Master of Science (Biotechnology)
M.Sc. (Biotechnology) Semester (II)

Course Code	PS02EBIT54	Title of the Course	Microtechniques
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To teach various light and electron microscopes. 2. To teach material processing for permanent slide preparation light and electron microscopes. 3. To teach various microtomes for wax embedded and resin embedded material. 4. To teach the techniques for enzyme localization

Course Content		
Unit	Description	Weightage* (%)
1.	Light microscopy Properties of lenses, Optical corrections, Properties and types of objectives, Oculars and Illumination. Light microscopes: Bright field, dark field, fluorescence, phase contrast, polarizing, differential interference contrast. Micrometry and photomicrography.	
2.	Basic components of electron microscopes. Thermionic and field emission guns. Types of electron microscopes: TEM, SEM, STEM, ESEM and HVEM	
3.	Maceration, squash and clearing techniques. Sample preparation for light microscopy. Classification of fixatives, formulas', (Plant and animal samples). Sample preparation for light microscopy: Fixation, dehydration and infiltration procedures. Embedding media for light microscopy. Stains and staining procedures- negative and positive staining procedures. Microtomes: Rotary, sliding, cryostat. Histochemical localization of metabolites for light microscopy: Starch, proteins, lipids, total carbohydrates, lignins, polyphenols, nucleic acid, histones, cutin, suberin and waxes. Localization of enzymes: Peroxidase, acid phosphatase and succinic dehydrogenase.	
4.	Freeze etching and freeze fracturing. Sample preparation for Electron microscope: Fixatives, double fixation, dehydration and infiltration procedures, embedding media for electron microscopy. Fixation and embedding of particulate samples like bacteria, virus etc. ultra-microtome and freezing ultramicrotomesemi thin sectioning, ultrathin sectioning, grids, formavar coating, Staining for electron microscopy. Ultrastructural cytochemistry: Tannin, protein, cell wall	

	polysaccharide, lignin and membrane. Enzymes: Peroxidase and phosphatase. Immunocytochemistry.	
...		

Teaching-Learning Methodology	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Students will have thorough understanding of modern development in light and electron microscopy.
2.	Students will be able to process plant/ animal samples for permanent slide preparation.
3.	Students will gain knowledge regarding various biological stains.
4.	Students will be able to localize various enzymes in plant/animal tissue.

Suggested References:	
Sr. No.	References
1.	Microscopy and Microtechnique: R Marimuthu MJP Publisher, Chennai

2.	• The study of plant structure: Principles and selected methods- T. P. O' Brien and M E McCully
3.	Plant Microtechnique- Johansen, DA, McGraw Hill Book Co., New York.
4.	Botanical Microtechnique and Cytochemistry;Graeme P. Berlyn and Jerome P Micksche.

On-line resources to be used if available as reference material
On-line Resources

*****