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GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Eight Semester – Regular) Examinations, April– 2024

BOEBT8010 - Protein Engineering

(Biotechnology)

Time: 3 hrs

Maximum: 70 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)

(1 x 10 =10 Marks)

Q.1. Answer ALL questions

		[CO#]	[PO#]
a. The structure formed by joining the amino acids by a peptide bond is called _____ structure of a protein		CO1	PO1
(i) Quaternary	(ii) Primary		
(iii) Secondary	(iv) Tertiary		
b. Which of the following factors is not responsible for the denaturation of proteins?		CO1	PO1
(i) Heat	(ii) Adding detergent		
(iii) pH change	(iv) Adding water to protein		
c. Which of the following techniques is used to determine the protein structures?		CO1	PO2
(i) X-ray crystallography	(ii) UV-Vis spectroscopy		
(iii) Magnetic resonance imaging (MRI)	(iv) IR spectroscopy		
d. Which of the following forces is the most favourable for protein folding?		CO1	PO2
(i) Conformational entropy	(ii) Hydrophobic interactions		
(iii) Vander Waals interactions	(iv) Hydrogen bonding		
e. Which of the following is not an application of protein engineering?		CO2	PO2
(i) Synthesis of chimeric proteins	(ii) Modification of natural proteins		
(iii) Construction of novel proteins	(iv) Multiplication of natural proteins		
f. Which of the following is the process of developing proteins with the desired function by manipulating the stability and specificity of a protein?		CO2	PO3
(i) Protein amplification	(ii) Protein assay		
(iii) Protein expression	(iv) Protein engineering		
g. Which of the following is done for the directed evolution of the proteins with an unknown structure?		CO3	PO2
(i) Site-directed mutagenesis	(ii) Specific mutations		
(iii) Non-random mutations	(iv) Random changes (mutations)		
h. Creation of mutant proteins with novel properties is called _____		CO3	PO5
(i) Cloning	(ii) Protein engineering		
(iii) Mutagenesis	(iv) Sequencing		
i. Which of the following factors does not influence electrophoretic mobility?		CO4	PO2
(i) Molecular weight	(ii) Shape of molecule		
(iii) Size of molecule	(iv) Stereochemistry of molecule		
j. Sodium dodecyl sulfate (SDS) used in SDS PAGE is _____.		CO4	PO2
(i) An anionic detergent	(ii) A cationic detergent		
(iii) A non-ionic detergent	(iv) An anion exchanger		

PART – B: (Short Answer Questions)**(2 x 10=20 Marks)**Q.2. Answer ALL questions

	[CO#]	[PO#]
a. Define Bragg's law with equation.	CO1	PO2
b. Define London force.	CO1	PO1
c. Which amino acids contribute the maximum fluorescence emission of protein?	CO2	PO3
d. What is the effect of pH and temperature on stability of protein?	CO2	PO2
e. Define site directed mutagenesis.	CO3	PO1
f. How the stability of protease can be increased?	CO3	PO2
g. What are the properties of proteins can be obtained by analyzing with IR spectroscopy?	CO3	PO1
h. Write down any two computational approaches in protein design.	CO4	PO1
i. What is hyperfine splitting?	CO4	PO5
j. Emphasize the factors affecting electrophoresis of protein.	CO4	PO5

PART – C: (Long Answer Questions)**(10 x 4=40 Marks)**Answer ALL questions

	Marks	[CO#]	[PO#]
3. a. Discuss about the hierarchy of protein structure.	7	CO1	PO1
b. Write the applications of protein engineering.	3	CO1	PO1
(OR)			
c. Discuss briefly about the forces that stabilizing the protein structure.	5	CO1	PO2
d. Write the notes on Ramachandran plot.	5	CO1	PO3
4. a. Discuss the methods of stabilization of engineered protein.	6	CO2	PO2
b. Write notes on protein folding.	4	CO2	PO3
(OR)			
c. How protein can be stabilized by chemical modification? Explain.	6	CO2	PO3
d. Illustrate the techniques of solvent perturbation.	4	CO2	PO5
5. a. Explain about the experimental methods used in protein engineering.	8	CO3	PO2
b. Write notes on rational design of protein.	2	CO3	PO3
(OR)			
c. Explain the methods of site directed mutagenesis to generate the engineered protein.	6	CO3	PO2
d. Write the methods of module shuffling.		CO3	PO3
6. a. Explain the principle and instrumentation of UV-V is spectrophotometry for analysis of engineered protein.	7	CO4	PO2
b. Write the principle of X-ray crystallography.	3	CO4	PO2
(OR)			
c. How NMR can be used to determine the structure of protein? Explain the principle of NMR.	6	CO4	PO5
d. Discuss the principle of SDS-PAGE for the separation of protein.	4	CO4	PO5

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