

**APRIL 2025**

**53105/236C3A**

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Time : Three hours

Maximum : 75 marks

PART A — ( $10 \times 2 = 20$  marks)

Answer any TEN questions each in 30 words.

Define/Write a note on:

1. Structural features of the DNA double helix.
2. DNA renaturation.
3. tRNA in protein synthesis.
4. What is an operon? Give one example found in prokaryotes.
5. Chemical mutagens.
6. Suppression mutations.
7. Name two types of plasmids based on their function.
8. Plasmid amplification techniques.
9. How are transposable elements utilized in genetic engineering?

10. One medical or industrial application of transposons in biotechnology or genetic research.
11. Structure of a prokaryotic ribosome.
12. Semi-conservative replication of DNA.

PART B — ( $5 \times 5 = 25$  marks)

Answer any FIVE questions each in 200 words.

13. Explain the process of DNA denaturation and renaturation, and discuss their significance.
14. What is DNA supercoiling? Discuss its role and importance in DNA topology.
15. Describe the structure and function of RNA polymerase in prokaryotes.
16. Describe the structure and processing of tRNA in eukaryotic cells.
17. Explain how physical mutagens induce mutations, providing specific examples.
18. Describe the structure of a typical plasmid. How does it differ from chromosomal DNA in bacteria?
19. Discuss the applications of transposons in genetic studies and biotechnology. How are they used to study gene function and manipulate genomes?

PART C — ( $3 \times 10 = 30$  marks)

Answer any **THREE** questions each in 500 words.

20. List and describe the roles of the key enzymes involved in DNA replication, including DNA polymerases, DNA ligase, and primase.
  21. Explain the concept of transcription in prokaryotes and its significance in gene expression.
  22. Discuss the significance and applications of induced mutations in scientific research and agriculture.
  23. Discuss the process of plasmid replication in bacterial cells. How does it differ from chromosomal DNA replication?
  24. Discuss the differences between generalized and specialized transduction in bacterial cells. Provide examples of each.
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