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Question Paper Code:R3C04

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

Third Semester

R21UBT304 - BIOCHEMISTRY

Biotechnology

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Write the physical properties of water CO1- U
2. Do water and oil mix? Justify your statement. CO2- App
3. What are enantiomers is give examples? CO1- U
4. How biologically important macromolecules are formed from their monomeric subunits? Give suitable example. CO2- App
5. What are the biological functions of dietary carbohydrates? CO1- U
6. Based on the concept of nutritional classification of amino acids, Why are some amino acids conditionally essential? CO3- App
7. What are isoenzymes? Mention their unique diagnostic value. CO1-U
8. A rise in body temperature from 37°C to 42°C leads to reduced enzyme activity. Analyze the molecular reason. CO4 -Ana
9. Define enthalpy and entrophy. CO1-U
10. How many ATP are produced (net gain) in glycolysis from one molecule of glucose? CO3-Ana

PART – B (5 x 16= 80 Marks)

11. (a) Write in detail about the structure and components of the cell. CO2- App (16)
How animal cell is different from plant cell?
Or
(b) Establish the role of Biochemistry in the field of Medicine. Give CO2- App (16)
its advantages in different diagnostic methods used in health care.

12. (a) Explain the phenomenon of mutarotation with suitable examples. CO3- App (16)
Discuss its importance in carbohydrate chemistry.
- Or
- (b) Evaluate the importance of glycosaminoglycans and proteoglycans in extracellular matrix organization and connective tissue function. CO3- App (16)
13. (a) Protein misfolding can lead to diseases like Alzheimer's and prion diseases. Analyze how alterations in protein folding affect structure and function. CO4 - Ana (16)
- Or
- (b) Explain the molecular basis of sickle cell anemia as an example and investigate how a single amino acid change alters protein structure and function. CO4 - Ana (16)
14. (a) A laboratory reports that K_m of enzyme X for substrate A is lower than for substrate B. Apply your knowledge of enzyme kinetics to predict which substrate will bind more efficiently. Justify with Michaelis-Menten concepts CO3- App (16)
- Or
- (b) A new drug is designed to inhibit an enzyme by simulating its substrate. Apply your knowledge of enzyme inhibition to explain how the drug would affect K_m and V_{max} . CO3- App (16)
15. (a) Explain the mechanism of oxidative phosphorylation and yield of ATP due to biological oxidation of NADH and FADH₂. CO1- U (16)
- Or
- (b) Explain the energetics of glucose pathway. Mention its importance in biological system. CO1- U (16)