JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- 2024
MSc-II Semester (Biotechnology)

COURSE CODE(CREDITS):20MS1BT211(3) MAX. MARKS: 35
COURSE NAME: Genetic Engineering
COURSE INSTRUCTORS: Dr Anil Kant MAX. TIME: 2 Hours

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

a. Appraise the concept of gene isolation by cell based cloning and selective amplification of the target sequence directly. What are genomic and cDNA libraries and figure out five discrete differences between these.

b. In context to cDNA library construction, diagrammatically outline the procedure to synthesize first and second strand of cDNA

c. Discuss the deciding factors for the minimum number of clones in a gene library? Mention the formula to calculate it along with proper descriptions of the quantities in it. [3x3=9]

Q.2 Attempt any three of following

a. Describe the principle and procedure of Sanger method of DNA sequencing. List three major interventions which lead to automation of this method.

b. Write a detailed note of functional modules, cloning and applications of any one of following types of vectors i) λ bases vectors and cosmids ii) M13 based vectors and Phagemids

c. What do you understand by positive selection and negative selection, explain with an example from each category. Explain the basis of following selection agent and resistance provided by their corresponding resistance genes gene.i) ampicillin and ampicillin resistance gene ii) Kanamycin and Kanamycin resistance gene iii) Tetracycline and tetracycline resistance gene

d. Draw a well labeled diagram, enlist functional modules and explain cloning and working of any two types of following vectors i) puC series vectors and basis of blue and white selection ii) Agrobacterium Ti based vectors iii) Baculovirus bases vectors.

[3x3=9]

Q.3

a. Let you are assigned a task of cloning a gene fragment in a YAC vector. Give a detailed strategy for the inserting gene segment, features of yeast strains to be used and selection of recombinant transformants on the basis of red and white colonies of yeast and its scientific basis. Draw suitable diagrams to illustrate cloning procedure.

a. Enlist the factors required to be considered for higher expression of the recombinant proteins. Explain i) Choice of Promoter ii) Codon usage preference and iii) protein stability in detail
b. State any four objective differences between between iii) Yeast episomal plasmid vector and yeast integrating plasmid vectors iii) Ti based cointegrating vector and binary vectors

[3x3=9]

Q.4

a. What are the different components involved in CRISPR based adaptive immunity of some bacteria? Explain three different stages of the process.
b. Draw a well labeled general design of CRISPR delivery vector and mention key points about the design.

[4x2=8]