AULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

CH-301

BASIC ENVIRONMENTAL ENGINEERING AND ELEMENTARY BIOLOGY

Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions. 10×1 = 10

(i) The cause of eutrophication is

(A) increase of pathogens (B) increase of BOD
(C) increase in algae's productivity (D) increase in DO

(ii) Which one of the following shows highest Green-house effect?

(A) CH_4 (B) CO_2
(C) NO_2 (D) O_3

(iii) Oxygen demanding waste is the

(A) inorganic pollutant (B) radioactive material
(C) organic pollutant (D) none of these

(iv) The law of minimum was proposed by

(A) Liebig (B) Woodbury
(C) Odum (D) Krebs

(v) In which year wildlife (Protection) Act, India, enacted

(A) 1986 (B) 1972
(C) 1984 (D) 1981

(vi) Biogas is_____ type and nuclear energy is_____ type of energy resource.

(A) conventional, non conventional
(B) non conventional, conventional
(C) both conventional
(D) both non conventional

(vii) Which is the normal hearing frequency range?

(A) 60 dB (B) 20 Hz-20,000 Hz
(C) 80 dB (D) 60 Hz-60,000 Hz

(viii) The mathematical formulation of environmental resistance is

(A) N = K/2 (B) 1 –(N/K)
(C) 70/r % (D) rK/4

(ix) Energy flow in an ecosystem is

(A) cyclic
(B) both cyclic and unidirectional
(C) unidirectional
(D) none of these

(x) Material cycles go through

(A) biosphere and lithosphere (B) atmosphere and hydrosphere
(C) biosphere and hydrosphere (D) all of the four spheres

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

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

3. What is L_{eqn}? Explain different types of noise. 2+3

4. What is Chemical Oxygen Demand (COD)? How is it related to Biological Oxygen Demand (BOD)? 2+3

5. (a) What do you understand by the term 'Maximum Sustainable yield'? 2+3
   (b) Define population growth? Prove that population growth is exponential?

6. What do you mean by 'environmental resistance' in determining population growth? Describe step function response in a box system with a suitable diagram. 2+3

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) What is dissolve oxygen? Why is it considered as an important water quality parameter to know the health of a water body? 2+2
   (b) Establish the relation $BOD_t = L_0 (1 - e^{-kt})$, 4
   where, BOD_t = amount of oxygen consumed by the waste in first t days.
   L_0 = the ultimate carbonaceous oxygen demand
   And k = the BOD reaction rate constant ($time^{-1}$)
   (c) The dilution factor P for an unseeded mixture of wastes and water is 0.030. The DO of the mixture was initially 9.0 mg/l and after 5 days it has dropped to 3.0 mg/l. The reaction rate constant is 0.22 day^{-1} calculate 3+3
   (i) the 5 day BOD of the wastes
   (ii) L_0
   (iii) The remaining oxygen demand after 5 days.
   (d) What is biodegradation rate constant? 1

http://www.makaut.com

8. (a) A sample of ground water has 140 mg/L of Ca^{2+} ion. Express its hardness in units of mg/L of $CaCO_3$. 3
   (b) Discuss the role of $ClONO_2$ in formation of Antarctic ozone Hole. 3
   (c) Enlist the different criteria pollutants as far as Air pollution is concerned. What is NAAQS? 2+1
   (d) Define sustainable development. Discuss how depletion of major renewable resources is caused by rapid growth of population and technology. 6

9.(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 and C_p = specific heat at constant pressure. 5+6
   (b) Explain with diagram 2
   (i) Sub Adiabatic Lapse rate,
   (ii) Super Adiabatic Lapse rate
   (iii) Neutrally stable Lapse rate
   (c) What is maximum mixing depth and ventilation coefficient? 2

10.(a) What is the working unit for measurement of sound intensity level (SIL)? Express it mathematically. 3
   (b) What is the intensity of 100 dB sound? 3
   (c) What is threshold limit value? Discuss various mechanisms to control noise. 4
   (d) What is heavy metals? How heavy metals interact with enzymes. 3
   (e) Discuss biomagnifications. 2

11. Write short notes on any *three* of the following: 3×5
   (a) Cyclone separator
   (b) Hydraulic gradient and Darcy's law
   (c) Arsenic pollution
   (d) Biological hotspot
   (e) Environmental Impact Assessment.

http://www.makaut.com