

NOVEMBER 2024

53105/236C3A

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. Role of topoisomerases play in DNA topology
2. Major forms of DNA
3. Transcription and its significance in prokaryotes
4. Name two general transcription factors in eukaryotes and their functions.
5. Process of photoreactivation repair.
6. DNA repair
7. Structure of bacteriophage T4
8. Applications of bacteriophages in microbial genetics.
9. Significance of transposons in bacterial genetics.

10. Function of insertion sequences.
11. How does eukaryotic RNA polymerase differ from prokaryotic RNA polymerase?
12. Primase.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions each in 200 words.

13. Describe the salient features of the double helix structure of DNA.
14. Compare and contrast the A-form, B-form, and Z-form of DNA.
15. Explain the role of the lac operon in the regulation of gene expression in prokaryotes.
16. Discuss the differences between prokaryotic and eukaryotic translation initiation.
17. Explain the base excision repair mechanism and its importance in correcting DNA damage.
18. What are the methods used for plasmid elimination in research and industrial applications?
19. Explain the process of conjugation in bacterial gene transfer.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions each in 500 words.

20. Differentiate between bidirectional and unidirectional DNA replication, providing examples of each.
 21. Outline the roles of general transcription factors in eukaryotic transcription.
 22. Describe the SOS repair system in bacteria, highlighting its role in response to extensive DNA damage.
 23. Discuss the strategies and challenges involved in phage-based therapies and bioremediation.
 24. Explain the role of transposons in creating genetic variability in bacterial populations.
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