MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : HU-401(MCA)

ENVIRONMENT AND ECOLOGY

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) Incineration is a disposal method of
      a) water pollutants b) air pollutants
      c) solid wastes d) none of these.

   ii) Road traffic noise is measured by
      a) L_{10} (18 hour) index b) $L_{e_n}P$
      c) L_{eq} d) none of these.

   iii) An air pollutant that reduces the oxygen-carrying capacity of the haemoglobin is
      a) ammonia b) hydrogen sulphide
      c) carbon monoxide d) sulphur dioxide.

   iv) Plants uptake phosphorus in the form of
      a) PO_4^{3-} b) HPO_3^{2-}
      c) HPO_4^{2-} d) P.

v) Monotreal protocol is related to
   a) water pollution b) air pollution
   c) land pollution d) noise pollution.

vi) Lakes rich in nutritive material are known as
   a) Mesotrophic b) Oligotrophic
   c) Eutrophic d) None of these.

vii) CFC-12 has the chemical composition
   a) CF_3Cl b) CF_2Cl_2
   c) $CHClF_2$ d) $CFCl_3$.

viii) The most potentially renewable energy resource is
   a) Sunlight b) Wind
   c) Tidal d) Biomass.

ix) Which one of the following is true for a waste water sample ?
   a) BOD > COD b) COD > BOD
   c) BOD = COD d) BOD = 1 / COD.

x) The pH of acid rain varies from
   a) 6 — 8 b) 4 — 8
   c) 3 — 6 d) 1 — 2.

xi) Trickling filter is classified under
   a) Primary Treatment
   b) Secondary Treatment
   c) Tertiary Treatment
   d) None of These.

xii) Minamata Disease is caused by
   a) mercury b) zinc
   c) cadmium d) lead.

GROUP – B
(Short Answer Type Questions)

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

2. Explain the following terms :
   a) Carrying capacity of the environment
   b) Sustainable yield
   c) Environmental resistance. 2 + 2 + 1

3. a) What is BOD ?
   b) Outline the steps in standard unseeded BOD test. 2 + 3

4. What are endemic species ? Differentiate between *in situ* and *ex situ* conservation principles. 2 + 3

5. a) What is the noise threshold limit value ?
   b) What are the effects of noise pollution on living organism ? 2 + 3

6. What are the greenhouse gases ? How do they change climate ?

GROUP – C
(Long Answer Type Questions)

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

7. a) Define energy flow in Ecosystem. Although the inorganic nutrients are recycled, the flow of energy is not. Justify.
   b) State the composition of Lithosphere. Write down the disadvantage of land filling.
   c) What are the different types of solid waste ?
   d) Write down the methods of disposal of solid waste. 4 + 4 + 2 + 5

8. a) What is meant by hardness of water ?
   b) State Darcy's law.
   c) What are the methods of water softening ?
   d) What are the biochemical effects of arsenic and cadmium ?
   e) Establish the relation $BOD_t = L_0(1 - e^{-kt})$ where, BOD_t = amount of oxygen consumed by the waste in first t days, L_0 = ultimate carbonaceous oxygen demand, k = the BOD reaction rate constant in day^{-1}. 1 + 1 + 4 + 5 + 4

9. What is noise pollution ? Explain the source of noise pollution. What are the physiological impacts of noise pollution ? How can noise pollution be controlled ?

2 + 3 + 5 + 5

10. a) Show that the temperature of the atmosphere falls by a rate $r = -g/C_p$ where,

r = rate of change of temperature with altitude

g = gravitational constant

C_p = specific heat at constant pressure.

b) In 1970, the world's population was 4 billion and growth rate was 2% per year. Steady-state population is 12 billion. When would the population reach 6 billion ? What would be the projected population in 2025 using logistic model ?

c) In a work area the noise levels are recorded as follows :

100 dB (A) for 30 min/day, 95 dB (A) for 2 hr/day, 90dB (A) for 4 hr/day, 80 dB (A) for 2hr/day. Determine whether the combined noise level is within limit. Given : Noise Threshold limit value of 100 dB (A) is 1 hr, 95 dB (A) is 2 hr, 90 dB (A) is 4 hr and 80 dB (A) is 16 hr. 5 + 5 + 5

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

a) Catalytic converter

b) Metamorphic rock

c) Pyramid of energy

d) Energy balance of earth and atmospheric window

e) Oil pollution and its effect in marine life and coastal infrastructure.