



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2024)

First Semester

BIOTECHNOLOGY

24BTT101: Concepts of Biology

COURSE OUTCOMES

- CO1:** Apply the principles of carbon bonding, energy transformations between biomolecules and salient features of water to investigate the various domains of life.
- CO2:** Analyse the structural features and functions of macromolecules.
- CO3:** Apply the fundamental concepts of genetics to explore the modified Mendelian patterns, and different postulates to understand the origin of life.

Time: Three Hours

Maximum Marks: 100

PART A (4 * 20 = 80 Marks)
Answer all the Questions

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|----|----|--|---|-----|-------------------|
| 1. | a) | Differentiate between configuration and conformation with examples. | 4 | CO1 | [K ₂] |
| | b) | Explain the role of entropy in biological systems. | 4 | CO1 | [K ₃] |
| | c) | Scenario: A biological system shows a sudden disruption in energy transformations. Analyze how this affects metabolic and generative processes. | 6 | CO1 | [K ₄] |
| | d) | Scenario: Evaluate how structural features of water molecules facilitate survival in extreme environments. | 6 | CO1 | [K ₅] |
| 2. | a) | Classify carbohydrates based on their structure with examples. | 4 | CO2 | [K ₂] |
| | b) | Describe the structural differences between Fischer and Haworth projections of glucose. | 4 | CO2 | [K ₃] |
| | c) | Discuss the structural features of cellulose and its functions in plants. | 4 | CO2 | [K ₄] |
| | d) | Analyze the role of sucrose in human metabolism and energy storage. | 4 | CO2 | [K ₄] |
| | e) | Evaluate how carbohydrate derivatives contribute to cellular recognition and signaling. | 4 | CO2 | [K ₅] |
| 3. | a) | Classify lipids and provide examples of their biological functions. | 4 | CO2 | [K ₂] |

- b) Explain how fatty acids contribute to membrane integrity. 4 CO2 [K₃]
- c) Analyze the structural features and functions of phospholipids in forming biomembranes. 4 CO2 [K₄]
- d) Evaluate the impact of cholesterol on membrane fluidity and cellular functions. 4 CO2 [K₄]
- e) Propose strategies to study the influence of saturated and unsaturated fatty acids on cell function. 4 CO2 [K₅]
- 4 a) List the functional roles of amino acids in enzyme catalysis. 2 CO2 [K₂]
- b) Define peptide bonds and their significance in protein structure. 2 CO2 [K₃]
- c) Discuss the functional importance of myoglobin in O₂ binding and storage. How does its structure support its role in maintaining O₂ supply in muscle tissues under low oxygen concentration. 12 CO2 [K₄]
- d) Analyze the relationship between protein secondary structures (α -helix, β -pleated sheets) and their contribution to stability 4 CO2 [K₅]

PART B (1 x 20 = 20 Marks)
Answer any ONE Question

5. a) Differentiate between structure of DNA and RNA. 2 CO2 [K₄]
- b) Describe the key structural features of Watson and Crick model of DNA. 2 CO2 [K₂]
- c) Discuss the significance of nucleotide triphosphates in energy transfer. 6 CO2 [K₅]
- d) Analyze the role of single-stranded RNA in viral replication. 6 CO2 [K₅]
- e) Evaluate the importance of nucleic acids in modern biotechnology applications, such as gene therapy. 4 CO2 [K₅]

OR

6. a) Describe Francesco Redi's experiment and its contribution to disproving spontaneous generation. 2 CO3 [K₄]
- b) Define the RNA World hypothesis and its implications in molecular evolution. 2 CO3 [K₄]
- c) Describe the Urey-Miller experiment and its significance in prebiotic chemistry. 12 CO3 [K₅]
- d) Illustrate the endosymbiotic theory. 4 CO3 [K₅]

CO distribution summary:

	CO1	CO2	CO3
Marks (%)	20	60	20
