**22MBU517N**

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**BSc DEGREE EXAMINATION DECEMBER 2025**
(Fifth Semester)
Branch - **MICROBIOLOGY**

**PRINCIPLES OF GENETIC ENGINEERING & 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 enzyme is used to join the ends of DNA fragments after they have been cut by restriction enzymes?<br>a) DNA helicase b) DNA ligase<br>c) RNA polymerase d) Reverse transcriptase | K1 | CO1 |
| | 2 | Which of the following is a characteristic feature of restriction enzymes?<br>a) They randomly cut DNA.<br>b) They cut DNA at specific sequences.<br>c) They add nucleotides to DNA.<br>d) They synthesize RNA. | K1 | CO1 |
| 2 | 3 | pBR 322 has/have which of the following selection marker(s)?<br>a) Ampr b)Tetr c) Both (a) and (b) d) Kanr | K2 | CO2 |
| | 4 | A plasmid can be considered as a suitable cloning vector if<br>a) it can be readily isolated from the cells<br>b) it possesses a single restriction site for one or more restriction enzymes<br>c) insertion of foreign DNA does not alter its replication properties<br>d) All of the above | K2 | CO2 |
| 3 | 5 | What does the "c" in cDNA stand for?<br>a) Coding b) Complementary<br>c) Circular d) Cytoplasmic | K1 | CO3 |
| | 6 | What is the first step in constructing a cDNA library?<br>a) Amplification of DNA<br>b) Isolation of mRNA<br>c) Ligation of DNA into vectors<br>d) Screening the library | K1 | CO3 |
| 4 | 7 | Which of the following is used to detect DNA in a sample?<br>a) Southern blotting b) Northern blotting<br>c) Western blotting d) Eastern blotting | K1 | CO4 |
| | 8 | Which of the following blotting techniques is used to detect RNA?<br>a) Southern blotting b) Northern blotting<br>c) Western blotting d) Southwestern blotting | K1 | CO4 |
| 5 | 9 | Chain-termination is a type of _____<br>a) Sequencing b) Vector generation<br>c) Antibiotic production d) Gene manipulation | K2 | CO5 |
| | 10 | Sequence of which of the following cannot be determined using the Maxam Gilbert method?<br>a) Bacteria b) Plants<br>c) Bacteriophage T7 d) Plasmid | 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. | DNA modifying enzymes - Explain in briefly? | K2 | CO1 |
| | | (OR) | | |
| | 11.b. | Summarize the ligases used in gene manipulation. | | |
| 2 | 12.a. | Build a note on the uses on plasmid vectors? | K3 | CO2 |
| | | (OR) | | |
| | 12.b. | Develop the details about the Colony PCR? | | |
| 3 | 13.a. | Explain in details about the steps involved in southern blotting? | K3 | CO3 |
| | | (OR) | | |
| | 13.b. | Interepret the RFLP analysis? | | |
| 4 | 14.a. | Elucidate the need of blotting sheet used in hybridization? | K4 | CO4 |
| | | (OR) | | |
| | 14.b. | Present a note on the uses and applications of Reverse Transcriptase in PCR? | | |
| 5 | 15.a. | Examine the modern sequencing methodology that uses the principles of the Sanger technique? | K4 | CO5 |
| | | (OR) | | |
| | 15.b. | List out the steps involved method of Third-Generation Sequencing? | | |

## 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 | Present a note on the type and uses of Methylation in genome? | K4 | CO1 |
| 2 | 17 | Illustrate about the plasmid vector pBR322 its structure, uses and its construction with a neat sketch? | K4 | CO2 |
| 3 | 18 | Explain the about the construction of cDNA library? | K5 | CO3 |
| 4 | 19 | Interpret the steps involved in western blotting technique and its applications? | K5 | CO4 |
| 5 | 20 | Elaborate are the steps in Next-Generation Sequencing (NGS)? | K6 | CO5 |

Z-Z-Z END