

(8 pages)

Reg. No. : \_\_\_\_\_

Code No. : 5681

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M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2025

Third Semester

Microbiology – Core

MOLECULAR BIOLOGY AND RECOMBINANT DNA  
TECHNOLOGY

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. Who proposed the wobble concept?
  - (a) Francis Crick
  - (b) Har Gobind Khorana
  - (c) Marshall Nirenberg
  - (d) Arthur Kornberg

2. Prenylation adds prenyl groups to the \_\_\_\_\_ amino acid residues.
  - (a) Methionine
  - (b) Cystine
  - (c) Threonine
  - (d) Arginine
3. Base pairing between mRNA and which of the following rRNAs help in the selection of translation initiation site?
  - (a) 5.8S rRNA
  - (b) 5S rRNA.
  - (c) 28S rRNA
  - (d) 16S rRNA
4. The DNA polymerase involved in base excision repair is \_\_\_\_\_.
  - (a) DNA polymerase  $\alpha$
  - (b) DNA polymerase  $\beta$
  - (c) DNA polymerase  $\sigma$
  - (d) DNA polymerase  $\gamma$
5. A Lac \_\_\_\_\_ repressor is a tetramer repressed when bound to the inducer. The trp repressor is a \_\_\_\_\_.
  - (a) Dimer inactivated when bound to the inducer
  - (b) Dimer activated on inducer binding
  - (c) Tetramer inactivated on inducer binding
  - (d) Tetramer activated on inducer binding

6. Which of the following chemical mutagen affects only replicating DNA?
- (a) Acridine dye
  - (b) Alkylating agent
  - (c) Deaminating agent
  - (d) Base analog
7. Which of the sequence will Dcm methylate?
- (a) GATC                      (b) GAATC
  - (c) CCAGG                    (d) CCGTT
8. There is a sequence region in M13 where the foreign DNA can be inserted. What is this sequence called?
- (a) Inverted repeat      (b) Palindromic
  - (c) Intergenic              (d) Interstitial
9. Which of the following is a fusogenic agent used for protoplast fusion?
- (a) Mannitol                  (b) Polyethylene glycol
  - (c) Sorbitol                  (d) Polyvinyl chloride

10. Which enzyme polymerizes RNA with defined sequences in a template-independent manner?
- (a) Peptidyl transferase
  - (b) RNA polymerase
  - (c) Reverse transcriptase
  - (d) Polynucleotide phosphorylase
11. cDNA libraries are produced from \_\_\_\_\_
- (a) ribonucleic acids
  - (b) messenger RNAs
  - (c) transfer RNAs
  - (d) ribosomal RNAs
12. Which of the following involves mimicking or blocking the activity of enzymes or natural peptides upon the design and synthesis of metabolically stable peptide analogs?
- (a) Auromimetics
  - (b) Carcinomimetics
  - (c) Carbamimetics
  - (d) Peptidomimetics

13. The first vaccine developed from animal cell culture was for \_\_\_\_\_
- (a) Hepatitis B            (b) Rabies  
(c) Small pox            (d) Polio
14. Name the technique which is used to enhance the life of a tomato.
- (a) Ex vivo gene transfer  
(b) Antisense technology  
(c) In vitro gene transfer  
(d) Molecular farming
15. MAbs was modified for delivery of a toxin, radioisotope and
- (a) Hormones            (b) Enzymes  
(c) Vaccines            (d) Cytokines

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

16. (a) Define: Wobble hypothesis.
- Or
- (b) Discuss the ribosome structure and its function.

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17. (a) What are the types of mutations?
- Or
- (b) Write a short note on arabinose operon.
18. (a) What is the role of restriction enzymes? Add its types and nomenclature.

Or

- (b) Write the structure and characteristic features of pUC vector.
19. (a) Explain the principle and applications of PCR.

Or

- (b) How to construct cDNA libraries?
20. (a) What is human gene therapy with an example?

Or

- (b) Write a short note on transgenic animals.

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PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

21. (a) Illustrate the structure and processing of RNA.

Or

- (b) Define translation. Illustrate post translational modifications.

22. (a) Explain the DNA repair mechanisms.

Or

- (b) How to detect and analysis mutations?

23. (a) Write in detail about eukaryotic vectors.

Or

- (b) Discuss the artificial gene transfer mechanism.

24. (a) Write the principle and applications of pyrosequencing.

Or

- (b) Define protein engineering. How to design and construct a novel protein.

25. (a) Explain the basic step and applications of plant tissue culture technology.

Or

- (b) Define and discuss the monoclonal antibodies in therapy.