

2016

MICROBIOLOGY — HONOURS

Third 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*Answer *Question No. 1* and *any four* from the rest

1. Answer the following questions : 5×2
- (a) What is the significance of meiotic cell division in higher eukaryotes?
- (b) What are the special characters of archaeobacterial lipid membrane?
- (c) What is abortive initiation of transcription?
- (d) Is it possible to isolate *E. coli* cells containing only one type of RNA polymerase σ -factor from the environment?
- (e) How do prokaryotic ribosome recognize the 5' end of the messenger RNA?
2. (a) How many different DNA polymerase are there in prokaryotes? What are their functions? 2
- (b) State whether the following statements are *true* or *false* : 4×1½
- (i) The degeneracy of the genetic code implies that more than one amino acid are encoded by one codon.
- (ii) The synthesis of the leading and the lagging strands during DNA replications occurs in different directions.
- (iii) The process of transcription is not primer dependent.
- (iv) The process of co-transcriptional translation can take place in a prokaryotic cell.
- (c) What is (a) an inverted repeat? (b) a tandem repeat? 2
3. (a) 'All elements of promoter are recognized by sigma factor' — is this statement true? Explain. 2
- (b) Outline the two modes of transcription termination in prokaryotes. 1½+1½

[Turn Over]

- (c) Define : (i) frameshift mutation (ii) missense mutation. 2
- (d) Why are negative and positive control of lac operon importance to the energy efficiency of *E. coli* cells? 3
4. (a) How does suppressor tRNA SupF help to overcome the problem of premature termination of protein synthesis? 2
- (b) State and out line the mode of action of an anti-microbial drug that target the ribosome. 2
- (c) (i) How does a tRNA charged with the appropriate amino acid? 2+2
- (ii) "The fidelity of aminoacylation of tRNA is very important in maintenance of the genetic code"—Justify. 2
- (d) What will happen when an internal methionine is recognized by prokaryotic initiation t-RNA? 2
5. (a) What is lipid raft? Outline the principal difference in the backbone structure between the phospholipids and sphingo lipids that constitute the cell membrane. 1+2
- (b) Name the organelle in the cell that maintains a low intra organellar pH and state the significance of this environment with respect to its functions. 1+2
- (c) Define the mode of action of Amphotericin B as a plasma membrane inhibita. 2
- (d) 'Trp operon in an inducible operon' — Justify. 2
6. (a) Describe the mechanism(s) involved in regulation of G1 → S switching in the cell cycle of yeast *S. cerevisiae*. 3
- (b) Write the difference(s) between Sec- and Tat- mediated protein secretion across the bacterial cytoplasmic membrane. 2
- (c) What is protein turn over? Describe the function(s) of ubiquitinligase(s) in eukaryotic cells. 1+2
- (d) 'Bacterial flagella are motorized by a flow of H⁺ ions but archaeal flagella are almost certainly powered by ATP' — Justify. 2
7. (a) Describe the difference(s) between passive diffusion and facilitated transport across the cell membrane. Schematically describe different kinds of facilitated coupled transport across the cell membrane. 2+2
- (b) Using a diagram distinguish between the rolling cycle and bidirectional mode of DNA-replication. 3
- (c) What will be the consequences of mistargetting of lysomal enzymes? 1 1/2
- (d) What is (are) the function(s) of golgi apparatus? 1 1/2

8. (a) Why do *S. cereriae* α-mating type cells mate only with a-mating type cells? Design an experiment to determine the mating type of *s. cervisiae* cells. 3+3

(b) "The maintenance of sodium glucose co-transport across the cell membrane is dependent on the function of sodium potassium pump"—Comment on this statement. 2

(c) State the similarities between "GroEL-GroES"—chaperon system and proteasomal system. 2

9. Write short notes on : 2 1/2 × 4

(a) Factors controlling replication fidelity

(b) Kinetoplast

(c) Oric

(d) Mitochondria.