JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

M.Sc.-II Semester (BT)

COURSE CODE (CREDITS): 20MS1WBT213 (2) MAX. MARKS: 15

COURSE NAME: Protein Engineering

COURSE INSTRUCTOR: Dr. Saurabh Bansal MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is not allowed

Q. No.	**Question**	**Marks**
Q1	Define Protein engineering and explain its importance in the field of biotechnology.	2
Q2	What are unnatural amino acids and provide two examples of their applications in biotechnology.	2
Q3	How does pH affect protein stability? Explain with reference to ionizable groups and electrostatic interactions.	2
Q4	What are the differences and similarities in Directed Evolution and Darwinian (Natural) evolution?	2
Q5	The CRISPR-Cas9 system has emerged as a powerful tool for gene editing. Using a diagram, illustrate the process of gene editing with CRISPR-Cas9.	2
Q6	A research team is attempting to engineer a therapeutic protein by incorporating a fluorescent unnatural amino acid at a specific site using amber suppression. However, they observe premature truncation of the protein and low yields. Analyze the possible reasons for this outcome and propose strategies to improve the efficiency of amber suppression for successful incorporation of the unnatural amino acid.	3
Q7	A pharmaceutical company finds that a protein drug stored in transparent vials shows aggregation after prolonged exposure to light. Based on the effects of UV radiation on proteins, analyze the structural changes that may occur. Suggest preventive measures to maintain protein stability during storage.	2

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