JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS- 2024

M.Sc-II Semester BT)

COURSE CODE(CREDITS): 20MS1BT211(3) MAX. MARKS: 25

COURSE NAME: Genetic Engineering

COURSE INSTRUCTORS: Dr Anil Kant MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory. (b)Marks are indicated against each question in square brackets. (c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.1 Briefly answer any five of the following questions.

a. What is subcloning? Why is it required in genetic engineering?
b. What is ct value in case of qRT PCR? How is it related with temepale concentration (e.g. viral load, level l of gene expression)?
c. Write about any three product oriented applications of genetic engineering which have been commercialized.
d. Why annealing temperature of PCR reaction should be standardized. What would happen if it is too low or high.
e. You are given a DNA fragment with 5' overhangs. Mention any two methods to convert into a blunt end fragment with logical explanation.
f. Enlist different types of radioactive isotope generally used to label nucleic acid probes

[1x5=5.0]

Q.2 Answer three of the following questions.

a. What are limitations of linkers? Design a conversion adapter for following two hypothetical restriction enzymes with six bp restriction sites i) 5'G/AT ii) C/GA.
b. Devise a strategy to carry out each of the following. You are required to mention the main enzymatic tool if any, its enzymatic activity, and rationale of using it. Draw suitable diagrams where required. i) Forming a blunt ended DNA fragment from nonspecific staggered ended DNA ii). Favoring formation of recombinant vectors, during Recombinant DNA construction
c. What is the inter-relationship between melting and annealing temperature of PCR primers? Estimate the melting temperature of a primer with given sequence, GGCATCTAACTATAGCCGAGG
d. Discuss main enzymatic activity, source and key application in genetic engineering of any three of following tools i) Terminal transferase ii) RNAse A and H

[2x3=6.0]

Q.3 Attempt any three of the following questions

a. Why PCR products can not be cloned directly in cloning vectors. Enlist methods developed to solve this problem. Outline details of one of the advanced methods with its advantages.
b. Enlist different gene transfer methods and write comprehensive note on two of the following with an emphasis on principle procedure and advantages i) *Agrobacterium* mediated gene transfer ii) Microprojectile iii) Electroporation
c. Appraise the detailed steps involved in southern hybridization. Draw any four key differences with northern hybridization in procedure and application.

d. Write a short note on following techniques with focus on variation and specific application i) Colony hybridization and Far Western Blotting ii) Quantitative PCR and nested PCR

[3x3=9.0]

Q.4

a. Give details of different types of hybridization probes wrt origin and characteristics. Explain nick translation method of labeling probes.
b. What is the role of reporter group affinity group and marker group in non isotopic labeling of probes, give examples.

[5.0]