

BACHELOR OF SCIENCE

5th SEMESTER

DISCIPLINE SPECIFIC ELECTIVES (DSEs)

BT520D1: BIO-TECHNOLOGY: BIOTECHNIQUES

CREDITS: THEORY – 4, PRACTICAL – 2(4+2)

OPTION-I

THEORY (4 CREDITS: 60 HOURS)

MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objective: This course is designed to give students exposure to various techniques and instruments used in biotechnology.

Unit – 1 (15 Hours)

Microscopy: principle, working and applications of light microscopy - bright-field, dark-field, phase-contrast, fluorescence & confocal microscopy, electron microscopy - TEM and SEM; Staining – principle and procedure of simple staining, negative staining & differential staining; **Spectroscopy:** principle, working and applications of ultraviolet / visible light spectroscopy (UV/Vis spectroscopy).

Unit – 2 (15 Hours)

Centrifugation- Basic principles and applications of preparative and analytical centrifugation (differential centrifugation & density-gradient centrifugation), ultracentrifugation and its applications; **Chromatography** – Principle, working and applications of thin-layer chromatography, ion-exchange chromatography, gel filtration and affinity chromatography

Unit – 3 (15 Hours)

Electrophoresis: General principle and types; Principle, procedure and applications of native polyacrylamide gel electrophoresis, sodium dodecyl sulphate-polyacrylamide gel electrophoresis, isoelectric focusing, two-dimensional gel electrophoresis and agarose gel electrophoresis; **Blotting techniques:** Southern, northern & western blotting; **PCR** – principle, types and application.

Unit – 4 (15 Hours)

Immunological techniques: Principle, procedure and application of immunodiffusion, immunoelectrophoresis, enzyme linked immunosorbent assay (ELISA) and radioimmunoassay (RIA); **Radioisotope techniques:** Concept of radioisotopes, types and properties of radioactive decay, units of radioactivity, characteristics of radioisotopes commonly used in biology, measurement of radioactivity.

PRACTICALS (2 CREDITS: 60 HOURS) MAXIMUM MARKS: 30, MINIMUM MARKS: 12

1. Paper chromatography.
2. SDS-PAGE.
3. Agarose gel electrophoresis.
4. Demonstration of Western blotting.
5. Demonstration of ELISA/RIA
6. Demonstration of PCR.

BOOKS RECOMMENDED

1. Principles and Techniques of Biochemistry and Molecular Biology: Wilson, K. and Walker, J. – Cambridge University Press.
2. Physical Biochemistry – Applications to Biochemistry and Molecular Biology: Freifelder, D. – W. H. Freeman and Company.
3. Molecular Cloning - A Laboratory Manual: Sambrook, J. and Russell, D. W. - Cold Spring Harbor Laboratory Press.

Expected Learning Outcomes:

1. Understanding of biophysical and molecular biology techniques and their applications.