22BTU416N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(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	Which of the following enzymes is responsible for joining DNA fragments? a) Restriction enzyme b) DNA ligase c) DNA polymerase d) RNA polymerase	K1	CO1
	2	What is the primary function of DNA methylase? a) Cleaving foreign DNA b) Protecting host DNA from restriction enzymes c) Unwinding the DNA double helix d) Synthesizing DNA from an RNA template	K1	CO1
2	3	What is the term for a small, circular, extrachromosomal DNA molecule that replicates independently? a) Cosmid b) Phagemid c) Plasmid d) YAC	K2	CO2
	4	The concept of "selectable markers" in cloning vectors is about____. a) Genes that protect DNA from degradation b) Sequences that initiate DNA replication c) Genes that allow for the identification of transformed cells d) DNA segments that control gene expression	K2	CO2
3	5	Which blotting technique is used to detect a specific DNA sequence? a) Northern blotting b) Western blotting c) Southern blotting d) Eastern blotting	K1	CO3
	6	The function of a retroviral vector is____. a) A vector that carries DNA and replicates in a plasmid form b) A vector that integrates its genes into the host's genome c) A vector that is capable of carrying a large DNA insert d) A vector that can replicate both in E. coli and yeast	K2	CO3
4	7	Which of the following is not a type of PCR? a) Real-time PCR b) RACE c) RAGE d) Dideoxy PCR	K1	CO4
	8	The role of primers in a PCR reaction is _____. a) To unwind the DNA double helix b) To serve as the building blocks for new DNA c)To provide a starting point for DNA polymerase d) To prevent the DNA from re-annealing	K2	CO4
5	9	Which of the following is a method for site-directed mutagenesis? a) Southern blotting b) Oligonucleotide-mediated mutagenesis c) Northern blotting d) Western blotting	K1	CO5
	10	What is the main purpose of gene knock-outs in research? a) To introduce a new gene into an organism b) To silence a gene's expression using siRNA c) To completely inactivate a specific gene d) To insert a reporter gene at a specific locus	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.	List out the different types of restriction enzymes and their respective cutting mechanisms	K2	CO1
		(OR)		
	11.b.	Describe the functions of DNA Ligase and Alkaline Phosphatase in molecular cloning.		
2	12.a.	Inspect the properties of pUC vectors to their advantages over pBR322 for cloning experiments	K2	CO2
		(OR)		
	12.b.	Distinguish the features of BAC and YAC vectors to their application in creating large DNA libraries		
3	13.a.	Enlist the process of constructing a genomic DNA library	K2	CO3
		(OR)		
	13.b.	Illustrate the process of Northern blotting and its application.		
4	14.a.	Relate the chemistry of dideoxy-nucleotides to their role in the Sanger sequencing method	K3	CO4
		(OR)		
	14.b.	Compare the different types of PCR (RACE and RAGE) to their specific applications.		
5	15.a.	Explore the ethical implications of using targeted genome editing technologies like CRISPR	K4	CO5
		(OR)		
	15.b.	Analyse the difference between gene targeting and gene silencing		

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	Describe the various modifying enzymes and their roles in preparing DNA for cloning.	K4	CO1
2	17	Compile the different types of *E. coli* vectors and their specific applications in molecular cloning.	K4	CO2
3	18	Explore the process of constructing and screening a c-DNA library, highlighting its advantages over a genomic library	K4	CO3
4	19	Interpret the different methodologies of Next-Generation Sequencing (NGS) and compare them with Sanger sequencing.	K4	CO4
5	20	Elaborate the techniques of Targeted Genome Editing using ZFNS, TALENS, and CRISPRs, highlighting their differences and applications.	K4	CO5

Z-Z-Z END