



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – M.Sc.(MB)-2024

Course Name – Microbial Ecology and Agricultural Microbiology

Course Code - MMB40115

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) The 16S rRNA gene is mainly used for
 - a) Fungal classification
 - b) Viral identification
 - c) Bacterial taxonomy
 - d) Protein synthesis
- (ii) The rhizosphere is the soil region influenced by
 - a) Leaves
 - b) Roots
 - c) Stems
 - d) Flowers
- (iii) Biopesticides are preferred because they are
 - a) Persistent
 - b) Highly toxic
 - c) Eco-friendly
 - d) Non-degradable
- (iv) The historical foundation of microbial ecology began with the
 - a) Discovery of antibiotics
 - b) Discovery of vaccines
 - c) Discovery of microorganisms
 - d) DNA structure discovery
- (v) Which microbial group would be most suitable for bioremediation in cold oil-contaminated regions
 - a) Thermophiles
 - b) Psychrophiles
 - c) Alkaliphiles
 - d) Hyperthermophiles
- (vi) Compared to physical methods, bioremediation is advantageous because it
 - a) Is faster in all cases
 - b) Produces toxic byproducts
 - c) Is cost-effective and sustainable
 - d) Requires no monitoring
- (vii) The most suitable treatment for municipal wastewater is:
 - a) Thermal treatment
 - b) Biological treatment
 - c) Chemical fixation
 - d) Solidification
- (viii) Disease resistance in plants primarily involves
 - a) Avoidance of pathogens
 - b) Chemical pesticides

- c) Structural and biochemical defenses
(ix) Induced defenses are activated in plants
a) During seed germination
c) During flowering
(x) Chitinases are effective mainly against
a) Bacterial pathogens
c) Fungal pathogens
(xi) The role of enzymes in plant pathogenesis is mainly to
a) Detoxify host compounds
c) Activate plant immunity
(xii) A pathogen that avoids recognition by host receptors will most likely
a) Fail to infect
c) Establish successful infection
(xiii) Designing disease-resistant crops should focus primarily on
a) Eliminating pathogens
c) Increasing toxin production
(xiv) The most integrated outcome of plant defense responses is
a) Complete pathogen elimination always
c) Permanent immunity
(xv) Viral plant diseases are mainly characterized by
a) Necrosis
c) Mosaic and chlorosis
- d) Vector elimination
b) After pathogen recognition
d) Under drought stress only
b) Viral pathogens
d) Nematodes
b) Degrade host cell components
d) Strengthen host tissues
b) Nematodes x
d) Induce SAR rapidly
b) Strengthening host defense pathways
d) Suppressing PR proteins
b) Balanced host survival and pathogen restriction
d) Absence of infection
b) Root rots
d) Cankers

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Group-B

(Short Answer Type Questions)

3 x 5=15

2. Identify any two soil bacteria involved in nitrogen fixation. (3)
3. Define psychrophiles and explain their ecological role. (3)
4. Define mutualistic microbial interactions. (3)
5. Mention one strategy for solid waste treatment. (3)
6. Differentiate between biotrophic and necrotrophic pathogens. (3)

OR

Define biological control of plant diseases. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Identify plant growth-promoting rhizobacteria (PGPR), metal-tolerant bioinoculants, and arbuscular mycorrhizal fungi (AMF). (5)
8. Describe the main characteristics, habitats, and practical applications of acidophiles and alkaliphiles. (5)
9. Analyze the role of microorganisms in nutrient cycling of carbon, nitrogen, phosphorus, and sulfur within ecosystems. (5)
10. Explain the biochemical basis of disease resistance with reference to SAR and LAR. (5)
11. Explain the defensive role and mode of action of pathogenesis-related proteins such as chitinases and glucanases. (5)
12. Analyze conflictual and beneficial microbial interactions in ecosystems using suitable examples. (5)

OR

Explain how microorganisms degrade hydrocarbons and petroleum products in contaminated (5) environments.

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