Semester – I

C2: Cell Biology (Theory MBTCR1022T; Practical MBTCR1022P)

Theory: CIA: 10 Marks; End-Sem: 50 Marks
Practical: 40 Marks

Module A: (25 marks) **(2 Classes per week)**

Cell membrane, cytoskeleton and sub cellular organelles

UNIT I: Cell: Introduction and classification of organisms by cell structure, cytosol, compartmentalization of eukaryotic cells, cell fractionation.

Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model, membrane as a dynamic entity.

UNIT II: Cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments

UNIT III: Subcellular organelles:

Lysosomes: Vacuoles and micro bodies: Structure and functions and dysfunction
Ribosomes: Structures and function including role in protein synthesis.
Mitochondria: Structure and function and dysfunction, Genomes, biogenesis.
Nucleus: Structure and function, chromosomes and their structure.
Endoplasmic reticulum: Structure, function including role in protein segregation.

Module B: (25 marks) **(2 Classes per week)**

Cell-cell communication

UNIT IV: Extracellular matrix – Composition, molecules that mediate cell adhesion, membrane receptors for extra cellular matrix, macromolecules, regulation of receptor expression and function, Signal transduction, integrin, cell-cell junctions

UNIT V: Cancer: Carcinogenesis, agents promoting carcinogenesis, characteristics and molecular basis of cancer, apoptosis

Teachers involved: Dr. Chandana Barat (Module A); Dr. Aryadeep Roy Choudhury (Module B)

Practical

1. Study of effect of temperature and organic solvents on semi permeable membrane.
2. Demonstration of dialysis.
3. Study of plasmolysis and de-plasmolysis.
4. Cell fractionation and determination of enzyme activity in organelles using sprouted seed or any other suitable source.
5. Study of structure of any Prokaryotic and Eukaryotic cell.
6. Section cutting, double staining of animal tissues like liver, oesophagus, stomach, pancreas, intestine, kidney, ovary, testes.
7. Cell division in onion root tip/ insect gonads.
8. Preparation of nuclear & cytoplasmic fractions.
9. Preparation of buffers.
10. Qualitative tests for Carbohydrates, lipids and proteins.

Teachers Involved: Dr. Aniruddha Banerji, Dr. Aryadeep Roy Choudhury

Texts & Reading/Reference Lists:

1) The Cell – A Molecular Approach – G.M. Cooper, R.E. Hausman
2) Molecular Biology of the cell - Bruce Alberts
3) Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. John Wiley & Sons.Inc.
4) De Robertis, E.D.P. and De Robertis, E.M.F. 2006.Cell and Molecular Biology.