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**BRAINWARE UNIVERSITY****Term End Examination 2025-2026****Programme – M.Sc.(BT)-2024****Course Name – Environmental Biotechnology****Course Code - MBT40212****(Semester IV)****LIBRARY****Brainware University
Barasat, Kolkata -700125****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) Define wastewater.
 - a) Pure groundwater
 - b) Used water containing contaminants
 - c) Distilled water
 - d) Rainwater
- (ii) Identify the primary objective of wastewater treatment.
 - a) Water storage
 - b) Salinity increase
 - c) Pollution removal
 - d) Colour enhancement
- (iii) Recognize the major source of domestic sewage.
 - a) Forests
 - b) Glaciers
 - c) Oceans
 - d) Households
- (iv) Identify a feature of industrial wastewater.
 - a) Absence of solids
 - b) Presence of toxic chemicals
 - c) Uniform composition
 - d) Sterility
- (v) Identify non-point source pollution.
 - a) Factory outlet
 - b) Sewer pipe
 - c) Effluent channel
 - d) Agricultural runoff
- (vi) Recognize the effect of high BOD.
 - a) Increased clarity
 - b) Oxygen depletion
 - c) Improved quality
 - d) Reduced microbes
- (vii) State the importance of sludge recycling.
 - a) Increases toxicity
 - b) Maintains microbial population
 - c) Reduces oxygen
 - d) Increases solids
- (viii) Identify a disinfection method.
 - a) Sedimentation
 - b) Screening
 - c) Grit removal
 - d) Chlorination

- (ix) State an advantage of biological treatment.
 - a) High chemical use
 - b) Low efficiency
 - c) High toxicity
 - d) Eco-friendly degradation
- (x) Identify facultative bacteria capability.
 - a) Only aerobic
 - b) Only anaerobic
 - c) Grow with or without oxygen
 - d) Non-metabolic
- (xi) Recognize sustainable wastewater management goal.
 - a) Maximum discharge
 - b) Chemical dependency
 - c) Water wastage
 - d) Environmental protection
- (xii) Analyze why aliphatic hydrocarbons degrade faster than aromatics.
 - a) Lower molecular weight
 - b) Simpler chemical structure
 - c) Higher toxicity
 - d) Greater halogenation
- (xiii) Evaluate the debate between economic growth and sustainable development.
 - a) Sustainability slows progress
 - b) Resource limits challenge unchecked growth
 - c) Growth always sustainable
 - d) No environmental impact
- (xiv) Evaluate smart city initiatives for environmental sustainability.
 - a) Environmentally neutral
 - b) Wasteful investment
 - c) Effectiveness depends on planning and governance
 - d) Always successful
- (xv) Analyze the importance of carrying capacity analysis in city planning.
 - a) Promotes congestion
 - b) Prevents ecological overloading
 - c) Encourages expansion
 - d) Increases waste

Group-B

(Short Answer Type Questions)

3 x 5=15

- 2. Categorize the different sources of water pollution. (3)
- 3. What are polycyclic aromatic hydrocarbons (PAHs)? (3)
- 4. Discuss briefly about bioremediation. (3)
- 5. Apply bioscrubbers in air pollution control. (3)
- 6. Propose improvements to existing air pollution prediction models. (3)

OR

- Design a basic approach for forecasting population growth using models. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

- 7. Explain why centralized sewage treatment plants are not economical in sparsely populated areas and discuss the design and components of a typical on-site subsurface wastewater disposal system. (5)
- 8. How does automation improve the stability and reliability of biological wastewater treatment processes? (5)
- 9. Describe the biodegradation of halogenated hydrocarbons. (5)
- 10. Evaluate carrying capacity analysis as a decision-making tool for sustainable development planning. (5)
- 11. Design a sustainability assessment framework combining indices, carrying capacity, and ecological footprint. (5)
- 12. Compare land requirement: Solar plant requires 4 hectares per MW, wind requires 1 hectare per MW. Calculate land required for 50 MW and analyze impact. (5)

OR

- Analyze the advantages and limitations of biomass energy utilization. (5)