# 2022

## 1st Semester Examination

## MICROBIOLOGY

### Paper : MCB 101

### (Diversity and Systematics of Prokaryotic Microbes)

Full Marks : 40 Time : Two Hours

*The figures in the margin indicate full marks.*
*Candidates are required to give their answers in their own words as far as practicable.*

### MCB 101.1

### (Bacteriology)

Answer any ***two*** questions of the following : 2×2=4

1. What is ribotyping?
2. What is metataxonomics?
3. What are the functions of heterocyst and akinete in Cyanobacteria?
4. What are coacervates?

Answer any ***two*** questions of the following : 4×2=8

5. Describe the process of evolution of metabolism within a cell in primitive earth.

P.T.O.

6. Give a brief account of different techniques used for bacterial identification.

7. Name one chemotaxonomic marker of bacterial cell and describe it's method of analysis. 1+3

8. Describe the causes of unculturability of bacteria.

Answer any ***one*** question of the following : 8×1=8

9. Write short note on :

   (a) RNA world hypothesis 3

   (b) Endosymbiotic theory 3

   (c) Cyanobacterial cell wall 2

10. Describe the role of high-throughput sequencing in the study of unculturable bacteria.

## MCB 101.2

## (Virology)

Answer any ***two*** questions of the following : 2×2=4

11. Name one enveloped virus. What is the advantage of enveloped virus? 1+1

12. What are the receptors for HIV and SARS-CoV-2? Which protein of HIV and SARS-CoV-2 interact with the host cell receptor for entry? 1+1

13. How will you enumerate bacteriophage present in a sample? 2

14. Name the methods for the cultivation and purification of animal virus. 2

Answer any ***two*** questions of the following : 4×2=8

15. Describe how the DNA of (+) strand and (–) strand RNA viruses replicate. 2+2

16. How the mRNA vaccine and whole inactivated vaccine for SARS-CoV-2 have been developed? 2+2

17. Describe the structure and replication of Influenza virus in nasal epithelial cells. 2+2

18. How Tat and Rev proteins regulate HIV replication? 2+2

Answer any ***one*** question of the following : 8×1=8

19. (i) How retrovirus carrying an oncogene, and not carrying an oncogene develop cancer/tumor?

(ii) Describe the mechanism of action of Azidothymidine (AZT) and Ritonavir. 4+4

20. (i) Describe schematically the synthesis of retroviral double stranded DNA from retroviral single stranded RNA.

(ii) How replication defective adenovirus with a foreign gene is prepared? 4+4