Course outcome Semester wise

Course: BSc

Subject: Botany

I Semester

Microbial diversity, Algae, Fungi, Plant Pathology and Bryophytes

- Acquaint knowledge about distribution of microbes
- Importance and role of microbes
- Knowledge about diseases of economically important plants

II Semester

Pteridophytes, Gymnosperms, Anatomy of Angiosperms and Reproductive Biology

- Diversity of spore bearing plants
- Distribution of naked seeded plants
- Fossil formation and extinct plants
- Internal, epidermal structures of Angiosperms
- Reproductive Biology helps in understanding plant breeding, crop improvement activities

III Semester

Morphology and Taxonomy of Angiosperms and Plant Propagation

- Diversity of flowering plants
- Useful plants products
- Medicinal uses to cure ailments
- Learning the methods of propagation

IV Semester

Plant physiology and Evolution

- Knowledge of physiology helps in understanding the basic requirements of plants growth and development of plants.
- Unique features of plants like maintaining ecological balance by evolving oxygen and carbon dioxide etc.,
- Understand the evolving of present day plant groups

V Semester

Cell biology, Molecular Biology and Ecology (Elective 1)

- Learning basic structural organization at molecular level
- It helps in understanding the genetic engineering techniques
- Understand nature of plants with their habitat

VI Semester

Genetics, Genetic Engineering, Plant Breeding And Plant Biotechnology (Elective 3)

- Learning gene action in plants
- Importance of genetic engineering in the field of agriculture, medicine etc.,
- Knowledge about bringing new varieties of crop plants by plant breeding centres particularly in India

Subject: Chemistry

I Semester

- The fundamental properties and basic model of atoms, simple quantum mechanical treatments of atoms and shapes of the orbitals which are important to understand the reaction mechanism and formation of molecule.
- The arrangement of elements in the periodic table in different blocks and the variation of different properties in the periodic table and the factors responsible for the variation.
- Basic concept of organic chemistry identify basic types of chemical reactions in organic chemistry.
- Types of indicators used in different reactions and the theory involved in it, miscibility of different liquid mixtures at respective temperatures, principles of fractional distillation and applications, distribution laws and applications and the students will be able to work out numerical problems.
- Use of the concept of the mole in quantitative chemical calculations, understand stoichiometric relationshipinvolved in reactions.
- Use of different methods of purification of compound and naming of different organic compounds in IUPAC system. Role of organic compounds in daily life.

II Semester

- The bonding fundamentals of ionic and covalent compounds, including bond energies using MO diagrams.
- Predicting geometries of simple molecules with the use of theory.
- Stability of conformational isomers of cycloalkanes, naming of different aromatic hydrocarbons different naming reactions aromatic derivatives, and effect of nature of alkyl groups, leaving groups, nucleophiles and solvents on nucleophilic substitution reaction.

  Students learn how reaction rates are measured and represented in rates laws and application of chemical kinetics.
- Ionic equilibria; theory of strong electrolytes, degree of hydrolysis, effect of temperature and dilution on degree of hydrolysis.
- Preparation and synthetic applications of organic reagents, types and classification of polymers, solving numerical problems on determination of molar mass of polymer.
- Comparison of organic and inorganic precipitates how soaps and detergents act on dirt in cleaning process.

III Semester

- Position of the transition elements in the periodic table, chemistry of inner transition elements, chemistry of organometallic compounds and structures of few rare organometallic compounds.
- Types of alcohols and their preparations and uses, classification of phenols, why phenol is corrosive and few naming reaction associated with phenols,

chemistry of ethers, epoxides, crown ethers and carbonyl compounds and the mechanism involved with few important reactions.

- Need for the thermodynamics of second law, significance of entropy, calculating bond energy, bond dissociation energy and resonance energy using thermodynamic data.
- X-ray crystallographycal studies and numerical problems in solving the crystals, different cromatographycal techniques and its use in separation, knowledge of different energy sources, fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, methods of nanomaterials preparation, aminoacids which are the building blocks of proteins and one can think of constructing new peptide bonds at nano level.

IV Semester

- Bonding in complexes and types, Concept of VBT and CFT in understanding the geometry of complexes, application of complexes in treating cancer and heavy metal poisoning, Ligan field theory which is the evidence for cbonding in complexes.
- Sterochemistry of organic compounds, types of isomerism in organic chemistry, classification of carbohydrates, structural elucidation of carbohydrates like glucose fructose.
- Partial structure of polysaccharides.
- Elemental quantum mechanics, concept of black body radiation, to determine equivalent conductance at infinite dilution for weak electrolyte, transport number, application of conductance measurements and conductometric titrations.
- Classification of acids and bases as Hard and Soft, gravimetric estimations and its advantages.
- Structure and synthesis of dyes.
- Concept of viscosity measurements, intermolecular forces, size and weight of the molecules, surface tension and parachor.

V Semester

- Industrial applications of inorganic chemistry in manufacturing of glass, ceramics, cements, study of paints in dept.
- Synthetic method of preparing terpenes, Synthesis of different class of heterocyles which play a very important role in pharmaceutical chemistry.
- Structure and classification of alkaloids, uric acids, vitamins, harmones, different chemotherapeutic agents and their synthesis.
- Photochemistry and radiation chemistry, new spectroscopic methods like IR, Raman Spectroscopy, molecular spectroscopy, electronic spectra.

VI Semester

- Types of metallurgy and metallurgical applications of inorganic chemistry in manufacturing of different metals and their purification.
- Production of ferro alloys.

- structure and role of metal ion in biological system with reference to Na+, K+ and Ca2+, Mg2+ ions , enzymatic role of metals in heamoglobin and myoglobin. Natyral pigments, hydroxyl
- synthesis of organic polymers by utilizing special techniques, classification and synthesis of nucleic acids, hydroxyl acids, diazonium compounds.
- Spectroscopic method of identification of compounds; IR, UV visible and NMR spectroscopy in depth.
- Electrochemistry ; cell construction, applications of EMF measurements, concept of phase equilibria, adsorption and kinetics of fast reactions and principles of techniques stopped flow method, flash photolysis, temperature jump method and pressure jump method.

Subject: Biotechnology

I Semester

DSC 1

- Biomolecules : Students learn to identify chemical elements. Compare and contrast the structure and function of the carbohydrates, proteins, nucleic acids, lipids. Identify their chemical elements and functional groups .Recognize the structure of sugars & amino acid and the peptide bond that connects di-, tri, and polypeptides.
- Cell Biology: Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles, how these cellular components are used to generate and utilize energy in cells and understand the cellular components underlying mitotic cell division.
- Genetics : Genetics introduces the principles of evolutionary and quantitative characters to students. They will understand relationships between molecule/cell level phenomena ("modern" genetics) and organism-level patterns of heredity ("classical" genetics) and will test and deepen their mastery of genetics by applying this knowledge in a variety of problem-solving situations such as Laws of segregation and independent assortment.

DSC 2

- Microbiology : Students learn classification of micro organisms, isolation, culture , staining, identification, pure culture techniques, maintenance and preservation of cultures etc.
- Enzymology: Students will study enzyme structure, cofactor and coenzymes chemical structure , factors that affect enzyme activity, such as , pH , concentration.
- Cellular Metabolism: Students learn the metabolic pathways - the energy-yielding and energy-requiring reactions in life and understand the diversity of metabolic regulation.

DSC 3

- Bio-Analytical Techniques: Students learn the basic principle and applications of gel electrophoresis, chromatographic separations and centrifugation techniques.
- Molecular Biology: Students learn the molecular mechanism of DNA replication, transcription and Translation; Compare the structure of eukaryotic genes with the structure of simpler prokaryotic genes.
- Genetic Engineering: They study on enzymes used in genetic engineering, polymerase chain reaction (PCR), gene transfer techniques, genetic engineering applications, production of transgenic animals and plants and their products.

DSC4

- Immunology and Immuno technology: Students learn the basic mechanisms of innate and adaptive immunity, the cellular/molecular pathways of humoral/cell-mediated adaptive responses, regulation of immune responses and immune tolerance, cytokine biology.
- Medical Biotechnology: This study includes study on recent advances in biotechnology in the field of medicine like vaccine therapy, hormone therapy, enzyme therapy, cytokine therapy, MCA therapy, gene therapy, antisense technology, nucleic acids in treatment and diagnosis of diseases.

DSE 1

- Plant Cell and Tissue Culture: Students study the vast application of plant tissue culture which includes Anther culture, pollen culture, germplasm conservation, somaclonal variation, synthetic seeds, somatic embryogenesis, protoplast technology, micropropagation, ovary/ovule/embryo culture etc.
- Animal Tissue Culture: Students learn the theory and practice of animal tissue culture with their role and applications in biotechnology and biochemical research. The topics covered in this course include media preparation, sterile techniques, aseptic handling, initiation and routine maintenance of cells in culture, common contaminants of animal cell culture, and understanding of some of the applications of cell culture technology e.g. somatic cell fusion and hybridoma technology.
- Reproductive Technology: Students will learn the principle and applications of artificial methods of conception – test tube baby, ZIFT, IUD, Contraception etc.

DSE 2

- Environmental Biotechnology: Students will learn the biotechnological methods in pollution abatement, biodegradation of xenobiotic compounds, biohydro metallurgy and bio-mining, treatment of industrial wastes: pulp, dye, leather and solid waste management and eco friendly bio-products.
- Agricultural Biotechnology : Students will learn the applications of research areas of Agricultural Biotechnology that include: gene cloning, construction of novel pest and disease resistance genes, development of new immunological and nucleic acid types of diagnostic probes for plant and animal disease, genetic engineering of microorganisms for the production of important pharmaceutical agents, and development of new bioengineered strains of microorganisms for fermentation and food production services.
- Food Biotechnology : The course discusses food processing and enzymes involved in food processing , fruit ripening and its manipulation, role of ACC syntheses, genetically modified foods- Golden rice, transgenic potato, transgenic fish, biotechnology in dairy industry.