



## BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – M.Sc.(MB)-2023

Course Name – Environmental Microbiology

Course Code - MMBE305

( Semester III )

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) Identify from the following which one is biodegradable object.
  - a) Plastic
  - b) TNT
  - c) Paper
  - d) Zinc
- (ii) Correlate the human activity, among the following, which causes maximum environmental pollution having regional and global impact.
  - a) Industrialization
  - b) Urbanization
  - c) Agriculture
  - d) Mining
- (iii) Identify the most harmful cause of ocean water pollution.
  - a) Plastic waste
  - b) industrial effluents
  - c) Domestic waste
  - d) oil spills
- (iv) Identify the non-renewable resource
  - a) Crude oil
  - b) Uranium
  - c) Hot spring
  - d) Silica
- (v) Recognize the situation when the death of the last individual in a species occurs.
  - a) Adaptation
  - b) Phylogenic diversity
  - c) Speciation
  - d) Extinction
- (vi) Classify the type of environmental pollution can metagenomics be particularly effective in remediating.
  - a) Noise pollution
  - b) Air pollution
  - c) Water pollution
  - d) Light pollution
- (vii) Predict the way metagenomics help in bioremediation.
  - a) By directly removing pollutants
  - b) By providing genetic information
  - c) By reducing microbial diversity
  - d) By increasing pollution levels
- (viii) Sketch out the sequencing technology commonly used in metagenomics to analyze complex microbial communities.
  - a) Sanger sequencing
  - b) PCR (Polymerase Chain Reaction)

- c) Next-generation sequencing                      d) Western blotting
- (ix) Illustrate the significant advantage of metagenomics over traditional culture-based methods in bioremediation.
- a) Faster results                      b) Identifying all microorganisms
- c) Lower cost                      d) High accuracy
- (x) Employ denitrification, and its impact the nitrogen cycle.
- a) Denitrification is the conversion of nitrate to ammonia.                      b) Denitrification is the conversion of ammonia to nitrate.
- c) Denitrification is the release of N<sub>2</sub> gas from nitrate and nitrite.                      d) Denitrification has no impact on the nitrogen cycle.
- (xi) Identify from the following is a major component of plant cell walls.
- a) Cellulose                      b) Hemicellulose
- c) Lignin                      d) All of these
- (xii) State the name of microbial organisms are commonly involved in cellulose decomposition.
- a) Bacteria                      b) Fungi
- c) Viruses                      d) Archaea
- (xiii) Consider a real-world scenario and explain how commensalism can shift to mutualism over time in microbial ecosystems.
- a) Increased competition                      b) Changes in the environment
- c) Evolutionary adaptations                      d) No shift is possible
- (xiv) Correlate the consequences of predation in a marine microbial community and its impact on nutrient cycling.
- a) It accelerates nutrient cycling                      b) It reduces nutrient availability
- c) It has no impact on nutrient cycling                      d) It promotes mutualism
- (xv) Biofilm is a
- a) A type of plant                      b) A layer of soil
- c) A group of microorganisms                      d) A layer of bioactive material

#### Group-B

(Short Answer Type Questions)

3 x 5=15

2. How does ammonification contribute to nutrient cycling and soil fertility in ecosystems? (3)
3. How does microbial degradation of pesticides benefit environmental health? (3)
4. Imagine you are planning a trip to explore terrestrial biomes. Explain how you would recognize and differentiate between a deciduous forest and a grassland biome based on their key characteristics and dominant vegetation. (3)
5. Assess the anaerobic degradation of cellulose. (3)
6. Analyze human activity, such as the use of synthetic fertilizers and runoff from agricultural fields, influence denitrification in aquatic ecosystems? (3)

OR

- Analyze anammox reaction (3)

#### Group-C

(Long Answer Type Questions)

5 x 6=30

7. How do mycorrhizal associations contribute to plant growth and ecosystem health? (5)
8. Assess the aerobic degradation of cellulose. (5)
9. Evaluate the key enzymes involved in hemicellulose degradation. (5)



10. Explain the significance of metagenomics in environmental microbiology, and how does next-generation sequencing (NGS) facilitate metagenomic studies? (5)
11. State the concept of solid waste management. (5)
12. How can knowledge of uncultivable bacteria contribute to applications in biotechnology and environmental management? (5)

OR

Describe with examples chemoorganoheterotrophs and photoorganoheterotrophs. (5)

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