

June : 2026

**BIOTECHNOLOGY**

Paper: BTH-C-201

**Foundations of Molecular Cell Biology**

**Time: 2 Hours**

**Total Mark: 45**

*(The figures in the right margin indicate full marks of the questions)*

1. Answer the following questions: 1×5=5
  - a) Which DNA polymerase mainly synthesizes the lagging strand in prokaryotes?
  - b) Name the protein complex that regulates progression through the cell cycle.
  - c) What is the role of aquaporins in membranes?
  - d) What is the principle of phase contrast microscopy?
  - e) What is the function of telomeres?
  
2. Answer the following questions (*any three*): 4×3=12
  - a) Discuss apoptosis as a form of programmed cell death and explain its biological significance. 4
  - b) What is flow cytometry? Write a note on its application.
  - c) Describe the role of sigma factor in prokaryotic transcription with suitable example.
  - d) Differentiate between euchromatin and heterochromatin.

- e) Write briefly on nuclear pore complex. What is the role of aquaporins in membranes.
  - f) Discuss the role of histones in DNA packaging and mention its significance.
13. Answer the following questions (*any three*): 4×7=28
- a) Compare endocytosis and exocytosis in eukaryotic cells with suitable examples and explain their biological importance
  - b) Describe different types of cell signaling. Discuss the GPCR mediated signaling pathway.
  - c) Describe the principle and applications of electron microscopy in cell biology.

**Or**

Discuss the role of aseptic technique in maintaining cell culture. Differentiate between primary and secondary cell lines.

- d) Discuss the mechanism of DNA replication in prokaryotes.

**Or**

Explain the mechanism of nuclear transport in eukaryotic cells with suitable diagram.

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