JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- 2025
M.Sc-II Semester Biotechnology (BT/BI)

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

Q.No	Question	Marks
Q1	**Attempt any five of following questions** a. Write a brief note on 'world's first' genome-edited rice varieties developed and released recently by India. Include names, purpose, trait modified and gene targeted b. What are dideoxynucleotides and how do they terminate growing DNA chains in sequencing PCR? c. Categories plasmids on the basis of their ability of conjugation. d. Why is IPTG used for induction of lac promoters in place of lactose in industrial applications? e. How stability of recombinant protein can affect its expression and accumulation f. What are signal peptides? Why these are important in recombinant protein expression	10
Q2	Purification of recombinant protein can be facilitated by provision of purification tags in expression vectors. Illustrate with help of a suitable diagram, how these tags are included in expression vectors. Outline the procedure to purify a recombinant protein with a poly histidine or maltose binding tag.	5
Q.3	Why are eukaryotic vector systems required? Enlist the different types of yeast vector and explain yeast integrating vectors in detail, including design and selection strategies. How these are different from yeast episomal vectors.	5
Q.4	a. Demonstrate your understanding about the concept of gene libraries? Why are genomic libraries not so useful when we are interested in isolating a gene from a eukaryotic organism but are very useful in case of a prokaryotic organism. b. What factors dictate the minimum number of clones in a gene library? Calculate the minimum number of clones required in a human gene library? Given: genome size 3.2×10^6 kb, average size of fragments cloned 100 kb and 99 % probability of finding a random clone.	8
Q.5	**Attempt any two of the following questions.** a. What is the significance of gene knockout in research and development? How knockout mice are developed by traditional methods? b. Write a detailed note on any one of the following genome editing methods. Include their components, their specificities, design of delivery vectors i) Zinc finger nuclease ii)CRISPR- Cas c. Appraise steps involved in northern hybridization. What are its applications? How it is different from southern hybridization in procedure and application.	7