

SYLLABUS

OBJECTIVES: To enable the students to

1. Comprehend the structure, properties and functions of biomolecules.
2. Learn about structure and functions of DNA, RNA, Vitamins & bioenergetics.
3. Have expertise in characterization of biomolecules using analytical techniques.
4. Get insight on principles of spectroscopy, microscopy & techniques.
5. Understand the basic concept on biostatistics.

COURSE OUTCOMES: Students will

- **CO1:** Be aware of structure and properties of carbohydrates, proteins and lipids.
- **CO2:** Be familiarized with DNA & RNA; and have insight into glucose metabolism
- **CO3:** Be acquainted with different methods in centrifugation, chromatography & electrophoresis
- **CO4:** Be proficient in concepts of spectroscopy, microscopy and radioactivity.
- **CO5:** Acquire knowledge on various methods in statistics

Unit-I: Carbohydrates, Proteins and Lipids

1. Classification, structure, properties of carbohydrates, amino acids, peptide bond and peptides.
2. Classification, structure (primary, secondary, tertiary, quaternary) and functions of proteins. denaturation and renaturation of proteins.
3. Classification structure and properties of saturated and unsaturated fatty acids.

Unit-II: Nucleic acids, Vitamins and Bio-energetics

1. Structure and functions of DNA and RNA.
2. Source, structure, biological role and deficiency manifestation of vitamins A, B, C, D, E and K. Free energy, entropy, enthalpy and redox potential.
3. High energy compounds, Electron-Transport System and Oxidative Phosphorylation.

UNIT III: Centrifugation, Chromatography and Electrophoresis

1. Basic principles of sedimentation and types of centrifugations.
2. Principle, instrumentation and application of partition, absorption, paper, TLC, ion exchange, gel permeation, affinity chromatography.
3. Basic principles and types of electrophoresis, factors affecting electrophoretic migration. PAGE (Native, SDS-PAGE). Introduction to 2D electrophoresis & Isoelectric Focusing.

Unit-IV: Spectroscopy, Microscopy and Radioactivity

1. Beer-Lambert law, light absorption and transmission. Extinction coefficient. Design and applications of photoelectric colorimeter and UV-visible spectrophotometer. Introduction to crystallography and application.
2. Types and design of microscopes - compound, phase contrast, fluorescent electron microscopy (TEM, SEM).
3. Introduction to radioisotopes, measurement of radioactivity (scintillation counter and autoradiography).

Unit-V: Biostatistics

1. Mean, median, mode, standard deviation
2. One-way ANOVA, Two-way ANOVA.
3. T-test, F-test and chi-square.

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