

BACHELOR WITH BIOTECHNOLOGY AS MAJOR
4th SEMESTER

BTG 422J1: BIOTECHNIQUES

CREDITS: THEORY – 3, PRACTICAL – 1

MAXIMUM MARKS: 75, MINIMUM MARKS: 27

- **Course Learning Objective:** This course is designed to expose student to different techniques, handling instruments understand their working and applications for research and analysis.
- **Course outcome:** A student will be able to;
 - prepare specimens and use different types of microscopes for observation and use of UV-Vis spectroscopy for different applications.
 - Separate, purify and characterize different bio molecules using centrifugation and chromatographic techniques.
 - Analyze, separate and identify nucleic acids and proteins by different electrophoretic and blotting techniques.

Unit -1 15 hours

Centrifugation: General principle of centrifugation, sedimentation coefficient, 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. HPLC.

Unit -2 15 hours

Electrophoresis: General principle and types; Principle, procedure and applications of native poly acrylamide gel electrophoresis, sodium dodecyl sulphate polyacrylamide gel electrophoresis, isoelectric focusing, two-dimensional gel electrophoresis and agarose gel electrophoresis, pulse field gel electrophoresis.

Blotting techniques: Southern, northern & western blotting; **PCR:** principle, methodology and applications.

Unit -3 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: Beer-Lambert's law. Principle, working and applications of ultraviolet/visible light spectroscopy (UV/Vis spectroscopy).

PRACTICALS (1 CREDITS: 15 hours) Maximum Marks: 25, Minimum Marks: 9

1. Use of microscope – simple attaining and differential staining (Gram staining)
2. Separating cells from broth/plasma separation from blood.
3. Paper chromatography/TLC
4. SDS-PAGE.
5. Amplification of a gene by PCR/demonstration.
6. Agarose gel electrophoresis.

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.