Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(N)/CE(N)/ME(N)/CSE(N)/IT(N)AUE(N)/MRE(N)/PE(N)/TT(N)/CT(N)/APM(N)SEM-3/CH-301/2012-13

2012

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 from the following : $10 \times 1 = 10$

i) A green house gas is

a) CO b) H_2S

c) SO_2 d) H_2O vapour.

ii) Identify the cause of eutrophication

a) Increase of pathogens

b) Increase of BOD

c) Increase of algae's productivity

d) Increase of DO.

iii) Coal induced smog was formed by the interaction SO_2 smokeand water to form H_2SO_4 and more thant 4000 people died in December 1952 in

a) London, England b) Los Angeles, California

c) Donora, USA d) Texas, USA.

iv) Who uses EIA ?

a) Industry b) Institution

c) Government d) All of these.

v) Which pyramid is always an upright one ?

a) Pyramid of energy

b) Pyramid of numbers

c) Pyramid of biomass

d) Pyramid of numbers and biomass.

vi) Incineration is a disposal method of

a) water pollutants b) air pollutant

c) solid waste d) none of these.

vii) Autecology can also be termed as

a) Population ecology b) Landscape ecology

c) Community ecology d) None of these.

viii) The phenomenon of accumulation of non-biodegradable contaminants in higher trophic level is known as

a) Bioprospecting b) Biopirary

c) Bioremediation d) Biomagnification.

ix) Vegetation Buffer is a remedial measure to combat

a) Air Pollution b) Water Pollution

c) Noise Pollution d) Soil Pollution.

x) Ozone is a pollutant when present in

a) stratosphere b) troposphere

c) mesosphere d) thermosphere.

GROUP – B

(Short Answer Type Questions)

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

2. Define the term 'noise'. Classify different type of noise. How much a 100 dB sound is louder than a 80 dB sound ?

$1 + 1\frac{1}{2} + 2\frac{1}{2}$

3. What do you understand by the term 'Maximum sustainable yield' ?

Prove that $N = k/2$ for maximum sustainable yield.

(Where N = population size and k = carrying capacity of a system) 2 + 3

4. What do you mean by Biological Oxygen Demand (BOD) ? Prove that $BOD_t = L_0 (1 - e^{-kt})$ where L_0 is the initial concentration of dissolved oxygen, K is the rate of degradation of organic waste. 2 + 3

5. Explain with diagram any two of the following :

a) Sub Adiabatic Lapse rate

b) Super Adiabatic Lapse rate

c) Neutrally stable lapse rate. $2\frac{1}{2} \times 2 = 5$

6. Write short notes on any two of the following : $2\frac{1}{2} \times 2 = 5$

   a) Earth's albedo

   b) Aquifer

   c) Cutalytic converter

   d) ESP.

GROUP – C

(Long Answer Type Questions)

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

7. a) What is food chain ?

   b) State the principal types of food chain with example.

   c) Write down the characteristics of food chain.

   d) What do you understand by ecological balance ?

   e) What is biodiversity ? Classify different types of biodiversity. 2 + 3 + 3 + 3 + 4

8. a) Define 'aquifer' and 'hydraulic gradient'. 2 + 2

   b) What is solid waste and write a note on land filling as a method of disposal of solid waste. 2 + 3

   c) State the measures adopted to protect soil from erosion. 3

   d) Write the sources of the metals Cadmium, Mercury, Lead and Arsenic in water and their adverse effects on human body ? 3

9. a) Explain the term Green house effect. Name six green house gases. Why is existence of life not possible in Venus ? 2 + 2 + 2

b) Show that the temperature of the artificial surface falls by a rate $r = -\frac{g}{C_p}$

where,

r = rate of change of temperature with altitude.

g = gravitational constant.

C_p = specific heat at constant process. 5

c) What are the pollutants emitted from automobile exhaust ? How these are controlled in urban vehicles ? What special type of petrol is used in modern car ? 2 + 1 + 1

10. a) Define the terms :

i) aerobic decomposition and

ii) anaerobic decomposition. 4

b) The dilution factor P for an unseeded mixture of waste and water is 0.030. The DO of the mixture is initially 9 mg/l, and after five days it has dropped to 3 mg/l. The reaction rate constant k has been found to be 0.22 day^{-1}. Estimate the following :

i) Five-day BOD of the waste.

ii) The ultimate carbonaceous BOD.

iii) the remaining oxygen demand after five days. 6

c) What is called hardness of water ? Describe briefly Lime-Soda process for softening of water. 5

11. a) What do you mean by resource ? What are the types of resources ? Classify the natural resources on the basis of stage of development and explain them.

$1\frac{1}{2} + 1\frac{1}{2} + 3 = 6$

b) Explain the effect of excessive use of resources in population growth. What is sustainable development ? 5

c) What are the various water treatment systems ? Discuss any one of them. 4