Semester	**IV**
Course [*1]	**Skill Enhancement Course**
Paper Code	**S2BT230411T**
Paper Title	**TECHNIQUES IN MOLECULAR AND CELL BIOLOGY**
No. of Credits [*2]	**3**
Theory / Practical / Composite	**Full Theory**
Minimum No. of preparatory hours per week a student has to devote	3
Number of Modules	2
Syllabus	**Module A** **Molecular Biology Methods** **UNIT I: Gene transfer:** Gene transfer in bacteria - Conjugation, transformation and transduction **UNIT II: Tools and techniques:** Concepts of genomic DNA, cDNA, plasmids and episomes; Restriction enzymes; Gel electrophoresis; Northern and Southern hybridization; Protein purification methods; DNA-protein and protein-protein interaction techniques (South-western blots, EMSA, DNase I foot printing, Immunoprecipitations- Chromatin immunoprecipitation, Co-immunoprecipitation). Introduction to PCR. Cloning and sub-cloning strategies. **No. of Classes: 1.5 Classes per week** **Module B** **Cell Biology Methods** **UNIT III: Microscopy and centrifugation methods -** Bright Field and Dark field microscopy, phase contrast microscopy, fluorescence microscopy, Scanning and transmission electron microscopy, AFM. Sedimentation and density gradient techniques, subcellular fractionation methods. **UNIT IV: Histochemical assays and immunotechniques:** Biochemical reporter assays; protein localization and interaction techniques; histochemical stains; in situ localization techniques - FISH and GISH; ELISA and Flow cytometry; chromosome banding. **UNIT V: Electrophysiological methods** – Neurophysiology techniques, pharmacological testing, Imaging techniques – PET, MRI, fMRI, CAT.
Learning Outcomes [*3]	• Give the students an essence of tools and techniques used in molecular biology. • Provide knowledge about gene transfer methods in bacteria. • Expose students to cell biological tools and techniques. • Provide an overview of histochemical assays, immunotechniques, electrophysiological and biophysical methods
Reading/Reference Lists [*4]	• Principles of Genetics- Gardner et al. • An Introduction to genetic analysis- David Suzuki • Genetics- Strickberger • Molecular Cloning: A Laboratory Manual - Sambrook and Russell • Principles of Gene Manipulation & Genomics-Primrose & Twyman • Biophysical Chemistry - David Friefelder

	• Cell and Molecular Biology – P. Sheeler, D.E. Bianchi (3rd Edition) • Wilson And Walker's Principles And Techniques Of Biochemistry And Molecular Biology- Eighth Edition • Brock Biology Of Microorganisms, Microbiology, Fourteenth Edition, By Pearson, 14th Edition • Molecular Biology of the Cell, 7th Ed, by Bruce Alberts • Lippincott Illustrated Reviews: Cell and Molecular Biology (South Asian Edition) - by Dr Poonam Agrawal	
Evaluation	**Theory (50)** CIA- 10 Assignment – 03 Attendance - 02 End-Semester Exam- 35	
Paper Structure for Theory Semester Exam	**Module A (18 marks)** : 3 questions, 2 marks each; i.e. 2x3=6 marks 2 questions, 6 marks each; i.e. 2x6=12 marks. **Module B (17 marks) :** 5 questions, 1 mark each; i.e. 1x5=5 marks 2 questions, 6 marks each; i.e. 2x6=12 marks.	