Total number of printed pages:4

PG/1st/PGET102

2021

ENERGY AND ENVIRONMENT

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions **out of seven***

1. a) Choose the correct answer: 5

(i) Energy flow in an ecosystem is: unidirectional/cyclic/both unidirectional and cyclic/cannot said

(ii) "Itai itai" disease caused by : Zinc/cadmium/ lead/mercury

(iii) Which of the following is true for a waste water sample: BOD>COD/ COD>BOD/ BOD=COD/BOD = 1/COD

(iv) Lakes, poor in nutritive material are known as: Eutropic/ Oligotropic/ Mesotropic/ Stratotropic

(v) Non hazardous solid waste can be best dispose by: open dumping/composting/sanitary landfill/incineration

b) Fill in the blanks: 5

(i) Ozone acts as a police man in _____

(ii) In the stratosphere, with increasing altitude temperature gradually_____

(iii) The simple global temperature model predicts earth temperature to be _____

(iv) The heat energy reaches from sun to earth by _____ method.

(v) The IR active gas is _____.

c) Match the following: 5

(i) Biotic Factor	(a) Algae production
(ii) photochemical smog	(b) Nitrate
(iii) Blue baby syndrome	(c) solid waste
(iv) Eutrophication	(d) Sulpher dioxide
(v) Incineration	(e) Plants and animals

d) (i) What is the value of Earth's albedo? 5x1 =5

(ii) What is the unit of intensity of sound?

(iii) Minamata disease is related to what metal?

(iv) Usually what catalyst is used in the oxidation step on catalytic converter?

(v) In ecosystem, what percentage of energy transfer to the next trophic level?

2. a) What are the different types of food chain in the ecosystem? 3

b) Explain how energy flow takes place through the food chain in ecosystem? 3

c) What is blackbody radiation? Write Stephen Boltzman law and explain each terms. 4

d) Consider earth as a blackbody with average temperature = 15°C and surface area = 5.1×10^{14} 5

square meter. Find the rate at which energy is radiated and also calculate the wave length of maximum radiation.

[Stephen-Boltzman constant = 5.67×10^{-8} J.Sec^{-1} m^2 K^4.]

e) Considering earth as a black body calculate the average temperature of the earth (here you consider earth's albedo). 5

3. a) What are the differences between primary and secondary pollutant 2

b) What is photochemical smog? Discuss the mechanism of formation of photochemical smog. 5

c) What is Montreal Protocol? and what is Kyoto protocol? 3

d) Write short notes on (any two) 5x2 =10

(i) Electrostatic Precipitator (ii) Catalytic converter (iii) Scrubber

4. a) What is BOD? Differentiate between BOD and COD 1 + 3

b) How will you model BOD as first order reaction? 3

c) Prove that $BOD_t = L_0(1 - e^{-kt})$. Also draw BOD remaining vs time and BOD utilised vs time graph. 5

d) Write short notes on (any two) 4x2 =8

(i) Mercury Pollution. (ii) Rotating Biological Contactor (iii) Trickiling Filtration

5. a) What is Logistic growth of population? Discuss with graphical diagram — 5

   b) In a area the noise levels are 100dBA for 3hours/day; 85 dBA for 2hours/day and 80 dBA for 3hours/day. Calculate whether the noise levels are within limit or not. — 5

   c) How much a sound of 100dB is louder than a sound of 90dB?-Calculate. — 5

   d) What are the effects of noise pollution? How will you control noise pollution? — 2+3

6. a) Describe primary and secondary energy sources. — 10

   b) Write the advantages and disadvantages of alternative resources. — 10

7 What are the different types of biomass available? Discuss each of them in detail. — 6+14