

**2021**

**MICROBIOLOGY — HONOURS**

**Paper : DSE-A-2**

**(Advances in Microbiology)**

**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** questions from the rest.

1. Answer **any five** from the following questions : 2×5
- (a) Differentiate between genetic shift and genetic drift.
  - (b) What do you mean by core genome and pan genome?
  - (c) What do you mean by bipartite genome?
  - (d) Define the term community metabolomics.
  - (e) Differentiate between metatranscriptomics and metaproteomics.
  - (f) What are the different types of bacterial networking that require cell to cell contact?
  - (g) Name four multicellular behaviours of bacteria that are controlled by quorum sensing.
  - (h) Why are quorum signalling molecules termed as autoinducers?
2. (a) Compare and contrast eukaryotic and prokaryotic chromosome structure.
- (b) Write the advantages of metatranscriptomics over metagenomics.
- (c) Mention three major challenges of metaproteomic study. Draw a simple flowchart of a metaproteomic experiment. 3+2+(3+2)
3. (a) State and explain the different steps of the general model of quorum sensing.
- (b) Name the autoinducer molecules and types of QS systems found in *Agrobacterium*.
- (c) What do you mean by flexible gene pool of microbes? 4+4+2
4. (a) How is the cDNA of polio viral genome synthesized?
- (b) Explain the LuxI/LuxR regular mechanism in *V. fischeri*.
- (c) What is 'Human Microbiome Project'? 4+4+2

**Please Turn Over**

5. (a) What according to you is the difference between genomes of prokaryotes and eukaryotes in relation to gene density?  
(b) Explain why do free living species have larger genomes than those of symbionts or obligate pathogens.  
(c) State and explain the two chief factors which shape the evolution of the bacterial genome. 2+3+(2½+2½)
6. (a) What are virulence factors? Explain citing two examples.  
(b) Enlist the factors that affect bacterial pathogenicity.  
(c) Explain the 'Cheater hypothesis' for maintenance of virulence factor genes.  
(d) Comment on 'Guard Hypothesis'. (1+2)+2+3+2
7. Write short notes on **any four** of the following : 2½×4
- (a) Pyrosequencing
  - (b) Contig assembly
  - (c) Invasins
  - (d) Top down approach in systems biology
  - (e) Viral metagenome.
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