SEMESTER - II

Course Type: MINOR Course Code: BOTAMIN202 Course Name: Cell Biology Credits: 4 (Theory-3, Practical-1) Full Marks: 80 (Theory-60, Practical-20)

Brief Course Description:

This course deals with topics in Cell Biology. In particular, the course will cover the structural organization and functions of prokaryotic and eukaryotic cell, cellular organelles and cytoskeleton. It also gives an idea of cell division.

Prerequisite(s) and/or Note(s):

(1) High School Biology.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives:

Knowledge acquired:

1) Clear idea about the structures and functions of basic components of prokaryotic and eukaryotic cells, especially cytoskeletons, membranes, and organelles. (2) Detailed knowledge of cell cycle and cell division.

Skills gained:

(1) Measurement of cell size.

- (2) Technique of Chromosome study.
- (3) Characterize plasmolysis and deplasmolysis.

Competency Developed:

(1) Student learn the structure and function of different parts of cell and its importance.

(2) Distinguish between the stages of cell division.

THEORY

Total lectures: 45

Unit 1: The cell

Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Endosymbiotic theory.

Unit 2: Cell wall and plasma membrane (S_{M})

Chemistry, structure and function of plant cell wall; Plasma membrane - Chemical composition and function, Fluid mosaic model; Membrane transport - Diffusion, Osmosis, Passive, active and Facilitated diffusion.

Unit 3: Cell organelles (524)

Nucleus - Structure of nuclear envelope, nuclear pore complex, nuclear lamina, structure of chromatin, nucleolus; Chloroplast, mitochondria and peroxisomes - Structural organization and functions; Endoplasmic reticulum - Structure and function; Golgi apparatus - Organization and function; Lysosomes - Structure and function.

Unit 4: Cell division

Mitosis and meiosis: Different stages and significance; Phases of eukaryotic cell cycle.

Unit 5: Cellular macromolecules (\mathcal{BL})

Carbohydrates - Nomenclature and classification with examples; Lipids - classification with examples; Fatty acids - structure and functions; Amino acids - Classification and examples; Proteins - peptide bond, properties and biological role of proteins, levels of protein structure; Properties and function of enzymes; Nucleic acids - Structure and types.

PRACTICAL

Total classes: 15

- 1. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf.
- 2. Measurement of cell size by the technique of micrometry.
- 3. Study of cell and its organelles with the help of electron micrographs.
- 4. Study the phenomenon of plasmolysis and deplasmolysis.
- 5. Study of different stages of mitosis by squash technique.
- 6. Qualitative tests for reducing sugars, non-reducing sugars, lipids and proteins.

(7 lectures)

(12 lectures)

(6 lectures)

(14 lectures)

(6 lectures)

(5-46)

Suggested Readings

1. Campbell MK (2012) Biochemistry, 7th edition, Published by Cengage Learning.

2. Campbell PN and Smith AD (2011) Biochemistry Illustrated, 4th

edition, Published by Churchill Livingstone.

3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd edition, W.H.Freeman.

4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company.

5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th edition, W.H. Freeman and Company.

6. Karp G (2010). Cell Biology, 6th edition, John Wiley & Sons, U.S.A.

7. Hardin J, Becker G, Skliensmith LJ (2012) 8th edition Becker's World of the Cell, Pearson Education Inc. U.S.A.