

**2021**

**MICROBIOLOGY — HONOURS**

**Fifth Paper**

**(Group-A)**

**Full Marks : 50**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**Question No. 1** is compulsory and answer **any three** questions from the rest.

1. Answer **any five** questions: 4×5
- (a) Define ectopic recombinants and cryptic transposons.
  - (b) Which experiment proved that RNA could also be the genetic material? Briefly discuss it.
  - (c) How does RNase affect bacterial genome structure? How can this be demonstrated?
  - (d) What is a composite transposon? Describe schematically.
  - (e) Distinguish between F<sup>+</sup> and Hfr mediated transfer with respect to the amount and intactness of the genetic material transferred.
  - (f) Write down the differences and similarities between intergenic & intragenic suppression.
  - (g) What is gene conversion? How is it different from recombination?
  - (h) Differentiate between euchromatin and heterochromatin.
  - (i) What is Ames test? Write down its significance.
  - (j) The name Mu(bacteriophage) stands for the mutator — Justify the statement.
2. (a) State the biological significance of Z-DNA.
- (b) Why does double stranded region of RNA assume A-DNA conformation?
- (c) Differentiate between A-DNA and B-DNA.
- (d) DNA binding proteins generally interact at the major groove—explain. 3+2+2+3
3. (a) Treatment of Chromatin fibre with micrococcal nuclease result in 200 bp ladder of DNA fragments. Explain the observation.
- (b) Write down the role of histone like protein responsible for compaction of bacterial chromosome.
- (c) What are  $\lambda$  dgal and  $\lambda$  pro? Explain. 3+3+4

**Please Turn Over**

4. (a) Draw a schematic of t-RNA molecule and use arrows to show the following:
- (i) loops
  - (ii) stems
  - (iii) amino acid attachment site
  - (iv) anticodon
  - (v) 5'-end.
- (b) Explain how does the mismatch repair system discriminate between the parent strand and daughter strand.
- (c) Explain how a mutagen can interfere with DNA replication to cause a mutation. Give two examples with proper explanation. 3+3+4
5. (a) Briefly discuss homologous recombination.
- (b) State the significance of chi-sites in recombination.
- (c) Name a protein which has both protease as well as endonuclease activity. Why are these activities needed? 3+2+5
6. (a) State the effect of
- (i) nitrous acid and
  - (ii) ethidium bromide on DNA.
- (b) What do you mean by direct reversal repair? Cite an example.
- (c) What is the difference between mutation and polymorphism? (3+2)+3+2
7. Write short notes on the following terms: 2×5
- (a) SOS Repair
  - (b) Retrotransposons
  - (c) Specialized transduction
  - (d) IS elements
  - (e) Chargoff's rule.
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