

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)

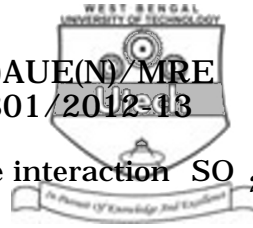
1. Choose the correct alternatives from the following :

10 × 1 = 10

- i) A green house gas is
 - a) CO
 - b) H₂S
 - c) SO₂
 - d) H₂O 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.

3102(N)

[Turn over



iii) Coal induced smog was formed by the interaction SO_2 smoke and water to form H_2SO_4 and more than 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) Catalytic 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 4
ii) anaerobic decomposition.

- 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

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