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Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – M.Sc.(MB)-2023

Course Name – Plant-Microbe Interactions

Course Code - MMBC303

(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) Correlate the following statements that best describes a habitat.

- | | |
|---|---|
| a) The specific role and position of a species within an ecosystem. | b) The physical and biological environment in which a species lives. |
| c) The interactions between different species within a community. | d) The process of change in the composition of a community over time. |

(ii) Select reasons for the microorganisms to form biofilms

- | | |
|---|---------------------------------------|
| a) To increase susceptibility to antibiotics | b) To inhibit cell-cell communication |
| c) To enhance resistance to environmental stressors | d) To reduce cellular metabolism |

(iii) Select from the following that is a common example of a biofilm-related infection in humans.

- | | |
|------------------|----------------|
| a) Influenza | b) Common cold |
| c) Dental plaque | d) Malaria |

(iv) Select the role played by "pili" in biofilm formation.

- | | |
|--|---|
| a) They are involved in quorum sensing. | b) They allow bacteria to move within the biofilm. |
| c) They facilitate initial attachment to surfaces. | d) They serve as energy sources for biofilm-forming bacteria. |

(v) Choose the role that efflux pumps play in biofilm antibiotic resistance.

- | | |
|---|--|
| a) They facilitate antibiotic penetration into the biofilm. | b) They pump antibiotics out of the biofilm. |
| c) They break down antibiotics into harmless compounds. | d) They stimulate quorum sensing. |

(vi) Predict the main enzyme component of Sanger sequencing.

- | | |
|-------------|---------------|
| a) Helicase | b) Polymerase |
| c) Nuclease | d) Gyrase |

- (vii) Choose from the followings: Soredia is a type of
- Asexual reproduction
 - Sexual reproduction
 - both
 - none
- (viii) State the association which involves the exchange of nutrients (metabolite) between two species
- mutualism
 - syntrophism
 - commensalism
 - antagonism
- (ix) Indicate the contribution of microorganisms in the environment.
- Recycle nutrition stored in organic matters to inorganic form
 - Generate Oxygen in atmosphere
 - Allows herbivore animals to get nutrition from poor quality food
 - All of the these
- (x) Choose the molecular method for detecting microbial inoculants.
- Staining
 - Catalase test
 - PCR
 - Soil pH measurement
- (xi) Name the system responsible for plant-microbe signaling in response to external stimuli.
- Photosynthesis
 - Two-component signal transduction system
 - Digestive system
 - Circulatory system
- (xii) Name a non-symbiotic nitrogen fixer.
- Rhizobium
 - Azotobacter
 - Mycorrhiza
 - Legume
- (xiii) Choose the primary succession in microbial communities?
- The stage where diverse microorganisms establish stable interactions
 - The initial colonization of previously uninhabited or disturbed habitats
 - The final stable and mature stage of microbial community development
 - The phase characterized by complex microbial interactions and nutrient cycling
- (xiv) Select the purpose of studying microbial succession in various habitats.
- To develop new antibiotics
 - To understand nutrient cycling and ecosystem dynamics
 - To improve agricultural practices
 - To identify new species of microorganisms
- (xv) Choose which of the following is an abiotic factor that influences microbial succession?
- Presence of other species
 - pH levels
 - Competition among microorganisms
 - Cooperation among microorganisms

Group-B

(Short Answer Type Questions)

3 x 5=15

- Explain the concept of seed endophytes. Write the benefits of seed endophytes. (3)
- Summarize the key characteristics of Type I survivorship curve, and which organisms typically exhibit this pattern? (3)
- Recall the reasons of biofilm formation and association of increased resistance to environmental stresses. (3)
- Describe the positive and negative influence of phyllosphere on plant. (3)
- Analyze the process of prevention of early blight of tomato by talc-based formulation. (3)

OR

Explain Systemic Acquired Resistance(SAR) in plant defense mechanism. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Write the role of mycorrhizal fungi in enhancing plant growth. How do mycorrhizae form (5)
Mycorrhizal fungi form symbiotic relationships with plant roots.
8. Explain MAMPs and PAMPs, and how do they contribute to plant immunity? (5)
9. Explain the significance of signaling pathways in plant defense against pathogens. Explain (5)
the ethylene signaling pathway in plant defense.
10. Explain with diagrams how to perform DNA or RNA sequencing using Next Gen sequencing (5)
techniques
11. Explain the application of biofertilizers in agriculture and forestry. How do beneficial (5)
microorganisms enhance soil fertility and plant growth? Provide examples of biofertilizers
and their specific functions.
12. Summarize the mechanism through which PGPR can promote plant growth directly. (5)

OR

Justify the advantages and limitations of Sanger sequencing. (5)

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