U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 23BT4PCGEN **Max Marks: 100**
Course: Genetic Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Which type of restriction endonucleases are used in rDNA technology? Discuss their mechanism of action, specificity, and applications in genetic engineering.	***CO 1***	***PO 1***	**10**
	b)		There are a class of enzymes which are called as copying enzymes. What are the applications of these enzymes in rDNA technology? Elaborate.	***CO*** 1	***PO 1***	**10**
			OR			
2	a)		Discuss the technique that leads to synthesis of Sense and Antisense RNA as products. Which are the enzymes involved and write their role in genetic manipulation.	***CO 1***	***PO 1***	**10**
	b)		A scientist isolates RNA for the synthesis of cDNA in laboratory. What precautions she/he needs to take in order to prevent the RNA from degradation and why?	***CO*** 1	***PO 1***	**10**
			UNIT - II			
3	a)		Discuss the significance of: i) MCS in cloning vector ii) cloning vector having replicon under relaxed control	***CO*** 4	***PO 3***	**10**
	b)		The earliest, best studied and general purpose plasmid cloning vector is pBR322. Describe the genealogy and properties of this plasmid vector.	***CO*** 4	***PO 3***	**10**
			OR			
4	a)		PUC series of vectors are one of the most popular *E.coli* cloning vectors as these have some significant advantages as compared to other vectors. Discuss these advantages	***CO*** 4	***PO 3***	**10**
	b)		If a foreign gene is cloned in an *E.coli*, it is very unlikely for the gene to express. Discuss about the 3 most important signals for gene expression in *E coli*.	***CO*** 4	***PO 3***	**10**

			UNIT - III			
	5	a)	What blotting technique can be used in molecular biology for detection of specific DNA sequence in DNA samples? Discuss in detail all the steps in the technique.	***CO*** 3	***PO 5***	**10**
		b)	Illustrate the detailed process on alkaline denaturation method for extraction of plasmid DNA	***CO 3***	***PO 5***	**10**
			OR			
	6	a)	Explain the role of primers, DNA polymerase, and nucleotides in the PCR process.	***CO*** 3	***PO 5***	**10**
		b)	Explain the strategy for Screening of cDNA libraries by immunological screening methods.	***CO*** 4	***PO 3***	**10**
			UNIT - IV			
	7	a)	How can Electroporation be carried out for the transfer of a gene into any cell? Explain the principle, procedure with advantages and disadvantages	***CO*** 2	***PO 5***	**10**
		b)	Which is a natural genetic engineer of plants? Why is it called so? Justify.	***CO*** 2	***PO 5***	**10**
			OR			
	8	a)	Differentiate between Adeno and Retro viruses in terms of efficiency and target organisms.	***CO*** 2	***PO 5***	**10**
		b)	Discuss the principle and requirements for the following physical mediated gene delivery: i) Ultrasound mediated gene transfer ii) Gold or tungsten based gene transfer	***CO*** 2	***PO 5***	**10**
			UNIT - V			
	9	a)	Design a protocol to create transgenic plants that are tolerant to abiotic stress.	***CO*** 5	***PO 6, 7, 12***	**10**
		b)	Evaluate the modern biological research used to modify/edit the DNA sequence (genotype) of an organism.	***CO*** 5	***PO 6, 7, 12***	**10**
			OR			
	10	a)	With suitable example differentiate between cloning and transgenic animal.	***CO*** 5	***PO 6, 7, 12***	**10**
		b)	How could Ex- Vivo gene therapy be applied in providing solution to mutant ADA associated SCID?	***CO*** 5	***PO 6, 7, 12***	**10**

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