Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U4D04

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Biotechnology

21UBT404-PROTEIN ENGINEERING

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Highlight the chemical properties of aminoacids and also state the differences between standard and non-standard amino acids with examples	CO1- U
2.	Inhibitory neurotransmitters list contain one amino acid. Think and apply and mention its properties also	CO1- U
3.	Unfolded proteins have high content of PPII helices identified by spectroscopic methods. Comment on the helix geometry of poly proline helices	CO2- App
4.	2.27 helix is different from 3.10 helix .How they are structurally and functionally different	CO1- U
5.	Both Myoglobin and haemoglobin stores oxygen .But their mechanism is different.How is it possible ?	CO1- U
6	“X amino acid that act as helix breaker “.Name the X, Mention its structure and functions	CO2- App
7	Span in transmembrane protein shows the direction of signal transduction".Justify the statement and give me some examples of protein with their span number	CO2 -App
8	How Racemisation is related to ageing process ?	CO1- U
9	Interpretation of NMR spectra differ with low resolution NMR spectrum from high resolution NMR Spectrum. How this Interpretation varies.	CO2- App
10	Figure out the various techniques for determining the secondary and tertiarystructure of protein	CO1 -U

PART – B (5 x 16= 80 Marks)

11.	(a)	How many RBCs are there in an average 70kg person? The concentration of Hb in RBC is 330g/lt. The relative molecular weight of Hb is 64500Da and volume of a RBC is 86fl.How many molecules of Hb are there in 1RBC? Mention the functions of hemoglobin	CO2 -App	(16)
		Or		
	(b)	A person was doing a research with acidic and basic amino acids to produce a novel Deep Eutectic solvent (DES). He studied thermodynamic and physico-chemical properties of DES but he couldn't interpret the results since he lacks the knowledge on chemistry behind acidic and basic amino acids. Help him out	CO2- App	(16)
12.	(a)	To facilitate peptide formation with minimal side reactions, chemical groups have been developed that bind to the amino acid reactive groups and block, or protect, the functional group from nonspecific reaction. Articulate the peptide bond details including confirmation of peptide bond and geometry of peptide linkage	CO2- App	(16)
		Or		
	(b)	Amino acid degradation pathways have significant role in molecular pathogenesis. Articulate its pathways with an example of disease	CO2 -App	(16)
13.	(a)	The protein functions depend on the 3D arrangement of their residues and the underlying energetic interaction network. Explain in detail with various illustrations	CO3 -Ana	(16)
		Or		
	(b)	Justify the following Case study The initial crude paper electrophoresis system leads to modern automated electrophoresis system, This development is due to advancement in technology like miniaturization, precision engineering, biochemistry and electrical and electronics. These advancements were introduced to meet the requirement for faster and better resolution of results. Discuss the various types in detail and also explain its changes	CO3 -Ana	(16)

14.	(a)	The Proton transfer in bacterial reaction centres and bacterial rhodopsin occur through several step by step mechanisms. Justify and Articulate the steps behind photosynthetic reaction centre and bacteriorhodopsin mechanism	CO2 -App	(16)
		Or		
	(b)	Help a Scientific illustrator to prepare a scientific report on Serine protease and Abzymes with illustrations and complete details	CO2- App	(16)
15.	(a)	Accurate, consistent, and transparent data processing and analysis are integral and critical parts of proteomics workflows in general .Validate the statement and discuss the concept of proteomics in detail	CO1- U	(16)
		Or		
	(b)	"Networks of protein–protein interactions provide a framework for the understanding of biological processes and can give insights into the mechanisms of diseases. Interaction networks can assist in designing drugs that modulate specific disease pathways" Articulate the above concept and give in detail about protein arrays and also various other techniques for protein-protein interaction	CO1- U	(16)