MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : CH (CHE)-301

BASIC ENVIRONMENTAL ENGINEERING & ELEMENTARY BIOLOGY

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Autecology can also be termed as

a) population ecology

b) landscape ecology

c) community ecology

d) none of these.

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ii) While carrying out BOD test, BOD bottle is stoppered

a) to avoid evaporation of water

b) to avoid photosynthesis

c) to avoid diffusion of atmospheric oxygen

d) to avoid diffusion of atmospheric carbon dioxide.

iii) Which of the following is an example of in situ conservation ?

a) Deer park b) Seed bank

c) Wildlife sanctuary d) Aquarium.

iv) Blue baby syndrome is related to

a) nitrate b) sulphate

c) phosphate d) carbonate.

v) The main component of photochemical smog is

a) water vapour b) sulphur dioxide

c) oxides of nitrogen d) all of these.

vi) The most useful method of disposal of non-hazardous solid waste is

a) Open dumping b) composting

c) land filling d) incineration.

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vii) Which of the following can be used for disinfection of water ?

a) chlorine b) hydrogen peroxide

c) ozone d) none of these.

viii) Aircraft noise is measured through

a) L_{10} (18 hour) index b) decibel

c) $L_e p_n$ d) L_{eq}.

ix) Biotic factor of ecosystem is

a) sunlight

b) soil

c) wind

d) producer and consumer.

x) Species with very restricted distribution over relatively small ranges is called

a) endangered species b) extinct species

c) endemic species d) none of these.

xi) Ozone acts as a protective shield when it resides in

a) troposphere b) stratosphere

c) mesosphere d) ionosphere.

xii) Which one is true for a waste water sample ?

a) BOD > COD b) COD > BOD

c) COD = BOD d) BOD = 1/COD.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is COD ? What are steps involved in COD test ? How is it related to BOD ? 2 + 3

3. Describe aquifer. Name different types of aquifers. What is hydraulic gradient ? State Darcy's law. 1 + 2 + 1 + 1

4. How do you define water pollution. How do agricultural chemicals cause water pollution. 2 + 3

5. Define habital, population, bio-community, ecological niche and species.

6. a) Explain the Wiens law & its application for explaining green house effect. 1 + 2

b) What is atmospheric radiation window ? 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What are the adverse effects of open dumping of municipal solid wastes on environment ?

b) How does sanitary landfill differ from open dumping ?

c) 'Compositing is best suited for disposal of biodegradable fraction of municipal solid wastes. Explain the statement.

d) What is noise pollution ? Define decibel. Mention two hazardous effects of noise pollution on public health. 3 + 3 + 4 + 5

8. a) What is oxygen sag curve ? Explain it by a diagram.

b) Sketch and discuss the typical treatment for surface water to make potable water.

c) Discuss the working principle of trickling filter used in the secondary treatment of waste water with suitable diagram.

d) A BOD test is run using 50 ml of waste water mixed with 150 ml of pure water. The initial DO of the mixture is 10 mg/1 and after 5 days it becomes 5 mg/1. After a long time the DO remain fixed at 1 mg/1.

i) What is BOD5 of waste water ? ii) What is the ultimate BOD ? iii) What is the remaining BOD after 5 days ? iv) What is the reaction rate constant at 20°C ? v) What would be the reaction rate constant if measure at 45°C ? 2 + 4 + 3 + 6

9. a) Write a short note on the sulphur cycle. 5

b) Explain in detail about energy flow mechanism of an ecosystem. 5

c) What do you understand by nitrification and nitrogen fixation ? Give the examples of microorganism that do fixation of nitrogen. 2 + 3

10. a) What is carrying capacity ? What is maximum sustainable yield ?

b) Discuss logistic population growth model.

c) Prove that $N = K/2$ for maximum sustainable yield, where N = no. of population and k = carrying capacity.

d) Suppose a population of butterflies is growing according to the logistic equation. If the carrying capacity is 500 butterflies and $r = 0.1$ individuals/(individual X month). What is the maximum possible growth rate for the population ?

e) Define aquatic ecosystem with reference to the flora, fauna (primary, secondary and tertiary consumers) and decomposers. 2 + 3 + 4 + 3 + 3

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11. Write short notes on any *three* of the following : 3 × 5

a) Ventury scrubber

b) Earth's albedo

c) Incineration

d) Food chain

e) Hydrological cycle

f) Activated sludge process.

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