JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

M.Sc. (Microbiology) - II Semester

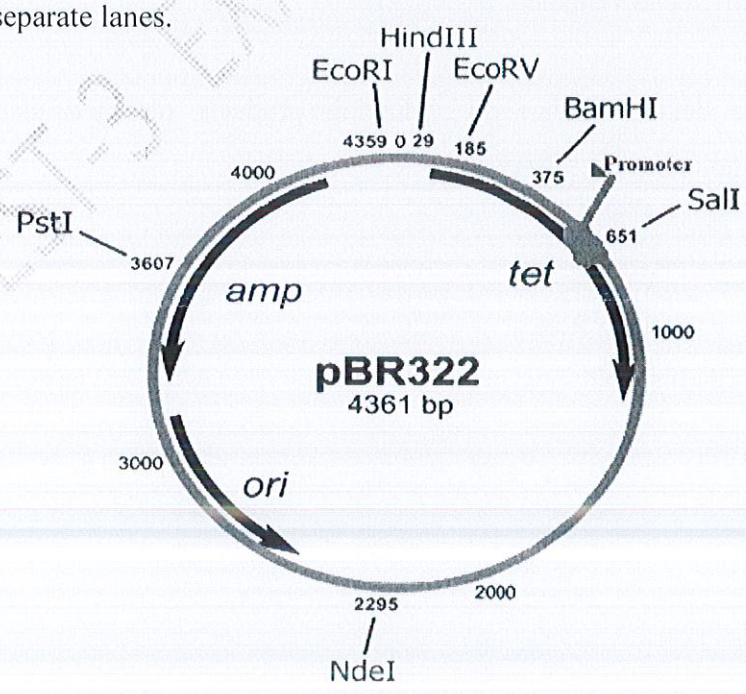
COURSE CODE (CREDITS): 18MS1BT313 (3) MAX. MARKS: 35

COURSE NAME: RECOMBINANT DNA TECHNOLOGY

COURSE INSTRUCTORS: Dr. Rahul Shrivastava MAX. TIME: 2 Hour

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

Q.No.	Question	Marks
Q1	You are provided with diagram of pBR322 vector. Calculate the size of restriction digestion fragments obtained in each case. (All calculations to be done in fair copy)	
	a. Number and size of products obtained when the plasmid is digested with **Hind III.**	[1]
	b. Number and size of products obtained when the plasmid is digested with **Sal I and Pst I**	[1]
	c. Number and size of products obtained when the plasmid is digested with **Sal I, Pst I, ScaI** and **GsuI.**	[2]
	d. If you wish to clone a gene for expression in the vector provided, at which site you would clone your gene, explain with reason.	[2]
	e. Sketch a labeled agarose gel showing different bands obtained when the plasmid / digested product(s) obtained from above - a, b and c digestion mixtures would be run in separate lanes.	[3]



Q2	A PCR needs to be performed for the amplification of *Mycobacterium tuberculosis* Rv3289c gene. The PCR yields a specific 2130-bp product. Primers used for the amplification are: Forward Primer - 5' TAGATTACCGTCAGCGGCACAT Reverse Primer - 5' GTTCATAGAACATGACTGCCCGT a. Calculate the Tm of the primers. b. Design a PCR cycle for amplification of the 2130 bp product c. Calculate the amount of PCR product that would be obtained after 3 cycles if the initial amount of gene product is 32ng.	**[3]** **[4]** **[3]**
Q3	***Case Study:*** Dr. Rahul is comparing the use of GST-tag and MBP-tag for expressing a poorly soluble human protein in *E. coli*. What factors should be considered in choosing between these two tags, and how might the choice affect protein expression, solubility, and purification strategy?	**[3]**
Q4	***Case Study:*** A pharmaceutical company has identified a transcription factor (TF-X) involved in cancer progression. Using the Y2H system, they aim to screen for inhibitors that disrupt TF-X's interaction with its co-activator. Outline how the Y2H assay can be adapted for small-molecule screening and describe how hits would be identified and validated.	**[4]**
Q5	Write detailed Notes on following products obtained using Recombinant Dna Technology (**Any Three**): a. Bt-cotton b. GM Mustard c. Golden Rice d. Insulin	**[3 X 3 = 9]**