identification as well as their usage.
		To understand the importance of field geology to identify different structures present the field and as well as to identify the minerals and rocks in the field.
		To understand the different surveys and their usage.
<b>B. Sc. I, 2S</b>	<b>Paper- II: Igneous, Sedimentary and metamorphic petrology</b>	Understanding the basics of petrology such as igneous rocks and their formation.
		Understanding the different textures and structures of igneous rocks.
		Understanding the magma and its evolution and different types of mode of classification of rocks.
		Understanding the phase rule and its concept and magma crystallization.
		Understand and identification of sedimentary rocks and their formation.
		Understand and identification of metamorphic rocks and their formation.
		To Know the Deposits of chemical and physical and biological origin.
<b>B. Sc. II, 3S</b>	<b>Paper- III: Stratigraphy and Paleontology</b>	Understand the stratigraphy and correlation its principles and importance. Physiological divisions of India.
		To understand the classification distribution and economic importance of different stratigraphic Super groups and Groups.
		To understand the stratigraphy of Maharashtra and some other Super-groups.
		Understanding the paleontology and identification of different fossils and their distribution.

		Identifying the different phylum and fossils present within it.
		Understanding the trace fossils and index fossils and their geological distribution and importance.
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Structural Geology, Tectonics and Geomorphology</b>	Understand the structural geology and recognition of primary structural features
		Understand the stress and strain and its role in deformation of geological formation.
		Understand the fold, fault, joints and its classification.
		Understand the mountain building, continental drift and plate tectonics processes.
		Understand the Isostasy and formation of mountain building.
		Understand the different landforms formed due to different geological agents.
		Understand the soil profile and its properties and different landforms.
<b>B. Sc. III, 5S</b>	<b>Paper- V: Economic Geology and Mineral Exploration</b>	Understand about the introduction, purpose scope and classification of Economic geology
		Understand the different types of ore deposits formation processes.
		Understand the scope mineralogy, properties and uses of different economic mineral deposits
		Understand the distribution, uses and application of oil and petroleum deposits of India
		Understand the application of Geochemical, Geophysical and Geobotanical methods in mineral prospecting
		Perceptive on the calculation and computation for grade of ore reservoir.
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Hydrology, Remote sensing, Engineering Geology and Geological Sill</b>	Understand the introduction of hydrogeology and hydrogeological properties of rocks.
		Understand the geophysical investigations for groundwater exploration and groundwater physico-chemical parameter
		Understand the aerial photography and key elements of image interpretation.
		Understand the Remote sensing, types and application of the satellites and its data.
		Understand the engineering geology and importance of geology in construction of civil structures.

		Understand the geological services in investigation of natural resources and environmental services.
<b>Subject: Geoinformatics</b>		
Class	Course	Outcome (Students will be able to....)
<b>M. Sc. I, 1S</b>	<b>Paper- I: Principles of Remote Sensing</b>	Gain knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing.
		Acquire skills in storing, managing digital data for planning and development.
		Learn basic level fundamental physical principles of remote sensing, including the electromagnetic spectrum; the emission, scattering, reflection, and absorption of electromagnetic (EM) radiation.
		Understand concepts, methodologies and applications of Remote Sensing Technology
	<b>Paper- II: Introduction to GIS</b>	Explain basic concepts of using GIS in mapping the earth in spatial terms and populating the GIS's system to access data
		Describe what GIS is; name the major GIS software available; know where to find more information, components and functionality of a GIS
		Understand the nature of geographic information and explain how it is stored in computer
		conduct simple spatial analysis using GIS software
	<b>Paper- III: Geodesy and GPS</b>	Have the basic math and science knowledge and technical skills of the Surveying and Geomatics Engineering Technology
		Execute surveying/ geomatics project activities for delivery in response to the needs of private and public industry, practice of geophysical geodesy and GPS
		Understand concepts, methodologies and applications of geodesy and GPS Technology.
	<b>Paper- IV: Introduction to IT</b>	Apply knowledge of computing and mathematics appropriate to the discipline

		Learn current techniques, skills, and tools necessary for computing practice
		Effectively integrate IT-based solutions into the GIS user environment
		Analyze the local and global impact of computing on individuals, organizations, and society
<b>M. Sc. II, 2S</b>	<b>Paper- V: Principles of Cartography</b>	Understand fundamentals of Cartography
		Learn methods for analog and digital visualization of geographical data.
		Perform numerical operations for the calculation using cartographic scales
		Recognize the contribution of digital cartography to Geography Science
	<b>Paper- VI: Digital Image Processing</b>	Understand Fundamentals, Image Transformations and Enhancement
		Learn mathematical transforms necessary for image processing.
		Learn the image enhancement techniques, restoration procedures.
		Learn algorithms that perform basic image processing & advanced image analysis
	<b>Paper- VII: Photogrammetry</b>	Understand concepts of photogrammetric, aerial photography and mapping from aerial photographs using different types of stereo plotters. Learn photo interpretation for use in environmental monitoring, and measurements of structural parameters.
		Learn Digital Map using stereoscopic frame camera images or satellite scenes
		Learn to take measurements , digital mapping products and solutions
		Understand properties and characteristics of aerial photographs
		Demonstrate knowledge and understanding of Digital Photogrammetry
		Illustrate the various types of Photogrammetric techniques and measurements
	<b>Paper- VIII: Spatial Modeling &amp; Analysis</b>	Learn fundamental aspects of spatial data modeling specifically to enhance the capability of spatial modelling, spatial database analysis
		Understand fundamental aspects of spatial data modeling.
		Understand the natural and social resource assessment, planning and monitoring for National development process.

<b>M. Sc. II, 3S</b>	<b>Paper- IX: Research Methodology</b>	Learn unique opportunities and challenges of integrating participatory action research into undergraduate GIS courses, drawing evidence from two undergraduate courses that contributed to a long-term participatory action research project.
		Understand the social and political construction and impacts of digital spatial data and GIS technologies.
		Identify overall process of designing a research study from its inception to its report
	<b>Paper- X: GIS Application Development</b>	To get fundamental concepts and practices of Geographic Information Systems (GIS) and advances in Geospatial Information Science and Technology (GIS&T).
		Learn undertaking new (unfamiliar) analysis using GIS, troubleshoot problems in GIS, software/website help menus and the GIS community to solve problems.
		Apply mathematical concepts, including statistical methods, to data to be used in geospatial analysis and technical language of GIS.
		Know how GIS is utilized in the larger context of business needs and IT strategies
	<b>Paper- XI: Geoinformatics Applications in Natural Resources Management</b>	Understand the impact of human behavior on natural resources and leads to more effective utilization of the same.
		Know data about natural resources could be collected through remote sensing, aerial photography or satellite imagery and then they are mapped using GIS technology.
		Understand major application of GIS in natural resource management is in confronting environmental issues like a flood, landslide, soil erosions, drought, earthquake etc.
	<b>Paper- XII: Geostatistics</b>	Understand concepts and algorithms for geostatistical modelling and demonstrates their application in the geosciences.
		Learn to validate and evaluate appropriate geo-statistical approaches to characterize and quantify spatial and spatiotemporal distributions of variables of interest.
Understand geographic information systems to integrate geostatistical techniques in the wider spatial sciences discipline.		

		Characterize spatially referenced data and understand implications of different spatial sampling methods
<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Database Management System</b>	Learn database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS with GIS
		Learn fundamental elements of relational GIS database management systems
		Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
		Understand the different issues involved in the design and implementation of a database system.
		Learn physical and logical database designs, database modeling, relational, hierarchical, and network models
		Know essential DBMS concepts such as: database security, integrity, concurrency,
	<b>Paper- XIV: Web Mapping and Web GIS</b>	Understand theories and technologies for disseminating and processing geographic information by means of Internet and World Wide Web.
		Know about Client/server computing and the distributed component framework
		Use Open source and commercial (ESRI) Internet mapping software
		Get knowledge about Professional GPS and mobile devices
		Learn and defend a strategy for developing a Web-based GIS application
	<b>Paper- XV: Geoinformatics Applications in Agriculture</b>	Understand a concept in agriculture that is gaining wide popularity due to the plethora of benefits it offers is that of precision agriculture.
		Learn fundamental theories and technologies for collect timely geospatial information on soil-plant requirements and prescribe and apply site-specific treatments to increase agricultural production and protect the environment.
		Learn how remotely sensed imagery can be combined with other sources of information in order to efficiently manage land, increase production and reduce costs and consider

		environmental benefits.
	<b>Paper- XVI: Geoinformatics Applications in Water Resources Management</b>	To increased knowledge of the linkages among watershed components (rivers, wetlands, groundwater, uplands, etc).
		To increased understanding of the feedbacks among processes operating at different spatial and temporal scales.
		To increased availability of inexpensive, useful indicators of watershed conditions and quantitative methods to evaluate land use and watershed management practices.
		To fundamental theories and technologies for availability of advanced watershed simulation models that are useful to and can be operated by managers who are not scientific experts
<b>Subject: Computer Science</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Computer Fundamental and C-Programming</b>	Understand Computers and programming concept, operating system of computer
		Understand the Introduction to Internet : Direct, Types of Internet connection: Direct dial-up, broadband, Internet protocol : TCP/IP, FTP, HTTP, Domain name e-mail address
		Understand the Programming Concept : Algorithm flowcharting programming languages, assembler, interpreter, compiler programming process
		Understand History, features structure of C program,
		Understand the I/O Operations : Formatted I/O : Printf ( ), Scanf ( ) , Unformatted I/O :
<b>B. Sc. I, 2S</b>	<b>Paper- II: Data Structure and Advance C</b>	Understand the basics of Data structure, its types, list, array, stack and Queue
		Understand the Linked list & its implementation, traversing, insertion, deletion algorithms, circular Queue
		Understand the : Tree : Binary, Binary search tree, tree Traversing : inorder, preorder and postorder, sorting and searching Techniques
		Understand the Function : Definition, prototype, local & global variable, function

		parameter, function calling and return
		Understand the String Handling : Declaring and initialization of string variable , operations on string
		To understand the : Structure : Definition and declaration , initialization, array of structure, nested structure Union File Handling
<b>B. Sc. II, 3S</b>	<b>Paper- III: Data structure and c++</b>	Understand the Introduction to data structure linear array, operation on linear array,
		Understand the queue : definition and concept of queue and operation on queue
		Understand the Tree: definition and concept of tree, sorting and searching , bubble sort , selection sort
		Understand the object oriented programming : features and application of object oriented programming , introduction of c++ programming managing console I/O
		Learn the Function in C++ line function, friends function , Array of object , pointer to object,
		Learn the operator overloading , Inheritance
<b>B. Sc. II, 4S</b>	<b>Paper- IV: RDBMS and PL/SQL</b>	Understand the Fundamental of Relational database management , Architecture of database system , database approaches data representation
		Understand the Relational model : relation domain and attribute keys E-R diagram , Normalization
		Understand the Introduction to SRL: Component of structure query language , data types and operator
		Understand the Function : Numeric function, Character function, conversion function
		Understand the PL/SQL : Feature and block structure , variable constant , data type cursor and its operation
		Understand the Transaction : Roll back and commit and save point , security of database
<b>B. Sc. III, 5S</b>	<b>Paper- V: dot NET Technology and Java programming</b>	Understand the .NETPRAMEWORK , NAMESPACES, assembler the common language Implementation

		Understand the visual programming , concept of event driven programming
		Understand the decision and looping statement
		Understand the java feature, evaluation, JDK, JUM.
		Understand the classes and inheritance
		Understand the string, package and interface their operations
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Advanced java and VB.NET</b>	Understand the exception handling multithreading; E conception handling
		Understand the applet; introduction to applet, applet lifecycle HTML applet tab with all attributes
		Learn the event handling and AWT ; introduction, event delegation model, java AWT
		Understand the window application forms
		Know the object oriented programming; classes and objects
		Work out the data access with ADO.NET

**Subject: Computer Science**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Digital System and Microprocessor</b>	Get an insight into Representation of integers and floati : Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor. Understand Boolean Algebra: laws Logic families: classification and characteristics, TTL, ECL, MOS, CMOS, their comparison. Learn Design of Arithmetic circuits: Half Adder, half subtract, or, full adder, full subtract, Flip Flops: Stack structure, interrupts in 8086 microprocessor,
	<b>Paper- II: Net Technologies and C#</b>	Get an insight into Understanding .net: The C# environment: Overview of C#, Learn Classes and objects: Principle of OOP, Access modifiers, Operator overloading: unary, binary, comparison, Delegates and events Multit Data Access with .Net: ADO.net overview hreading in c#:
	<b>Paper- III: Operating System</b>	Get an insight into Introduction: Services, Types, User-O.S. Learn Interface: Command Interpreter, Graphical User Interface, Process Management,

		Process Synchronization and Deadlocks:, File System
	<b>Paper- IV Computer Networks</b>	Get an insight into Digital Communication, Application Layer: Principles of Application Understand Layer Protocols, Transport Layer: , Network Layer: Data Link Layer , Network Security and Management:
<b>M. Sc. I, 2S</b>	<b>Paper- V: Java Programming</b>	Get an insight into Introduction to java, Java development tools, Java and WWW, Java applications. Understand Objects and classes: Packages: creating and importing packages, Arrays, Applet: Life cycle of an applet, APPLET tag , Exception Handling, User Interface
	<b>Paper- VI: Data Structures</b>	Get an insight into Types of Data Structures, Linear & Nonlinear data structures, stack , queue, array, sorting and searching, graphs and indexing
	<b>Paper- VII: Software Engineering</b>	Get an insight into Software Engineering:, Software Process Framework; Umbrella Activities. Understand Process Models: SDLC (Waterfall), Requirements Engineering , software design, software testing
	<b>Paper- VIII: Discrete Mathematical Structures and Compiler Construction (GIC)</b>	Get an insight into mathematical logic, set theory, algebra structure : Lattices and Boolean algebra, Fault detection in combinational switching circuits – graph theory Get an insight into Compilers, : Scanning and Parsing Techniques:, Memory Allocation: Static and dynamic memory allocation, Compilation of control structures: Error detection, Code optimization.
<b>M. Sc. II, 3S</b>	<b>Paper- IX: Data Mining and Data Warehousing</b>	Get an insight into Data Mining Functionalities, Data Preprocessing, Data Warehouse and OLAP Technology, Data Wa Hidden surfaces and lines: rehouse and OLAP Technology, Polygon: Introduction, Polygon , Polygon representation, Entering polygon, Segments: Introduction, the segment table, segment creation,
	<b>Paper- X: Computer Graphics</b>	Get an insight into Geometry and line generation: : Polygon: Introduction, Polygon, Segments: Introduction, the segment table, segment creation, Interaction : Introduction, hardware, input devices, handling algorithm, event handling,

	<b>Paper- XI: Client-Server Computing</b>	Get an insight into Networking in Java:, Java Database Connectivity: JDBC concepts, JDBC API, Servlets: Structure and lifecycle of Servlets, Servlet API: , JavaScript Overview, Variables, Operators, Data Types, Control Statements
	<b>Paper- XII: Distributed Operating system (GIC) And Theory of Computation</b>	Get an insight into distributed systems: goals of distributed system, Synchronization in distributed systems, : Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling , Distributed file systems. Get an insight into Strings, alphabets and languages, Graphs and trees, Inductive proofs, Regular set and regular expression, Context free grammar, derivation trees, Chomsky Normal Form , Turing Machine: Definition, model, Design of Turing machine.
<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Artificial Intelligence and Expert Systems</b>	Get an insight into Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, Definition of AI, AI technique, tic-tac-toe, pattern recognition, Basic problem solving methods, Game Playing: Minimax search procedure, Natural Language Understanding.
	<b>Paper- XIV: Design and Analysis of Algorithms</b>	Get an insight into Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer, Greedy Method, Basic Search and Traversal techniques, Branch and bound:, Lower bound theory, : NP-Hard and NP-Complete problems,
	<b>Paper- XV: Network Security</b>	Get an insight into Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Medium Access Control,
	<b>Paper-XVI: Mobile Communications, Digital Image Processing, Software Testing (GIC)</b>	Get an insight into Satellite Systems, Wireless LAN: Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth., Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer. Get an insight into: X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging, Digital Image Fundamentals, Image

		Enhancement in the Spatial Domain, Image Enhancement in the Frequency Domain, Image Restoration:, Color Image Processing, Creating Quality Software.
<b>Subject: Zoology</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper- I: Life and diversity of Non-Chordata</b>	Understand the evolution, history of phylum. Understand about the Non Chordate animals (external as well as internal characters of non chordates).
		Understand the economical importance of Non- chordate animals .
<b>B. Sc. I, 2S</b>	<b>Paper- II: Cell Biology and developmental biology</b>	Understand the Scope of cell biology, because cell is the basic unit of life.
		Understand the Main distinguishing characters between plant cell and animal cell.
		Understand the whole cell organelles with their structure and function.
		Understand the cell cycle and know the importance of various cells in body of organisms.
		Understand applications of cells by using cell biology like various types of tumour.
		Understand development of different animals by using developmental biology
<b>B. Sc. II, 3S</b>	<b>Paper- III: Life and diversity of Chordata and concept of Evolution</b>	Understand the phylum Chordate. Understand the basic concept, external morphology and sexual dimorphism in chordates.
		Understand the various systems, adaptation and dentition in Mammals.
		Clear the concepts of Universe, theories of life cycles.
		Understand the Lamarkism, Neo-Lamarkism and Darwinism.
		Understand the Geological time scale.
		Learn about Palaentology ie. Fossils and its significance.
		Understand the Zoogeographical realm.
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Advance genetics and ecology</b>	Understand the Mendel`s laws of hereditary and Interactions of genes
		Understand significance of linkage, Mechanism of crossing over & Multiple alleles
		Understand Sex determination
		Understand Genetic disorders, Genetic Screening and parental diagnosis

		Understand Abiotic factors and biotic factors and their interrelation ship in the nature
<b>B. Sc. III, 5S</b>	<b>Paper- V: Animal physiology and economic zoology</b>	Understand the terms Physiology.
		Understand mechanism of respiration, circulation , ABO Blood typing Rh-factor
		Understand mechanism muscle Physiology
		Understand the Nerve Physiology.
		Understand Reproductive Physiology of animals
		Understand Homeostasis and conservative regulation
		Understand Thermoregulation in Poikilotherms and Homeotherms.
		Learn Economic importance of Insects
		Know pests of cultivated crop and stored food grains .
		Learn nderstand Fresh water fish culture
<b>B. Sc. III, 6S</b>	<b>Paper- VI: Molecular biology and biotechnology</b>	Understand the cell biology and molecular biology.
		Understand the various cell types and cell divisions.
		Understand the term cell signalling.
		Cancer awareness.
		Understand the Tools and Techniques in Molecular Biology.
		Understand the term ELISA technique and DNA finger printing.
		Understand the various Applications of Biotechnology.
		Understand the Hybridoma technology as well as Enzyme biotechnology.
		Have insight about DNA Recombinant technology.
		Understand the industrial and environmental biotechnology.
Know the Stem cell biotechnology.		
Understand the Scope and Significance of Biotechnology.		
<b>Subject: Zoology</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>

<b>M. Sc. I, 1S</b>	<b>Paper- I: animal structure and function (non-chordata)</b>	Understand the evolution, history of phylum. Understand about the Non Chordate animals.
		Learn external as well as internal characters of non chordates.
		Learn distinguishing characters of non chordates.
		Understand the economical importance of Non- chordate animals .
	<b>Paper- II: animal structure and function (chordata)</b>	Understand the Scope of cell biology, because cell is the basic unit of life. Understand the Main distinguishing characters between plant cell and animal cell.
		To study and understand the whole cell organelles with their structure and function.
		Understand the cell cycle and know the importance of various cells in body of organisms.
		Understand the various applications of cells by using cell biology like study of various types of tumour.
		Understand development of different animals by using developmental biology
	<b>Paper- III: Gamete Biology</b>	Understand Heterogamy in eukaryotes.
		Understand Spermatogenesis and Biochemistry of Semen
		Understand Ovarian follicular growth and differentiation
		Understand Oogenesis and vitellogenesis-morphogen gradient
		Understand Fertilization and Creating multicellularity
		Understand Genomic imprinting
		Understand Cloning of animals by embryo transfer
		Understand <i>In vitro</i> fertilization and Transgenic animals
	<b>Paper- IV: Genes and Differentiation</b>	Understand Cell specification and Differentiation & Body axis formation
		Understand Environmental cues and effects
		Understand Contraception:
Understand Biology of sex determination & Environmental sex determination		
Understand Stem cells & Stem cell disorders		

		Understand Bone marrow transplantation
<b>M. Sc. I, 2S</b>	<b>Paper- V: Molecular Biology</b>	Understand Structure and functions of Bio-membrane, Cell Surface & Receptors.
		Understand Cell Signaling & Cell cycle control
		Understand Cytoskeleton and Secretory pathways
	<b>Paper- VI: Tools and Techniques in Biology</b>	Understand Principles and uses of Colorimeter, Spectrophotometer, Spectrofluorometer, Atomic absorption spectrophotometer, ESR and NMR spectrometers, XRD and Radioactivity counters
		Understand Principles and application of Light, phase contrast, fluorescence, Scanning and transmission electron microscopy, Atomic Force microscopy
		Understand Microbiological techniques- Media preparation and sterilization, Inoculation and growth monitoring., Use of fermenters. Biochemical mutants and their use, Microbial assays.
		Understand Organelle separation by centrifugation and Understand Tissue engineering
		Understand Cryotechniques and Separation techniques (TLC. GC, HPLC, Affinity chromatography and Electrophoresis.
		Understand Radioisotope and mass isotope techniques in biology
	<b>Paper- VII: Endocrinology</b>	Understand Histology of vertebrate endocrine glands, Histophysiology of endocrine placenta, testis and ovary in vertebrates, Urohypophysis and Corpuscles of Staninus in fishes.
		Understand Classification of Hormones and hormone actions.
		Understand Hormones in biological clock
		Understand Role of hormones in digestion, Hormonal regulation of carbohydrate, Lipid and Protein metabolism, Hormonal regulation of Growth and Reproduction
		Understand Synthesis, transport (release) and metabolism of steroid hormones
Understand Ectohormones in insects and mammals		
Understand Endocrine gland hormones and disorders.		

		Understand Comparative study of steroid and non-steroid hormones in reproduction
		Understand Hormone replacement therapy
		Understand Neuroendocrine mechanism in Amphibian metamorphosis
	<b>Paper- VIII: Environment and Ecology</b>	Understand Interaction of Environmental factor, Species interaction
		Understand Community ecology, Ecological succession
		Understand Structure and function of some Indian ecosystems
		Understand Global climate change; Global warming, Global dimming,
		Understand Biodiversity-statuses and major approaches to management, Indian case studies on conservation
		Understand Metabolism & effects of Organochlorine, organophosphate and carbamate pesticides
		Understand Biochemistry of Detoxification – Phase I & phase II reactions.
<b>M. Sc. II, 3S</b>	<b>Paper- IX: Molecular Cytogenetics-1</b>	Understand Mutation, Molecular basis of gene mutation
		Understand Somatic Cell Genetics and Epigenetics
		Understand Genome Organization
		Understand Genetics of Cancer
		Understand Human Cytogenetic
		Understand Numerical abnormalities of human chromosomes and related syndromes
		Understand Genome Analysis and Functional genomics
		Understand Population Genetics/ Genetics of quantitative traits in populations
		Understand Molecular Phylogenetic
		Understand Mitochondrial DNA and evolution.
	<b>Paper- X: Molecular Cytogenetics- 2</b>	Understand Microbial genetics, Bacteriophages
		Understand Extra chromosomal inheritance, <i>Drosophila</i> Genetics
		Understand Polytene chromosomes:
		Understand Behavioral traits

		Understand Molecular Cytogenetic Technique
		Understand Genome Analysis and Functional genomics
		Understand Molecular Phylogenetic
	<b>Paper- XI: Insect Classification and Morphology</b>	Learn Major Classification of Class Insect, their characters, general biology, habit and habitats. Economically important insect families.
		Principles, utility and relevance: insect body wall structure,
		Understand structure and modification of Thorax in insects.
		Understand structure and modification of Wings in insects .
	<b>Paper- XII: Insect anatomy and Physiology</b>	Understand Abdomen- Segmentation and appendages in insects.
		Understand Structure, modification and physiology of digestive and Circulatory Systems in insects.
		Understand Structure, modification and physiology of respiratory , excretory and osmoregulatory systems in insects. ,
		Understand Structure, modification and physiology of nervous , sensory systems in insects.
		Understand Structure, modification and physiology of reproductive systems-,
		Understand Structure, modification and physiology of endocrine and exocrine glands.
		Understand Physiology of insect growth and development
	<b>M. Sc. II, 4S</b>	<b>Paper- XIII: Biochemistry (Compulsory)</b>
Understand Monosaccharides and polysaccharides of biological importance		
Understand Amino acids and Proteins		
Understand Transamination and deamination		
Understand Conjugated proteins: structure and function		
Understand Nucleic Acids		
Understand Carbohydrate metabolism		

		Understand Lipid Metabolism
		Mitochondrial and peroxisomal systems of fatty acid oxidation.
		Ketone bodies – Structure, biosynthesis and functions
	<b>Paper- XIV: Advanced Mol. Biology</b>	To learn about the evolution of genes and origin of life
		Understand gene structure and organization
		To understand the mechanism of replication in both prokaryotes and eukaryotes
		To understand the concept of gene expression and regulation in detail
	<b>Paper- XV: Enzymology and Biostatistics</b>	Understand Enzyme: Structure, Classification & kinetics
		Understand Enzyme: Categories & Functions
		Understand Enzyme: Functional diversity & applications
		Understand Biostatistics: Diagrammatic representation of data ( Line graph, Bar diagram, Pie diagram)
		Understand Significance test (students ‘t’ test)- paired and unpaired.
		Understand chi square test as a test for goodness of fit.
		Understand Analysis of variance (ANOVA)
		Understand Estimation of allele frequency (dominant and co-dominant cases)
		Understand Examples on Hardy-Weinberg equilibrium
	<b>Paper- XVI: Plant Nutrition and Reproduction</b>	Understand the concept of PTC & its applications
		To understand the concept of reproduction in plants
		To learn about phytohormones
		To understand the concept of water relation in plants
To learn about biochemical basis of plant diseases and concept of plant disease resistance.		
<b>Subject: Electronics</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Sc. I, 1S</b>	<b>Paper –I: Basic Electronics</b>	Understand the construction, working and applications of various types of resistors,

		<p>inductors, capacitors and transformers.</p> <p>Understand the concept of KCL, KVL and Network Theorems and their applications</p> <p>Understand the basic principle, construction, working, their uses and drawbacks of various Measuring Instruments. Understand the Construction, working and uses of CRO</p> <p>Understand the operation and characteristics of various types of diodes and rectifiers</p> <p>Understand the concept of unregulated and regulated power supply, zener diode voltage regulator and IC regulator</p> <p>Understand the construction, working, operation and characteristics of NPN and PNP transistor. Their Configuration and Biasing Modes</p> <p>Understand the construction, working, characteristics and their switching action of FET, MOSFET, UJT, SCR, DIAC, TRIAC</p> <p>Understand the construction, working and characteristics of optoelectronics devices (LED, LDR, photodiode, Photovoltaic cell)</p> <p>Understand the concept of IC technology, classification, advantages, disadvantages and basic steps of IC fabrication</p>
<p><b>B. Sc. I, 2S</b></p>	<p><b>Paper- II: Digital Electronics</b></p>	<p>Understand different number system and their conversions, Various operations of Binary arithmetic and binary codes</p> <p>Identify and use of basic and universal logic gates in digital circuits. Construction and working of adder circuits</p> <p>Understand the Boolean laws, simplification of Boolean equations and De-morgan's theorem. Simplification of K-map and logic families</p> <p>Understand the construction and working of multivibrators.</p> <p>Learn Concept of different types of Flip-flops with logic diagram, truth table, construction and working. Understand the function of preset and clear</p> <p>Understand the construction and working various types of counters and shift registers and their applications</p>

		Understand the construction working, and applications of different types of encoder, decoder, multiplexer, demultiplexer
		Understand the concept of memory, it's classification, applications and memory hierarchy
<b>B. Sc. II, 3S</b>	<b>Paper- III: Electronics devices and circuits</b>	Learn different Hybrid-parameters of the circuits and its importance for the circuit analysis. And types of coupling, interconnections and applications of various amplifiers.
		Understand classification and applications of power amplifiers. Also learn Construction, working, advantages and disadvantage of power amplifiers.
		Understand designing of amplifiers for various practical purposes.
		Learn concept of positive and negative feedback, and its necessity in any kind of circuits. Construction, working, advantages and disadvantages of various types of oscillators.
		Learn characteristics, parameters, construction, working and various applications of Operational Amplifiers. Can explain and design practical circuits for various applications.
		Learn about advance applications of Operational Amplifiers.
		Developed their ability for solutions of various simultaneous equations.
		Understand necessity, and specifications of various Analog-to-Digital converters and Digital-to- Analog converters. Solve numerical based inter-conversions of A/D and D/A Converters. Perform the related practicals and analyzed the given data.
<b>B. Sc. II, 4S</b>	<b>Paper- IV: Communication Electronics &amp; Microprocessor 8085</b>	Comprehends the need of Modulation and Demodulation in Electronics communication systems. Learn different parameters of the circuit for communication purposes. Learn types of Transmitter and Receiver circuits, modulation methods and its applications.
		Learn classification and applications of various optical fibers. Understand Construction, working, advantages and disadvantages of Optical fiber communication systems.
		Understand selection of optical sources & optical detectors for practical purposes.
		Understand Pulse Modulation, and its necessity. Learn construction, working, advantages and disadvantages of various Pulse Modulations and conversions of audio signal into equivalent Pulse Modulation formats.

		<p>Learn about specifications, characteristics, and working principle of 8085 Microprocessor.          Know constructional architecture and various application and operation modes.          Explain, draw various timing diagrams for various instructions and applications.</p> <p>Students get clear understanding about various instruction and its classification.          Developed their ability for algorithm, flowchart and assembly language programming.          Explain and write programs for Addition, Subtraction, Division, Multiplication and so on.</p> <p>Understand basic interfacing concepts and specifications of various I/O schemes.          Learned about interfacing of PPI IC-8255, Analog-to-Digital and Digital-to-Analog converters and so on.          Solve numerical based inter-conversions of A/D and D/A Converters.</p>
<p><b>B. Sc. III, 5S</b></p>	<p><b>Paper- V: Basic Instrumentation</b></p>	<p>Understand concept of generalized Instrumentation System with block diagram like transducers, how they work and their types, Primary and Secondary transducers, Active and Passive transducers, Analog and Digital transducers, Resistive, Inductive and Capacitive transducers with examples</p> <p>Understand various thermal sensors like thermocouple, thermopile, thermistor and RTD through their working, linear temperature sensor IC's like LM34 and IC LM35</p> <p>Understand measurement of temperature in various temperature range using remote sensing thermometers</p> <p>Understand the pyrometers like Total Radiation and Infrared Pyrometer</p> <p>Understand what basically the timer circuit is and the IC555 for it with block diagram</p> <p>Understand the applications of IC 555 as an Astable, Monostable and Bistable MV with circuit construction and working</p> <p>Understand abovementioned Multivibrators expressions for Time period and Frequency</p> <p>Understand PLL (Phase Lock Loop) with block diagram and its working, characteristics of PLL, PLL applications as FM demodulator, AM detector and frequency synthesizer concepts</p> <p>Understand basics of various types of digital displays and their types with their</p>

		<p>advantages and disadvantages</p> <p>Understand digital instruments measuring frequency, voltage and capacitance with block diagram and its functioning</p> <p>Understand broader classification of recorders with its necessity</p> <p>Understand what is sensor and its principle and various types of it like mechanical, thermal, optical, magnetic and chemical</p> <p>Understand Actuators with working principle of dc motor to clear the concept. Electro thermal and Electro optical type Actuators through Bent Beam type and LED</p> <p>Understand interdisciplinary concept of change in biological parameters to be measured electronically</p> <p>Understand Electrodes their types , bio potential concept.</p> <p>Understand various bio electronic machine's like ECG, EEG, X-Ray, Instantaneous heart rate meter, Systolic and Diastolic blood pressure meter, Ear oximeter and laser Doppler Blood flow meter through basic block diagrams with applications</p>
<p><b>B. Sc. III, 6S</b></p>	<p><b>Paper- VI: Advance Microprocessor and Microcontroller</b></p>	<p>Understand basics of the 8086, 16-bit up its block diagram and sectional divisions as EU and BIU., operating modes of 8086, various registers of 8086 with their purpose</p> <p>Understand concept of segmented memory , instruction pointer, status flag and pin diagram of 8086.</p> <p>Understand the concept of obtaining physical and effective address</p> <p>Understand the advancements of 8086 to that of 8085.</p> <p>Understand and develop the skill of writing programs in 8086</p> <p>Understand various addressing modes and how the changes in program takes place on changing of the addressing mode</p> <p>Understand the basic difference between Microprocessor and Microcontroller</p> <p>Understand the various blocks of 8051 uc block diagram with various registers and their sizes</p>

		Understand the various memories, timers, counters, ports and interrupts in 8051 uc
		Understand various instructions used in and syntaxes allowed in 8051 to learn effective programming in it.
		Understand various addressing modes and how the changes in program takes place on changing of the addressing mode
		Understand the most important bit level instructions and programming, the unique character of microcontroller 8051
		Understand the basics of serial communication and types of communication
		Understand RS 232 and its interfacing
		Understand SCON and PCON registers
		Understand interfacing of ADC and DAC with 8051uc and waveform generation
		Understand power reduction / down modes of 8051
		Understand basics of advance uc 32 bit AVR and its various parameters
		Understand ALU, Program and data memories, downloadable flash memory, SRAM data memory and General purpose registers and EEPROM data memory
		Understand how AVR ucs proves itself powerful than uc

**Subject: Home Science**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to.....)</b>
<b>B. Hsc. I, 1S</b>	<b>Course Outcome of Semester –I</b>	Develop skills of communication in English and Marathi by knowing their importance in academic and professional growth.
		Understand the role of Home Science in development of family, community and nation Acquaint with the Home Science discipline.
		Know systematic process of management and role of goal, values, standards etc.
		Understand the decision making process. Sensitize with family resources
		Understand the Physiology of human body. understand the integrated functions of all

		<p>systems of the body.</p> <p>Understand food composition and chemistry of food.</p> <p>Realize the importance of environment &amp; ecology &amp; various household technologies.</p> <p>Understand importance and cultivation of fruits and medicinal plants.</p>
<b>B. H.Sc. I, 2S</b>	<b>Course Outcome of Semester –2</b>	<p>Understand the functions of food and the role of various nutrients, requirements and their effects of deficiency and excess.</p> <p>Make familiar with the different methods of cooking and methods of improving the nutritional quality of food.</p> <p>Develop skill of preparing nutrient rich recipes.</p> <p>Introduce the students to the major concepts of Human Development.</p> <p>Acquaint the students about the areas of Human Development.</p> <p>Understand the physiology of Human Body &amp; integrated functions of all systems of the body.</p> <p>Impart knowledge pertaining to basic principles of dyeing.</p> <p>Acquaint with the materials, reagents, equipment's and processes involved in laundering.</p> <p>Sensitize them the difference in the laundering processes used for different fabrics.</p>
<b>B. Hsc. II, 3S</b>	<b>Course Outcome of Semester –3</b>	<p>Understand elements and principles of art and design.</p> <p>Develop an understanding to the application of art principles in design composition of traditional and contemporary art, architecture and textile and interior design.</p> <p>Develop skills in interior designs and making art objects. Gain better understanding of principles of interior designing.</p> <p>Provide adequate facility of work, relaxation, rest, comfort, privacy, maintenance and aesthetic etc.</p> <p>Understand Concept of an adequate diet and the importance of meal planning. Nutritional needs during the life cycle and the R.D.A. for various age groups.</p> <p>Get comprehensive view of child at each stage of development, developmental stages of</p>

		<p>young children and important aspects of development during the whole life span. Understand the issues face and adjustment required at each stage across the life span.</p> <p>Acquaint with proper notion regarding choice of the fabric. Develop skills in clothing construction. Acquaint with the different textiles and their performance. Acquaint with the yarn and their testing.</p> <p>Understand the concept of extension education, role of extension worker. Understand the need and importance of programmes for national development.</p> <p>Know the basics of Computers. Use computers for education, information.</p> <p>Understanding of the basic principles of Biochemistry (as applicable to Human Nutrition). Obtain an insight into the Biochemistry of major nutrients and physiologically important compounds. Apply the knowledge acquired to Human Nutritional dietetics.</p> <p>Understand architecture of internet. Its use in self-study and Search information related to the subject.</p>
<b>B. HSc. II, 4S</b>	<b>Course Outcome of Semester –4</b>	<p>Understand principles of planning various types of residential space and furnishing. Learn drawing house plan, furniture layout, creating design of furniture items. To develop the skill of flower arrangement.</p> <p>Understand the diet therapy, Modification in nutrient consistency and texture. Common nutritional problems &amp; their dietary management.</p> <p>Get knowledge about preschool programmes &amp; its relations to onward formal education. Understand meaning of curriculum &amp; various components to be included in the daily programme to promote all round development of children.</p> <p>Get knowledge on different textile finishes and become aware of the factors affecting children’s clothing, clothing construction techniques.</p> <p>Get acquainted with extension teaching methods and aids, knowledge of leadership in the community, concept of community &amp; community development organization.</p> <p>Develop skills of working on M.S. Excel and MS Power Point and soft wares related to</p>

		Home Science.
		Develop an understanding of the principles of Biochemistry (as applicable to Human Nutrition). Obtain an insight into the Biochemistry of major nutrients and physiologically important compounds. Apply the knowledge acquired to Human Nutritional dietetics.
		Acquainted with the different forms of electronic media. Understand the role of electronic media in communication and extension. And develop the skill in writing the different forms of electronic media.
<b>B. HSc. III, 5S</b>	<b>Course Outcome of Semester –5</b>	To create awareness among the students about management at family level. Understand the factors influencing kitchen design of a family, use of time, money and energy management.
		To understand the factors to be considered during selection of basic food commodities.
		Understand about the characteristics of children with special need, different psychological aspects of development. Develop regarding family and child welfare.
		Develop creativity in designing of the textile & clothing. Impart knowledge of principles of arts and elements of art.
		Understand the importance of communication for extension, skill of communication & extension. Get knowledge of mass communication.
		To know the environmental hygiene and value of sanitation.
		Manage and organize various events.
<b>B. HSc. III, 6S</b>	<b>Course Outcome of Semester –6</b>	To understand the factors influencing kitchen design. Learn different materials of a family used for various surfaces in kitchen. Know the principles of kitchen planning, dimensions of work centres and storage.
		Understand the concept of nutritional status & its relation to health. Know the methods used for assessment of nutritional status. Know effective methods of nutrition education.
		Make aware of the family in relation to social changes. Create awareness regarding the contemporary issues in family studies. Learn family as a primary social institution and its

		role in the all-round development of the individual.
		Impart knowledge of pattern making, regional embroidery and Regional Textile Costume.
		Get acquainted with the knowledge of programme planning and Extension Evaluation and its analysis.
		Know the personal & community hygiene. Understand the physical environment.
		Enhance some creativity and management skills.

**Subject: Home Science (Food Science & Nutrition)**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Food Science</b>	Understand composition of various food stuffs. Learn the changes occurring in various food stuffs as a result of processing and cooking Get theoretical knowledge in various applications and food preparations.
	<b>Paper- II: Human Physiology</b>	Understand the basic physiology and physiological functioning in human. Understand relationship of physiology and role of nutrition.
	<b>Paper- III: Food and Human Behavior</b>	Understand indicators of human behaviour. Know various factors influence dietary practices of individual. Understand consequences of the behaviour on health. Know means of modifying food behaviour. Develop skills of developing scale.
	<b>Paper- IV: Nutrition Programme Design and Evaluation</b>	Understand the process of programme design. Develop ability in planning nutrition programmes.
	<b>Paper- V: Computer Application in Food Statistics</b>	Understand use of excel in analysis of data related to food and nutrition. Develop skills of drafting text, tables, figures, etc.
<b>M. Sc. I, 2S</b>	<b>Paper- VI: Food Microbiology</b>	Gain knowledge of role of microorganisms in human and environment. Understand the importance of microorganisms in food spoilage. Understand the role of microbes in food borne disorders and approaches to food safety.

	<b>Paper- VII: Nutritional Biochemistry</b>	<p>Acquired knowledge basic Biochemistry.</p> <p>Understand the mechanism adopted by human body for regulation of metabolic pathways.</p> <p>Become proficient for specialization in nutrition.</p> <p>Perform biochemical analysis with accuracy and reproducibility.</p>
	<b>Paper- VIII: Communication Application in Nutrition</b>	<p>Understand use of communication approaches in improving nutritional status of the population of different sector.</p> <p>Develop skill of preparing tools of communication.</p>
	<b>Paper- IX: Entrepreneurship Development in Food</b>	<p>Provide conceptual inputs regarding entrepreneurship development in food.</p> <p>Sensitize and motivate towards entrepreneurship development.</p> <p>Get knowledge to identify and implement entrepreneurship opportunities.</p>
	<b>Paper- X: Research Methods in Nutrition</b>	<p>Know importance of research in food science and nutrition.</p> <p>Understand the types, tools applicable to research problem.</p> <p>Construct common data collection tools.</p> <p>Develop skills of preparing out line of research work.</p>
<b>M. Sc. II, 3S</b>	<b>Paper- XI: Food Product Development</b>	<p>Develop products which could meet consumers need and nutritionally and commercially viable.</p>
	<b>Paper- XII: Sensory Evaluation</b>	<p>Use various methods for evaluating of variety of foods.</p> <p>Analyze and interpret sensory evaluation data.</p>
	<b>Paper- XIII: Therapeutic Nutrition</b>	<p>Understand the etiologic, physiologic and metabolic anomalies of acute and chronic diseases on nutritional status and nutritional &amp; dietary requirements.</p> <p>Provide appropriate nutritional care for prevention and treatment of the various diseases.</p>
	<b>Paper- XIV: Biochemical Correlation with Nutritional Therapy</b>	<p>Correlate signs and symptoms, pathological condition of patient and nutritional requirement.</p>
	<b>Paper- XV: Dietetic Techniques &amp; Patient Counselling</b>	<p>Critically appraise, plan and organize/ supervise preparation and service of different kinds of therapeutic diets in hospital dietary service.</p> <p>Develop skills for patient counselling.</p>

		Interact effectively with patients and their families and to give dietary advice in the context of the patients socio-cultural and economic miller.
<b>M. Sc. II, 4S</b>	<b>Paper- XVI: Food Informatics</b>	Develop skill in data base management
	<b>Paper- XVII: Current Issues in Food &amp; Nutrition</b>	Understand current trends, issues and research in various aspects of Food Science and Nutrition. Make debate on various emerging areas in Food Science and Nutrition.
	<b>Paper- XVIII: Scientific Writing</b>	Understand national/International standards of scientific writing and develop skill of writing research reports.
<b>Subject: Home Science (Human Development)</b>		
<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Theories of Human Development</b>	Understand the need of theory in human development for practical application. Critically evaluate the cross cultural applicability of theory.
	<b>Paper- II: Problems of Human Nutrition</b>	Understand nutritional problems of India, their causes, treatment, prevention and control measures. Know various approaches in nutrition and health interventions, prevention and control measures.
	<b>Paper- III: Psychology of Human Behaviour</b>	Sensitize with importance of psychology of human behaviour. Understand Personality Traits. Develop skill of measurement of IQ, EQ and Personality.
	<b>Paper- IV: Human Development Programme Design and Evaluation</b>	Understand the process of programme design. Develop ability in planning human development programmes.
	<b>Paper- V: Computer Application in Human Statistic</b>	Understand use of computer in statistical analysis in human development. Develop skills of drafting text, tables, figures etc. with the help of computer.
<b>M. Sc. I, 2S</b>	<b>Paper- VI: Psychological Testing</b>	Become aware of psychological tests suitable for assessing human development. Know various psychological tests.

	<b>Paper- VII: Communication Approaches in Human Development</b>	Understand use of Communication Approaches in Human Development. Develop skill of preparing tools of communication.
	<b>Paper- VIII: Entrepreneurship in Human Development</b>	Provide conceptual inputs regarding entrepreneurship development in human development. Sensitize and motivate towards entrepreneurship development. Identify and implement entrepreneurship opportunities.
	<b>Paper- IX: Human Anatomy and Physiology</b>	Understand the integrated functions of all systems. Understand of some of the relevant issues and topics of human physiology.
	<b>Paper- X: Research Methods in Human Development</b>	Know importance of research in human development. Understand the types, tools applicable to research problem. Develop skills of preparing outline of research problem.
<b>M. Sc. II, 3S</b>	<b>Paper- XI: Working With Parents and Community</b>	Learn importance of parent and community involvement for overall development of young children. Understand the nature of welfare programmes.
	<b>Paper- XII: Child &amp; Human Rights</b>	Sensitize with child and human rights. Learn why sensitization and how to sensitize.
	<b>Paper- XIII: Advanced Child Development</b>	Develop broad perspectives in studies of historical and research trends in children. Learn recent developments in human development studies.
	<b>Paper- XIV: Behavioural Problems, Child Guidance and Counselling</b>	Get acquainted with various techniques of Guidance , understanding children. Provide the information about the characteristics of children with special needs. Give the factual information about the types of handicaps and their causes.
	<b>Paper- XV: Child with Special Needs</b>	Integrate knowledge about special needs. Know the various areas of requirements of children with special needs. Develop the understanding regarding educational facilities and rehabilitation of children with special needs.
<b>M. Sc. II, 4S</b>	<b>Paper- XVI: Personal Empowerment</b>	Know the importance of personal empowerment and its ways.

		Understand the need of empowerment of women.
	<b>Paper- XVII: Current Trends and Issues in Human Development</b>	Became aware regarding current trends, issues and researches related to various aspects of human development. Understand the importance of innovative / new programme in the field. Develop an understanding of the role of advocacy in promoting issues and concerns related to human development.
	<b>Paper- XVIII: Scientific Writing</b>	Understand national/International standards of scientific writing and develop skill of writing research reports.

**Subject: Home Science (Textile & Clothing)**

<b>Class</b>	<b>Course</b>	<b>Outcome (Students will be able to....)</b>
<b>M. Sc. I, 1S</b>	<b>Paper- I: Advanced Textile Design</b>	Develop awareness and appreciation of art and aesthetic in textile. Impart creative and technical skills for designing textiles with special emphasis on structural design.
	<b>Paper- II: Textile Chemistry</b>	Understand textile chemistry production and fundamental properties of natural and synthetic fibres. Understand the theory of dyeing in relation to various classes of dyes.
	<b>Paper- III: Programme Design and Evaluation</b>	Understand the process of programme designing. Develop ability in planning programmes related to textile and clothing.
	<b>Paper- IV: Entrepreneurship Development in Textile and Clothing</b>	Promote entrepreneurship skills among students. Understand the process and procedure of setting up small enterprise. Develop management skills for entrepreneurship development.
	<b>Paper- V: Computer application in Textile and Clothing</b>	Understand use of computer in statistical analysis in textile statistics. Develop skills of drafting text, tables, figures etc. with the help of computer
<b>M. Sc. I, 2S</b>	<b>Paper- VI: Fashion and Apparel Design</b>	Create awareness of fashion and apparel design as an art and science of visualizing,

		<p>creating and developing fashions.</p> <p>Focus on design elements and principles, garment details on.</p> <p>Develop and understand the principles of pattern making through flat pattern.</p>
	<b>Paper- VII: Textile Testing and Quality Control</b>	<p>Acquaint the students about physical properties of textiles.</p> <p>Familiarize students with various testing equipment.</p> <p>Impart knowledge of various test methods applied to textile in various stages.</p> <p>Understand the quality control and standardization.</p>
	<b>Paper- VIII: Textile Clothing and Human Psychology</b>	<p>Study the psychological effect of clothing on the individual in social situation.</p> <p>Impart knowledge regarding the factors that affect making clothes for individual in terms of texture, fabric growth, development etc.</p>
	<b>Paper- IX: Communication Approaches in Textiles and Clothing</b>	<p>Understanding regarding vital aspects of communication and various audio visual media/ mass media and their use.</p> <p>Become familiar with important communication programmes.</p> <p>Develop skills to prepare and use communication tools.</p>
	<b>Paper- X: Research Methods in Textile and Clothing</b>	<p>Know importance of research in textile and clothing.</p> <p>Understand the types, tools applicable to research problem.</p> <p>Develop skills of preparing out line of research work.</p>
<b>M. Sc. II, 3S</b>	<b>Paper- XI: Pattern Making</b>	<p>Enable the students to make sketch / photograph.</p> <p>Enable the students to obtain perfect fit and harmony between fabric and design of garment.</p>
	<b>Paper- XII: Fashion Illustration</b>	Develop skills of sketching and rendering
	<b>Paper- XIII: Fashion Making and Merchandising</b>	<p>Impart knowledge regarding the marketing environment and the prevalent merchandising practices.</p> <p>Guide the process of product development towards the market needs.</p>
	<b>Paper- XIV: Advanced Apparel Construction</b>	<p>Develop skills in pattern making.</p> <p>Create awareness of quality assurance norms and evaluating quality in apparel.</p>

	<b>Paper- XV: Fashion Communication</b>	Critically appreciate and understand the intricacies of the fashion industry and to impart skill of communication comprising of visualisation and illustration.
<b>M. Sc. II, 4S</b>	<b>Paper- XVI: Current Trends in Textile Clothing</b>	Awareness regarding current trends, issues and researches related to Textile and Fashion Designing.
	<b>Paper- XVII: CAD in Textile and Fashion</b>	Develop different types of weaves, making punch cards from the graphs. Learn scanning of already printed fabrics and the process of printing out colour separation. Work on computer for fashion illustration.
	<b>Paper- XVIII: Scientific Writing</b>	To understand national/International standards of scientific writing and develop skill of writing research reports