200

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS- 2026
M.Sc. II Semester (BT)

COURSE CODE (CREDITS): 03 20MS1BT211 MAX MARKS: 25
COURSE NAME:Genetic Engineering
COURSE INSTRUCTOR:Dr Anil Kant, MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory. (b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems (c) Use of calculator is not allowed*

Q.No	Question	Marks
Q1	**Answer at most 3 lines only.** i. Extract two striking differences between linkers and adapters. ii. Why can PCR products not be cloned directly? iii. Differentiate between Cloning and subcloning. Enlist at least three activities for which subcloning is required iv. What will happen if annealing temperature in PCR reaction is i) too low ii) too high v. Calculate melting temperature of a primer with sequence 5′-GCGTACGCGTATCGGCTGAC-3′. vi. Which radio label you will prefer to achieve i) high intensity signal ii)To know location of signal in cells or tissue. Mention reasons vii. What is the principle of Southern hybridization? Name two related techniques in which restriction digestion and electrophoresis can be obviated? viii. What is identified using South-Western Blotting?	0.75x8=6
Q2	**Answer briefly and draw suitable diagrams wherever required** a. Demonstrate your understanding about the homopolymeric tailing method of cloning. Include enzymes used and their activities. b. Design a conversion adapter for Xho1, 5′-C↓TCGAG-3′ and 5 Sal1 5′ -G↓TCGAC-3′ c. In an experiment you are required to remove hybridized RNA from DNA- RNA hybrid. Suggest enzymes to be used and its enzymatic activity. d. Explain working principles of TA cloning?How was the T vector developed? e. How DNA, RNA and oligonucleotide probes differ with respect to origin and important characteristics? f. A DNA fragment has non-specific 5' overhangs, and you are interested in cloning it in a vector which can be linearized with EcoR1, Bam H1 or Pst1. Outline a cloning strategy to achieve successful cloning? g. Briefly explain with help of a diagram how a large deletion mutation can be created using PCR based site-mutagenesis? How do parental vectors get eliminated in the GeneTailorTM system? **P.T.O**	1.5x8=12

	h. What type of interactions are detected using DNAase I Footprinting, Electrophoretic Mobility Shift Assay (EMSA) and Methyl Interference Assay? Briefly explain the principle of Methyl Interference Assay?	
Q3	a. Outline the process and logic of signal development, when probes are labeled with i) Fluorescent tag ii) Biotin-Streptavidin (reporter-affinity) and Alkaline Phosphatase as marker molecules. b. Suggest and explain in detail a method i) to increase specificity and yield of PCR ii) amplify when only the internal sequence of a DNA fragment is known ii) real time quantification(one method) and explain the concept of threshold cycle (Ct value).	3.5x2 = 7