

**BASIC ENVIRONMENTAL ENGINEERING & ECOLOGY
(CHEM 2001)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**

- (i) The hottest region of atmosphere is
(a) magnetosphere (b) stratosphere
(c) mesosphere (d) thermosphere.
- (ii) Wildlife sanctuary is one kind of
(a) ex situ conservation (b) hot spot
(c) artificial ecosystem (d) in situ conservation.
- (iii) 'Itai Itai' disease is cause due to poisoning of
(a) Cd (b) Hg (c) As (d) Pb.
- (iv) Human ear frequency response is related to the network
(a) dBA (b) dBB (c) dBC (d) none of these.
- (v) A greenhouse gas is
(a) H₂S (b) CO (c) SO₂ (d) H₂O vapour.
- (vi) In the oligotrophic lake the nutrient status and productivity of aquatic plants are
(a) very high (b) high (c) moderate (d) low.
- (vii) The recommended maximum TDS concentration of drinking water according to WHO is
(a) 100 mg/l (b) 500 mg/l
(c) 150 mg/l (d) 250 mg/l.
- (viii) Radioactive waste disposal method usually involve
(a) incineration (b) sanitary landfill
(c) window composting (d) encapsulation.

- (ix) Reverse Osmosis is a technique to remove from water the
(a) oxygen demanding waste (b) pathogen
(c) salinity (d) thermal pollution.
- (x) Which of the following poisonous gas was released during Bhopal Gas Tragedy?
(a) Arsenic pentafluoride (b) Chlorine
(c) Methyl isocyanate (d) Carbon monoxide.

Group – B

2. (a) The increase in population from 1 million to 10 million took 200 years. For exponential growth at constant rate find out the growth rate and the doubling time.
(b) What are the endemic species to biodiversity? Give example.
(c) Give one example of each in situ and ex situ conservation to biodiversity.
(d) Give a brief account of sulphur cycle showing schematic diagram.
(2 + 2) + (2 + 1) + (1 + 1) + 3 = 12
3. (a) Exemplify renewable and non-renewable resources.
(b) Define food web? Give one example of food web.
(c) According to logistic growth of population explain the term carrying capacity.
(d) Write short notes on sustainable development.
(e) Give a brief account of biological nitrogen fixation.
(1 + 1) + (2 + 1) + 2 + 3 + 2 = 12

Group – C

4. (a) What is global warming? What are effects of global warming?
(b) What are the main constituents of photochemical smog?
(c) Write a short note on (i) Bag house filter (ii) Kyoto Protocol.
(d) Give a brief account of green house effect.
(1 + 3) + 2 + (2 + 2) + 2 = 12
5. (a) What are the effects of ozone layer depletion?
(b) Show that for unit mass of air the temperature of the atmosphere fall by a rate $r = -g/C_p$.

[where, r = rate of change of temperature with altitude; g = gravitational acceleration; C_p = specific heat at constant pressure]

- (c) Write the reactions involved during formation of acid rain.

$$3 + 6 + 3 = 12$$

Group - D

6. (a) What do you mean by Biological Oxygen Demand? Prove the relation $BOD_t = C_0(1 - e^{-kt})$, where all the terms have their usual significance.

- (b) What are the physiological effects of noise pollution on human beings?

- (c) How the loudness of a sound is expressed in terms of intensity? What are the threshold of hearing and threshold of pain in terms of sound intensity?

$$(2 + 3) + 3 + (2 + 2) = 12$$

7. (a) Describe with figure different kinds of aquifers.

- (b) What are the sources of mercury (Hg) contamination in water? Describe the biochemical effects of the above heavy metal.

- (c) How much a sound of 150 dB is louder than a sound of 100 dB?

- (d) What are the technical processes for controlling noise pollution?

$$3 + (1 + 2) + 3 + 3 = 12$$

Group - E

8. (a) Write a short note on 'Bhopal gas tragedy'.

- (b) What is cancer? How does cancer develop?

- (c) Discuss incineration process mentioning advantage and disadvantage.

- (d) What are the biomedical wastes?

$$3 + (1 + 2) + 4 + 2 = 12$$

9. (a) What do you mean by green chemistry?

- (b) What is green solvent? Give example.

- (c) Differentiate between garbage and rubbish?

- (d) What are the main objectives of Environment Protection Act, 1986 of India?

- (e) What are the mutagens? Give examples.

$$2 + (1 + 1) + 2 + 4 + (1 + 1) = 12$$