Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. Second Semester Mid Semester Examination, February 2024
ENVIRONMENT AND ECOLOGY (CE1201)

Full Marks: 50 Time: 2 h

Assume any necessary data if required.
Both Part A and Part B are to be answered in the same answerscript

Part – A
Answer any three (3) questions.

1.(a) Classify and discuss natural resources with examples.

(b) 'Biogass' - what type of resource? Explain.

(4+4=8)

2.(a) What is biosphere?

(b) Mention different biotic and abiotic components in a pond ecosystem. How are these components interlinked?

(c) Classify different types of ecosystems.

(2+4+2=8)

3.(a) Write short notes on the following.

i. Nitrification and denitrification and their role in the nitrogen cycle

ii. Bio-magnification of DDT through the food chain

(4+4=8)

4.(a) What are the major classifications of biodiversity? Explain the 'economic values' of biodiversity.

(b) What are the threats to the biodiversity?

(c) What do you understand by biodiversity hot spot?

(4+2+2=8)

Part – B

5. A power plant of 250 MW capacity burns 20 T coals/MW. During thus burning process, the plant has the following information.

Sulphur in coal: 0.3% (weight/weight)

Temperature in stack: 150°C

Pressure in stack: 1.1 atm

Stack exit velocity: 10m/s

Diameter of stack: 10m

The limit for SO_2 emission from such thermal power plant is 600 mg/Nm3. Are the power plant stack emissions expected to comply within the limit of emission? Assume complete combustion of sulphur compounds.

(6)

6. (a) A restaurant with a volume 500 m^3 has 30 smokers in it, each smoking two cigarettes per hour. An individual cigarette emits, among other things, about 1.40 mg of formaldehyde (HCHO). Formaldehyde converts to carbon dioxide with a reaction rate coefficient K = 0.4/hour. Fresh air enters the bar at the rate of 1000 m^3/hour and stale air leaves at the same rate. Estimate the steady state concentration of formaldehyde in the air, assuming complete mixing.

   (b) Suppose the air in the restaurant is clean when it opens at 5 P.M. If formaldehyde with reaction rate K = 0.4/hour is emitted from cigarette smoke at the constant rate (as indicated previously) starting at 5 P.M., what would be the concentration at 6 P.M.?

(8)

7. Which pollutants are considered for the National Ambient Air Quality Standards in India? Which pollutants are monitored to calculate the Air Quality Index in India? Which are the pollutants monitored in the exhaust of petrol driven vehicles? How catalytic converters help in control of pollutants in automobile exhaust gases?

(2x4=8)

8. What would be the CFC number of $C_2H_4F_2$? Why CFC is destructive for ozone layer in stratosphere? What would be the pH of acid rain? Name four greenhouse gases in order of increasing global warming potential (except water vapour).

(1+2+1+2=6)