TOTAL PAGES: 2

22BTU416N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Fourth Semester)

Branch – **BIOTECHNOLOGY**

RECOMBINANT DNA TECHNOLOGY

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	S1 nuclease ---------- a) Acts on double stranded DNA b) Acts on single stranded DNA c) Acts on both types of strands d) obtained from *E. coli*	K1	CO1
	2	Methylase function is ---------- a) Addition of methyl groups to DNA b) Removal of methyl groups to DNA c) Both in removal and addition of methyl groups from DNA d) Used in the production of methane	K2	CO1
2	3	---------- is the primary function of an expression vector in genetic engineering a) To carry genes for drug resistance b) To replicate DNA in bacterial cells c) To express and produce recombinant proteins d) To degradhage unwanted DNA sequences	K1	CO2
	4	M13 vector is primarily used in --------- a) Expression of eukaryotic genes b) Cloning and sequencing of DNA fragments c) Production of recombinant proteins in bacteria d) Plant transformation studies	K2	CO2
3	5	Vectors designed to replicate in cells of two different species are called ---------- a) Phasmids b) Transfer vectors c) Shuttle vectors d) Phagemids	K1	CO3
	6	Which of the following vectors is commonly used for cloning large genomic fragments in a genomic DNA library a) Plasmids b) Cosmid vectors c) Expression vectors d) Bacterial artificial chromosomes	K2	CO3
4	7	The RAGE method primarily amplifies ---------- a) mRNA b) Genomic DNA c) rRNA d) Total RNA	K1	CO4
	8	In Sanger sequencing, a ---------- component is responsible for chain termination a) Deoxynucleotide b) Dideoxynucleotide c) DNA polymerase d) Primer	K2	CO4
5	9	What is the primary purpose of genetic knockout in biological research? a) To enhance gene expression b) To amplify gene sequences c) To delete entire genomes d) To study the function of specific genes	K1	CO5
	10	TALENs are composed of ---------- and ---------- components a) DNA binding domain and cleavage domain b) RNA binding domain and mutagenic domain c) Gene promoter and enhancer c) Cas9 protein and guide RNA	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	What are restriction enzymes? How do these enzymes participate in the genetic engineering?	K3	CO1
		(OR)		
	11.b.	Explain the types and general properties of plasmids		
2	12.a.	Describe the salient features and benefits of using pUC vector and phagemid.	K3	CO2
		(OR)		
	12.b.	Discuss the advantages and limitations of using BACs and cosmid for cloning DNA fragments.		
3	13.a.	List out the applications of retroviral and Baculo viral vectors.	K3	CO3
		(OR)		
	13.b.	Outline the construction and labelling of probes.		
4	14.a.	Describe the identification of nucleic acid sequencing by Maxam Gilbert method.	K4	CO4
		(OR)		
	14.b.	Explain the principle and steps involved in Next-Generation Sequencing (NGS).		
5	15.a.	Illustrate the selection of mutant *E. coli* strains with defective dUTPase (dut) and uracil-N-glycosylase (ung) for site directed mutagenesis through uracil replacement.	K3	CO5
		(OR)		
	15.b.	Elucidate the PCR-based method for site-directed mutagenesis.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Discuss the uses of alkaline phosphatase and DNA ligase enzymes in recombinant DNA technology.	K6	CO1
2	17	How does the presence of antibiotic-resistance genes in pBR322 aid in the selection of transformed cells?	K5	CO2
3	18	Explain the steps involved in the construction of the cDNA library and applications of Western blotting technique.	K5	CO3
4	19	Enumerate the essential steps of the real-time PCR. How is this technique useful in the diagnosis of infectious disease?	K4	CO4
5	20	Discuss the targeted genome editing tool CRISPRs and miRNA-induced silencing.	K5	CO5

Z-Z-Z END