Seat No. : _____

OI-108

October-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. Enlist and explain various molecular mechanisms that occur at DNA replication fork. **14**

OR

1. (A) Describe experiment that proved DNA as genetic material in bacteriophage T2. **7**
1. (B) Describe experiment that proved DNA replication is semi-conservative. **7**

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

OR

2. (A) Describe rho independent termination of transcription. **7**
2. (B) Describe the structure of a protein coding gene with suitable diagram. **7**

3. Explain with examples : Chemical and Biological mutagenesis. **14**

OR

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

4. Draw and describe : Hfr conjugation and F'conjugation. **14**

OR

4. (A) Explain production and fate of merozygote. **7**
4. (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 : Replicon and Replisome.

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

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

(4) Describe the role of IF3 and RF3 in the translation of bacterial mRNA.

(5) Which amino acids are coded by UGA and CUA codons in yeast mitochondria?

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

(7) Give names of two molecular mechanisms which results in spontaneous mutations.

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

(9) Give name of error free and error prone systems of DNA repair.

(10) Give names of two agents that increase the rate of plasmid curing.

(11) Describe the role of pilin complexes PilQ and PilE of DNA uptake system of *N. gonorrhoeae*.

(12) Explain : Defective phage and Prophage