

2022

MICROBIOLOGY — HONOURS

Paper : CC-7

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.*

Answer **question no. 1** and **any three** from the rest.

1. Answer **any ten** questions :

2×10

- (a) State two major differences between B-DNA and Z-DNA.
 - (b) Why is RNA more susceptible to alkali than DNA?
 - (c) Write down the relationship between Linking number, Twist number and Writting number of a covalently closed circular DNA.
 - (d) What are isoacceptor tRNA?
 - (e) Write down the function of telomerase.
 - (f) What is Cot analysis?
 - (g) Write any four characteristics of genetic code.
 - (h) Write down the role of SSB protein in DNA replication.
 - (i) Differentiate between plant chloroplast DNA and nuclear DNA.
 - (j) What is meant by processivity of DNA Polymerase?
 - (k) What is anti-termination?
 - (l) Differentiate between closed promoter and open promoter complexes.
 - (m) In bacteria, methylation of native DNA acts as a primitive immune system. Justify.
 - (n) Name any one protein synthesis inhibitor and briefly state its mechanism of action.
 - (o) What are sense and anti-sense strands of DNA?
2. (a) Explain briefly Messelson Stahl's experiment of semi-conservative DNA Replication, with a properly labelled diagram showing the bands in CsCl density gradient centrifugation up to 3rd generation.
- (b) What are Okazaki fragments?
 - (c) Write down the role of Tus protein.

(3+3)+2+2

Please Turn Over

3. (a) State whether in the following partial diploid mediated synthesis of lac operon proteins is constitutive, inducible or uninducible :
- $i^+O^c z^- y^+ / i^s O^+ z^+ y^+$
 - $i^- d O^+ z^+ y^+ / i^+ O^+ z^+ y^+$
 - $i^- O^+ z^+ y^- / i^+ O^c z^+ y^+$
- (b) An *E. coli* mutant is isolated that is simultaneously unable to utilize a large number of sugars as sources of carbon. However genetic analysis shows that each of the operons responsible for metabolism of each sugar is free of mutation. What are the possible genotypes of this mutant?
- (c) What are the different types of transcription termination? How does Rho facilitate transcription termination?
- (d) What is a leader sequence? State its significance. (1×3)+2+(1+2)+2
4. (a) Draw the structure of 5' cap of eukaryotic mRNA and write down its functions.
- (b) Explain the phenomenon of transcription attenuation with respect to trp operon.
- (c) State in brief the functions of different initiation factors involved in Prokaryotic translations. (1½+1½)+3+4
5. Write short notes on **any four** : 2½×4
- D-loop Replication
 - Sporulation in Bacillus
 - Role of spliceosome
 - Yeast mating type switching.
 - Excision Repair System
 - Fidelity of Translation.
6. (a) Nucleosomes are the building blocks of eukaryotic chromosome. Justify.
- (b) Does genome size of an organism correlate with its complexity? Explain your answer.
- (c) Write down the importance of polyadenylation in eukaryotes.
- (d) Write what you know about negative regulation of lac operon. 3+3+2+2
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