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**Question Paper Code: R2C05**

B.E./B.Tech. DEGREE EXAMINATION, DEC 2025

First Semester

Biotechnology

R21UBT205- CELL BIOLOGY

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. This jelly like substance inside the plasma membrane in which all cell organelles are floating is CO1-U  
(a) Cytoplasm            (b) Tonoplasm            (c) Karyoplasm            (d) Cell sap
2. Cell wall of fungi is made up of CO1-U  
(a) lignin            (b) Quin            (c) chitin            (d) cellulose
3. Nuclear DNA replicates in the \_\_\_\_\_ phase. CO1-U  
(a) G2 phase            (b) M phase            (c) S phase            (d) None of the above
4. Which of the following signal molecules is not used for extracellular signaling? CO1-U  
(a) Autocrine            (b) Endocrine            (c) Cyclic AMP            (d) None of the above
5. Microfilaments are composed of a protein called CO1-U  
(a) Tubulin            (b) Actin            (c) Myosin            (d) Chitin

PART – B (5 x 3= 15 Marks)

6. Cells consist of many organelles, yet we do not call any of these organelles as structural and functional unit of living organisms. Generalize the reason. CO1-U
7. Relate Phagocytosis with Pinocytosis CO1-U
8. Summarize apoptosis. CO1-U
9. State the role of G proteins in a signaling pathway CO1-U
10. Write any two applications of cell biology techniques in biotechnology. CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Discuss the structural differences and similarities between animal and plant cells and their significance. CO1-U (16)  
Or  
(b) Explain the structure and functions of various cell organelles and discuss how they work together to maintain cellular function. CO1-U (16)
12. (a) Summarize symport, antiport and uniport. Explain in detail about sodium-potassium pump and calcium pump. CO1-U (16)  
Or  
(b) Explain the various mechanisms of passive and active transport across the plasma membrane and discuss their biological significance with suitable examples. CO1-U (16)
13. (a) Explain how the apoptotic pathways are targeted towards Cancer Therapeutics. CO1-U (16)  
Or  
(b) Explain the different stages of the cell cycle and the molecular events that occur during each phase. CO1-U (16)
14. (a) Describe the structure and function of G-protein coupled receptors (GPCRs) and their role in intracellular signaling. CO1-U (16)  
Or  
(b) Explain the steps involved in cell signal transduction, highlighting the roles of receptors, second messengers, and effector proteins in transmitting signals within the cell. CO1-U (16)
15. (a) Describe the working principles of light, phase contrast, and electron microscopes and compare their uses in cell biology. CO1-U (16)  
  
(b) Describe the any two microscopy techniques used in cell biology and relate how each contributes to understanding cell structure and function. CO1-U (16)