

2020

**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** from the rest.

1. Answer **any five** questions : 2×5
- (a) What are open and closed ‘pangenomes’?
  - (b) What is a ‘Resistosome’?
  - (c) What is ‘DNA Polymorphism’?
  - (d) What do you mean by ‘Alpha-Diversity’?
  - (e) Name any two bacteria harbouring Type III secretion system (TTSS).
  - (f) Why are some pathogens called ‘opportunistic’?
  - (g) How is microbial diversity measured?
  - (h) How does biofilm help developing antibiotic resistance in bacteria?
2. (a) What are pathogenicity islands (PAIs)? Discuss some of the genetic features of PAIs.  
(b) Distinguish between biotrophic and necrotrophic plant pathogens.  
(c) What is ‘flexible genome pool’ of microbes? How is it different from ‘core genome pool’?  
4+3+(2+1)
3. (a) Mention any two major contributions of Metaproteomics in environmental microbiome study.  
(b) Discuss the scopes and achievements of synthetic biology.  
(c) Can synthetic biology aid in bioterrorism? 3+(2+2)+3
4. (a) What is the major difference in quorum sensing mechanism in Gram-positive and Gram-negative bacteria?  
(b) Discuss the major stages of biofilm development.  
(c) Discuss the mechanism of activation of hypersensitive response in plants. 3+4+3

**Please Turn Over**

5. (a) Discuss the structural similarities between flagella and Type III secretion system.  
(b) Mention the chemical nature of the molecules used by bacteria for quorum sensing.  
(c) What do you mean by horizontal gene transfer? Mention the different processes through which horizontal gene transfer happens in nature. 4+2+4
6. (a) What are biosensors? Mention few applications of biosensors.  
(b) What are the differences between metagenomics and metatranscriptomics?  
(c) Mention some of the factors that trigger biofilm formation. 4+3+3
7. Write short notes on **any four** of the following : 2½×4
- (a) 16S rRNA : a molecular clock
  - (b) Metabolome
  - (c) Next-Generation Sequencing
  - (d) Biological Networks
  - (e) Epiphytic bacteria
  - (f) Genetic drift.
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