MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : CH-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 the following : $10 \times 1 = 10$

i) 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.

ii) The IR active gas is

a) O_2 b) CO_2

c) N_2 d) He.

iii) The simple global temperature model predicts earth temperature to

a) 0°C b) 34°C

c) –19°C d) – 273°C.

iv) For a sample of waste water containing both biodegradable and non-biodegradable waste

a) BOD > COD b) BOD < COD

c) BOD = COD d) BOD $\propto$ 1/COD.

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

a) endangered species b) extinct species

c) endemic species d) none of these.

vi) Water will be considered saline if the TDS value is

a) < 1500 mg/L b) > 5000 mg/L

c) < 500 mg/L d) None of these.

vii) For air stability, we must have

a) Dry Adiabatic Lapse Rate – Ambient Lapse Rate

b) Dry Adiabatic Lapse Rate > Ambient Lapse Rate

c) Dry Adiabatic Lapse Rate < Ambient Lapse Rate

d) None of these.

viii) Aircraft noise is measured through

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

c) Le Pn d) Leq.

ix) In the measurement of SPL, the reference pressure is taken

a) $2 \times 10^{-5} N/m^2$ b) $1 \times 10^{-5} N/m^2$

c) $8 \times 10^{-5} N/m^2$ d) $6 \times 10^{-5} N/m^2$.

x) The temperature range of troposphere is

a) – 2°C to 92°C b) – 56°C to – 2°C

c) 15°C to – 56°C d) – 92°C to 1200°C.

GROUP – B

(Short Answer Type Questions)

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

2. Define the term EIA. 1

The following data are given in a dam construction project :

Parameter	Original value	Present value
SPM	120 µg/c.c.	100000 µg/c.c.
TDS	100 mg/L	20000 mg/L
Do	8 mg/L	3mg/L
Noise level	40dB	120dB

Find out the total EIU value considering the parameter importance unit as 4, 3, 2 and 4 respectively for the parameters mentioned above. 4

3. Which of the Hg (I), Hg^{2+} and CH_3Hg^{2+} is most toxic ? Mention the biochemical effects of toxicity due to

a) Mercury and b) Cadmium. 1 + 1 + 3

4. What is trickling filter ? Explain its use with a diagram. 2 + 3

5. World population in 1850 has been estimated to have been about 1 billion. It reaches 4 billion in 1975. Use the exponential growth rate equation to find the growth rate constant and also calculate the doubling time value. $2\frac{1}{2} + 2\frac{1}{2}$

6. Discuss the winkler method of analysis of DO in the laboratory.

GROUP – C

(Long Answer Type Questions)

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

7. a) What is global warming ? 2

   b) Describe clearly how the greenhouse gases cause global warming. 4

   c) Explain the 'Wien's Law' and its application for explaining greenhouse effect. 4

   d) Consider earth to be a black body having average temperature of 15°C and surface area = $5.1 \times 10^{14} m^2$. Find the rate at which energy is radiated by the earth and the wavelength at which the maximum energy is radiated.

   Given that Stefan-Boltzmann constant,

   $\partial = 5.67 \times 10^{-8} Wm^{-2} K^{-4}$. 5

8. a) Explain Stack and Plumes. 3

   b) How many types of plumes can be observed ? 3

   c) Explain maximum mixing depth and ventilation coefficient. 4

   d) 'ELR > ALR is the ideal situation for the dispersion of the pollutants in the atmosphere.' – Justify it. 5

9. a) What types of solid wastes are separated from domestic, trade and industries ? 3

   b) What are solid hazardous wastes ? How can those wastes be disposed ? 1 + 4

   c) What is noise pollution ? State the various sources of noise pollution. 1 + 3

   d) How much is a sound of 100 dB louder than a sound of 90 dB ? 3

10. a) What do you mean by eutrophic lake ? How does thermal stratification influence an eutrophic lake ? Write a short note on ozone layer depletion in stratospheric zone. 5

    b) Give a concise account of the chemical speciation of (a) Mercury, (b) Lead. 5

    c) How is a catalytic converter used for creating automobile emissions ? What is the role of tetramethyl lead in the internal combustion of engines ? 5

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

a) EIA

b) Montreal Protocol

c) Oxygen Sag Curve

d) Electrostatic Precipitator

e) Temperature inversion

f) Demography

g) Environmental Management System

h) Activated Sludge Process.