Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 90034

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2025
First Semester
Biotechnology
P23BT102 – ADVANCED RECOMBINANT DNA TECHNOLOGY
(Regulation 2023)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are expression vectors and why are they important in recombinant DNA technology?	2	K1	CO1
2.	Mention two methodologies to reduce the formation of inclusion bodies during protein expression.	2	K2	CO1
3.	How does electroporation facilitate the introduction of recombinant DNA into host cells?	2	K1	CO2
4.	How does the gene gun method differ from traditional transformation methods?	2	K2	CO2
5.	Differentiate genomic and cDNA libraries.	2	K2	CO3
6.	Give the function of His tags in protein purification.	2	K2	CO3
7.	What factors must be considered when designing experiments to study gene expression?	2	K2	CO4
8.	List out the purpose of reverse transcriptase PCR (RT-PCR)?	2	K1	CO4
9.	What are physicochemical methods for gene delivery, and provide two examples?	2	K1	CO5
10.	How do viral vectors facilitate gene delivery in therapeutic applications?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Compare and contrast the applications of YACs and BACs in genomic studies. Discuss their advantages and limitations in cloning large DNA fragments.	13	K4	CO1
		(OR)			
	b)	Explain the mechanisms by which expression vectors enhance protein production in *E. coli*. Include a discussion on the role of promoters and ribosome binding sites.	13	K3	CO1
12.	a)	Elucidate the effectiveness of blue-white selection in identifying recombinants compared to other selection methods. Include examples of situations where blue-white selection would be particularly advantageous.	13	K3	CO2
		(OR)			
	b)	Describe the use of GFP and luciferase in monitoring gene expression and selection. How do these methods enhance our understanding of gene function in live cells?	13	K4	CO2
13.	a)	Discuss the various methods for synthesizing and labeling DNA and RNA probes. Evaluate the impact of labeling techniques on the sensitivity and specificity of hybridization assays.	13	K4	CO3
		(OR)			
	b)	Explain the principles and techniques involved in immunochemical screening of libraries. How does this method compare to other screening techniques in terms of specificity and efficiency?	13	K3	CO3
14.	a)	Discuss the principles and applications of ribosome profiling in understanding gene expression and protein synthesis. How does this technique provide insights into translation regulation?	13	K3	CO4
		(OR)			
	b)	Elucidate the significance of microarrays in gene expression profiling. Discuss the steps involved and how microarrays have transformed our understanding of transcriptomes.	13	K3	CO4
15.	a)	Describe the use of the Cre/loxP system in conditional gene knockout studies. Discuss its advantages in understanding gene function and regulation.	13	K4	CO5
		(OR)			
	b)	Discuss the significance of transposons in genome editing and gene therapy. How can they be utilized for targeted gene integration?	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Evaluate the transformative impact of CRISPR-Cas technology on various fields, including medicine, agriculture, and synthetic biology. Provide detailed case studies that illustrate its applications and potential benefits.	15	K5	CO5
		(OR)			
	b)	Design a multidisciplinary research project that utilizes gene cloning and expression, genome editing, gene therapy, and synthetic biology principles to address a major agricultural challenge, such as drought resistance in crops. Include methodologies, expected outcomes, and implications for food security.	15	K5	CO3