

Seat No. : \_\_\_\_\_

# **MB-104**

**March-2025**

**B.Sc., Sem.-V**

**MI 301 : Microbiology**

**(Molecular Biology and Genetics of Prokaryotes)**

**Time : 2:30 Hours]**

**[Max. Marks : 70**

**Instructions :** (1) All questions are compulsory.

(2) Figure on the right indicates marks.

(3) Mention correct question number against the answer.

(4) Draw figure(s) wherever necessary.

1. Draw labelled diagram of DNA replication fork. Explain synthesis of RNA primer, formation of leading and lagging strands, joining of Okazaki fragments and proof reading activity of DNA polymerase. 14

**OR**

1. (A) Describe the experiment of Avery, McCarty and MacLeod. 7  
(B) Draw and describe Rolling Circle mechanism of DNA replication. 7

2. Draw and describe negative and positive control of the lactose operon. 14

**OR**

2. (A) Describe the structure of a protein coding gene with suitable diagram. 7  
(B) Describe the formation of 70S initiation complex of translation. 7

3. Explain mutagenesis by 5-bromouracil, UV radiations and phage Mu. 14

**OR**

3. (A) Write a brief note on classes of bacterial mutant. 7  
(B) Write a brief note on mismatch repair system. 7

4. Draw and describe : Hfr Conjugation and F<sup>+</sup> Conjugation. 14

**OR**

4. (A) Describe DNA uptake system in Gram positive and Gram negative bacteria. 7

(B) Describe the mechanism for maintenance of plasmid in *E.coli*. 7

5. Give short and specific answer in **1-2** lines only : (any **seven**) 14

(1) Define : Gene and Genome.

(2) Mention the role of Rosalind Franklin in the elucidation of DNA structure.

(3) Give name of two different covalent bonds, found in the structure of B-DNA.

(4) Describe the role of Sigma factor and Rho factor in transcription of a bacterial gene.

(5) What is genetic code degeneracy ?

(6) Mention the role of Pribnow box and SD sequence in bacterial gene expression.

(7) Write name of two molecular mechanisms which results in spontaneous mutations:

(8) Write name of the genetic marker (structural gene) of *Tn3* and *Tn10*.

(9) Write name of two enzymes that fills the gap in DNA during nucleotide excision repair.

(10) Give any two differences between horizontal and vertical gene transfer.

(11) What are exogenote and endogenote ?

(12) Define : Episome and Prophage.

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