

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 )**

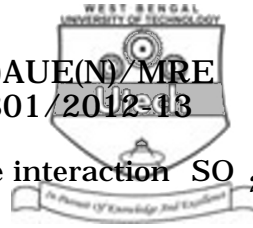
1. Choose the correct alternatives from the following :

10 × 1 = 10

- i) A green house gas is
  - a) CO
  - b) H<sub>2</sub>S
  - c) SO<sub>2</sub>
  - d) H<sub>2</sub>O 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.

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[ Turn over



iii) Coal induced smog was formed by the interaction  $\text{SO}_2$  smoke and water to form  $\text{H}_2\text{SO}_4$  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<sup>-1</sup>. 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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