KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(6 Pages) **Reg. No: ……**

Question Code No: 25001608 **Course Code: 24PEMB31**

PG Degree - End Semester Examinations, November 2025

Third Semester

M.Sc. MICROBIOLOGY

Soil Microbiology and Microbial Ecology

(For those who joined in July 2024 onwards)

Time: 3Hours **Maximum: 75 Marks**

PART– A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer:

1. Which of the following microorganisms play a major role in soil fertility?

   (a) Cyanobacteria (b) Viruses

   (c) Protozoa (d) Yeasts

2. The genetics of biological nitrogen fixation is primarily studied in

(a) *Escherichia coli* (b) *Rhizobium*

(c) *Lactobacillus* (d) *Bacillus subtilis*

3. Citrus canker is caused by _____.

(a) *Xanthomonas citri* (b) *Pseudomonas syringae*

(c) *Fusarium oxysporum* (d) *Alternaria solani*

4. Which defence mechanism in plants involves the accumulation of PR proteins?

(a) Systemic Acquired Resistance

(b) Induced Systemic Tolerance

(c) Hypersensitive Response

(d) Antibiosis

5. The rhizosphere effect refers to _____.

(a) Reduced microbial activity near roots

(b) Enhanced microbial activity near roots

(c) Neutral interaction between microbes and plants

(d) Antagonism between microbes

6. Mycorrhizae represent a type of _____.

(a) Antagonism (b) Competition

(c) Commensalism (d) Mutualism

7. Biofilm succession is an example of _____.

(a) Primary succession (b) Secondary succession

(c) Ecological retrogression

(d) Climax community

8. Which factor contributes most to microbial community development in soil_____.

(a) Wind flow

(b) Soil organic matter

(c) Solar radiation

(d) Rock hardness

9. The most probable number (MPN) method is used for _____.

(a) Biomass estimation

(b) Non-culturable bacteria detection

(c) Microbial population quantification

(d) DNA sequencing

10. Which staining method helps in detecting viable but non-culturable (VBNC) bacteria?

(a) Gram stain

(b) Acridine orange direct count

(c) Endospore stain

(d) Ziehl–Neelsen stain

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 250 words.

11. (a) Explain the diversity and distribution of soil microorganisms.

(OR)

(b) Describe the process of mineralization of organic matter in soil.

12. (a) Illustrate the disease cycle of Tikka disease.

(OR)

(b) Write short notes on systemic acquired resistance in plants.

13. (a) Differentiate between positive and negative interactions among microbial populations.

(OR)

(b) Explain the significance of microbial biofilms in natural ecosystems.

14. (a) Discuss the dynamics of microbial communities in ecosystems.

(OR)

(b) Explain microbial succession in biofilms with suitable examples.

15. (a) Describe the methods for detecting non-culturable bacteria in soil.

(OR)

(b) Explain the principles of microbial biomass estimation.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 600 words.

16. (a) Discuss in detail the role of soil microorganisms in soil fertility.

(OR)

(b) Explain the genetics of biological nitrogen fixation.

17. (a) With suitable diagrams, describe the pathogenesis of Citrus canker.

(OR)

(b) Explain the role of phenolics and phytoalexins in plant defence.

18. (a) Discuss in detail rhizosphere interactions and their agricultural importance.

(OR)

(b) Evaluate the role of microbes in animal diseases.

19. (a) Analyse the factors influencing the development of microbial communities in ecosystems.

(OR)

(b) Discuss microbial community succession with examples from soil ecosystems.

20. (a) Explain the methods used to quantify microbial populations in soil.

(OR)

(b) Evaluate the different approaches for microbial biomass determination.