**St. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM**

**w.e.f. AY 2023-24**

**III Semester**

**Course No- 4 CELL BIOLOGY**

**Code- BCH Ma2 2802 (3)**

**No. of Credits -3 Hrs/Wk- 3**

**COURSE OBJECTIVES**

To enable students to-

* To study the cell organelles in prokaryotic and eukaryotic cells.
* Detailed information on Cell division, Cell cycle regulation with cdk and cyclins, MPK, MPF.
* To know the cell communication, molecules, proteins in cell adhesion and desmosomes, hemidesmosomes, gap junctions, extracellular matrix, integrins.
* Knowledge on ER mediated Protein Sorting and Targeting
* Knowledge on Composition of plasma membrane and various transport mechanisms.

**COURSE OUTCOMES**

Students will be able to-

CO1- Differentiate Prokaryotic and Eukaryotic cells

CO2- Illustrate cell division and its regulation

CO3- Explain protein involved in cell communication and cell signal transduction

CO4- Narrate protein secretion and post translational modifications

CO5- Explain cell membrane structure and membrane transport methods

**UNIT-I**

**Prokaryotic and Eukaryotic cells:**

Cell organelles- Structure, Composition and functions of nucleus, mitochondria plastids, endoplasmic reticulum, Golgi, lysosomes, vacuole, microbodies, ribosomes, cytoskeleton.

**UNIT-II**

**Cell division:**

Mitosis, meiosis, cell cycle and its regulation, different phases of cell cycle.

Apoptosis, Regulation of cell cycle, Cyclins, MPF, Cyclin dependent kinases, Growth

factors, Nuclear Laminins.

inhibition of cell cycle progression,

Check points in cell cycle regulation.

**UNIT-III**

**Cell communication:**

General principles of cell communication

Cell adhesion and roles of different adhesion molecules

**Signal transduction:**

Cell surface receptor, G-protein coupled receptors.

Signal transduction pathways, second messengers.

Regulation of signalling pathways, bacterial and plant two component systems, bacterial chemotaxis, and quorum sensing.

**UNIT-IV**

**Protein Sorting and Targeting:**

Overall pathway of synthesis of nuclear coded, secretory, lysosomal and membrane proteins.

Import across ER – Signal hypothesis, post translational modifications of secretory/ membrane proteins in ER

**UNIT-V**

**Bio membranes:**

Chemical composition of Membranes, Composition of plasma and organelle membranes of animal and plant cells.

Molecular structure of membranes: Miscelle, and liposomes.

Biological membrane structure: Symmetry of the membrane; Membrane fluidity; **fluid mosaic model of biological membranes.**

Membrane Transport: Donnan membrane equilibrium, Diffusion across cellular membranes,

Passive transport anion exchange proteins; Active transport- Active transport of Na+ K+ (Sodium potassium ATPase), Ca2+ (Ca2+-ATPase).

**Recommended Books**

1. Goldman, Emanuel, and Lorrence H. Green, eds. Practical handbook of microbiology. CRC Press, 2015.

2. Dubey, R. C., and D. K. Maheshwari. Practical microbiology. S. Chand, 2002.

3. Microbiology: A laboratory manual by Cappuccino and Sherman, Pearson Education, 6th Ed