Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-4/HU(MCA)-401/2010

2010

ENVIRONMENT & 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) The saturated value of DO is approxiamtely

a) 20 mg/L b) 6 mg/L

c) 5 mg/L d) 9 mg/L.

ii) Energy flow in the ecosystem is

a) unidirectional

b) cyclic

c) unidirectional or cyclic

d) cannot be said.

iii) Chernobyl disaster was occurred due to

a) severe relase of pesticide in the environment

b) severe release of radioactivity in the environment

c) ozone layer depletion

d) atomic bomb explosion.

iv) Air pollutant PAN stands for

a) peroxy acetyl nitrate

b) permanent account number

c) polythene

d) none of these.

v) Ozone is an essential component of

a) troposphere b) stratosphere

c) mesosphere d) ionosphere.

vi) Minamata disease occurs due to

a) arsenic pollution

b) lead pollution

c) mercury pollution

d) cadmium pollution.

vii) Eutrophication is related to

a) overnutrient lakes

b) European air pollution

c) damage of ozone layer

d) none of these.

viii) In a seeded BOD test the dilution water contains

a) distilled water

b) distilled water containing some micro-organisms

c) distilled water containing some waste

d) none of these.

ix) Montreal protocol is related to

a) land pollution

b) noise pollution

c) production and use of CFCs

d) increase of population.

x) Sulphurous smog is a

a) secondary pollutant

b) primary pollutant

c) water pollutant

d) none of these.

xi) Bhopal disaster was occurred due to

a) severe release of methyl isocyanate in the environment

b) severe release of radioactivity in the environment

c) ozone layer depletion

d) hydrogen bomb explosion.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. State the various methods of disposal of solid wastes.

3. Indicate the six structural components of ecosystem ecology.

4. Distinguish between primary and secondary pollutants with example.

5. State the importance of EIA.

6. Discuss the working principle of rotating biological contractor used in secondary treatment of waste water.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Define COD and BOD. Which one is greater and why ? (1 + 1) + 2

   b) Discuss the principles of five-day BOD test. How is COD measured ? 3 + 1

   c) What is rotating biological contractor ? 2

   d) A standard 5-day BOD test is run using a mix consisting of 8 parts distilled water and 2 parts waste water (no seed). The initial DO of the mix is 9·0 mg/L and the DO after 5 days is determined to be 3·0 mg/L. What is the BOD_5 ? 3

   e) What is eutrophication ? 2

8. a) What are the catalytic reactions that destroy ozone layer ? What are the effects of ozone destruction ? 3 + 2

   b) Deduce the chemical formula of CFC-11. 2

   c) What is ozone depletion potential ? 2

   d) Describe the mechanism of PAN formation. 4

   e) Explain the effect of carbon monoxide and hydrocarbon on human health. 2

9. a) What is Noise Pollution ? What are its different sources ? Define decibel (dB). Calculate the intensity of a 100 dB sound.

[Given : reference intensity = 10^{-12} W m^{-2}]

1 + 1 + 1 + 2

b) Calculate the average temperature of Venus. (Given the solar constant of the planet is 2613 W/m^2 and albedo of 75%). 5

c) What is photochemical smog ? What are the reactions involved in the formation of it ? What are the ill effects of photochemical smog ? 1 + 3 + 1

10. a) What is Greenhouse effect. Show the same with the help of a diagram.

b) Explain three major environmental impacts of Green-house effect on climate & human beings.

11. a) Discuss the different phases of a typical growth curve. 2

b) Show if population growth is logistic, then maximum sustainable yield is obtained when population is at half its carrying capacity i.e., $N = k/2$. 3

c) Suppose a human population follows a logistic curve until it stabilizes at 15·0 billion. In 1995, world's population was 5·0 billion and its growth rate was 1·7%. When whould the population reach

i) 7·5 billion and

ii) 14 billion ? 4

d) The increase in population from 1 million to 10 million took 200 years. For exponential growth at constant rate, find out the growth rate. 2

e) Establish the ralation $BOD_t = L_0 (1 - e^{-kt})$

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}. 4

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

a) Aquifers

b) Temperature inversion

c) Trickling filters

d) CO_2 as single major source of greenhouse effect

e) Bhopal gas tragedy

f) Global warming.