

Duration : 3 Hours

Total marks : 75

- Note : 1. All questions are compulsory.  
2. Figures to right indicates full marks.

**Q. NO. I Choose the correct option and write it down. 20**

- Which of the following is NOT a characteristic of prokaryotic cells?
  - Presence of membrane-bound organelles
  - Lack of a true nucleus
  - Presence of ribosomes
  - Circular DNA molecule
- The final phase of Mitosis is called as -----
  - Metaphase
  - Interphase
  - Anaphase
  - Telophase
- Which of the following best describes the structure of the cell membrane?
  - A single-layered phospholipid bilayer with embedded proteins
  - A double-layered phospholipid bilayer with peripheral proteins
  - A single-layered phospholipid monolayer with integral proteins
  - A triple-layered phospholipid trilayer with extrinsic proteins
- Which of the following statements best describes a component of the cell theory?
  - All cells have a nucleus.
  - All cells arise from pre-existing cells.
  - All cells contain chloroplasts.
  - All cells are visible to the naked eye.
- Who is known as the father of Molecular biology?
  - Linus Carl Pauling
  - James Watson
  - Francis H. Crick
  - Mahlon B. Hoagland
- What is the primary function of the Rho factor in prokaryotic transcription?
  - Initiating transcription
  - Elongating the RNA transcript
  - Termination of transcription
  - Proofreading the RNA transcript

7. What is molecular biology primarily concerned with?
  - A. The study of individual cells and their functions
  - B. The study of the structure and function of molecules within cells
  - C. The study of ecosystems and their interactions
  - D. The study of genetics and heredity in organisms
8. Which enzyme helps in the loading and activation of t-RNA?
  - A. Ribozyme
  - B. Aminoacyl synthetase
  - C. Peptidyl transferase
  - D. RNA polymerase
9. Which of these processes ensure the haploid phase of life cycle?
  - A. Fission
  - B. Mitosis
  - C. Meiosis
  - D. Fertilization
10. What are the subunits of prokaryotic ribosomes?
  - A. 50S, 30S
  - B. 60S, 40S
  - C. 70S, 30S
  - D. 60S, 30S
11. Arrange the phases of mitosis in the correct order:
  - A. Interphase → Prophase → Metaphase → Telophase → Anaphase
  - B. Prophase → Metaphase → Anaphase → Telophase → Interphase
  - C. Interphase → Prophase → Metaphase → Anaphase → Telophase
  - D. Prophase → Metaphase → Anaphase → Telophase → Interphase
12. Which level of protein structure involves interactions between distant amino acids in the polypeptide chain?
  - A. Primary structure
  - B. Secondary structure
  - C. Tertiary structure
  - D. Quaternary structure

13. Which of the following structures is unique to eukaryotic cells?
- A. Cell wall
  - B. Nucleoid
  - C. Ribosomes
  - D. Nucleus
14. Which of the following is a function of the cell membrane?
- A. Selective permeability
  - B. Storage of genetic material
  - C. Synthesis of proteins
  - D. Regulation of cell shape
15. For translating a codon, its corresponding anticodon is present on:
- A. m-RNA
  - B. t-RNA
  - C. r-RNA
  - D. All of them
16. If a DNA sample contains 13% adenine, what percentage of the sample contains cytosine?
- A. 13%
  - B. 37%
  - C. 26%
  - D. 74%
17. Which represents the correct sequence of stages in the cell cycle?
- A. G<sub>1</sub>, G<sub>2</sub>, S, M
  - B. G<sub>1</sub>, G<sub>2</sub>, M, S
  - C. M, S, G<sub>1</sub>, G<sub>2</sub>
  - D. G<sub>1</sub>, S, G<sub>2</sub>, M
18. What is the primary function of protein kinases in cellular signalling?
- A. Facilitating DNA replication
  - B. Promoting protein degradation
  - C. Modifying the activity of proteins by phosphorylation
  - D. Regulating membrane fluidity

19. What type of bond stabilizes the alpha-helix and beta-sheet structures in proteins?
- Hydrogen bonds
  - Ionic bonds
  - Covalent bonds
  - Disulfide bonds
20. Which of the following enzymes is responsible for catalyzing the synthesis of RNA from a DNA template during transcription?
- DNA ligase
  - RNA polymerase
  - DNA helicase
  - DNA polymerase

**Q. NO. II Answer ANY TWO of the following.**

**20**

- Explain the process of meiosis with neat and labelled diagram.
- Describe the four levels of protein structure. Add a note on positive control of protein synthesis
- Elaborate on process of translation with neat labelled diagram.

**Q. NO. III Answer ANY SEVEN of the following.**

**35**

- Write a note on protein kinases & their functioning.
- Explain the main differences between transcription and translation in protein synthesis.
- What is cell signals? Write a note on receptors for cell signals.
- Describe the double helix structure of DNA.
- Write a note on cellular activities & their checkpoints.
- Write a note on structure of the cell membrane.
- Discuss different types of RNA found in cells with their respective functions.
- Explain the central dogma (molecular information flow) of molecular biology.
- Compare eukaryotic and prokaryotic cells in terms of their structure and organization.