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Barasat, Kolkata -700125**Term End Examination 2025-2026****Programme – M.Sc.(BT)-2025****Course Name – Environmental Biotechnology****Course Code - MBT20404****(Semester II)****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) Secondary treatment is mainly intended to remove:
 - a) Dissolved and colloidal biodegradable organics
 - b) Salinity
 - c) Settleable solids only
 - d) Heavy metals
- (ii) COD in wastewater primarily measures:
 - a) Total nitrogen concentration
 - b) Total suspended solids only
 - c) Oxygen used by microorganisms to oxidize organic matter
 - d) Oxygen required to chemically oxidize organic and inorganic matter
- (iii) Biodegradation of organic pollutants primarily depends on:
 - a) Molecular weight only
 - b) Microbial metabolic capability and environmental conditions
 - c) Presence of heavy metals only
 - d) Color of the pollutant
- (iv) Why are aromatic compounds generally more resistant to biodegradation than aliphatic compounds?
 - a) Lower toxicity
 - b) Higher solubility in water
 - c) Presence of stable ring structures
 - d) Higher vapor pressure
- (v) Azo dye reduction occurs preferentially under:
 - a) UV radiation
 - b) Anoxic or anaerobic conditions
 - c) Aerobic conditions
 - d) High temperature
- (vi) Biomass energy is primarily derived from:
 - a) Fossilized organic matter
 - b) Nuclear reactions
 - c) Geothermal gradients
 - d) Living or recently living biological materials
- (vii) Anaerobic digestion of biomass mainly produces:
 - a) Hydrogen gas only
 - b) Carbon monoxide
 - c) Methane and carbon dioxide
 - d) Nitrogen gas
- (viii) Geothermal energy exploitation may lead to environmental issues such as:

- a) Land subsidence and induced seismicity
- b) Ozone depletion
- c) Acid rain
- d) Thermal inversion
- (ix) Compared to fission, nuclear fusion is considered advantageous because it:
 - a) Produces more long-lived radioactive waste
 - b) Is already commercially viable
 - c) Requires heavy elements
 - d) Uses abundant fuel and has higher safety potential
- (x) India's Environment Action Programme mainly focuses on:
 - a) Urban real estate growth
 - b) Industrial expansion only
 - c) Population control only
 - d) Integration of environment and development planning
- (xi) Urbanization refers to:
 - a) Expansion of agriculture
 - b) Decline of rural population
 - c) Reduction in infrastructure
 - d) Increase in proportion of population living in urban areas
- (xii) Urban sprawl is characterized by:
 - a) Compact high-density development
 - b) Unplanned outward expansion of cities
 - c) Efficient public transport
 - d) Decrease in land consumption
- (xiii) Carrying capacity refers to:
 - a) Industrial capacity
 - b) Urban land value
 - c) Maximum population an environment can sustain
 - d) Maximum economic output
- (xiv) A key criticism of sustainable development is that it:
 - a) Is vague and difficult to implement uniformly
 - b) Encourages overexploitation
 - c) Rejects economic growth
 - d) Promotes inequality
- (xv) Environmental modelling primarily helps in:
 - a) Simulating real-world environmental processes
 - b) Avoiding policy decisions
 - c) Eliminating data collection
 - d) Exact prediction without error

Group-B

(Short Answer Type Questions)

3 x 5=15

2. State the main differences between primary and secondary wastewater treatment. (3)
3. Differentiate between biodegradation of aliphatic and aromatic hydrocarbons. (3)
4. State the basic principle of solar energy conversion. (3)
5. Explain the concept of ecological footprint. (3)
6. Evaluate the challenges in modelling pollutant transformation processes. (3)

OR

Assess why model utilization is as important as model accuracy. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe the biodegradation of halogenated hydrocarbons. (5)
8. Critically discuss the factors limiting biodegradation of pesticides. (5)
9. Describe different methods of energy extraction from biomass with examples. (5)
10. Discuss the role of fuel cells in sustainable energy systems. (5)
11. Critically discuss the applicability of Gaussian plume model under real conditions. (5)
12. Explain the advantages and limitations of suspended growth systems. (5)

OR

Explain biological phosphorus removal and its advantages. (5)