Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. 1st Semester (Gr-I/II/III/IV) Final Examinations, March, 2021

CE1101: Ecology and Environment

Full Marks: 50 **Time: 90 Minutes**

Upload First Half and Second Half answer scripts in two separate Files

FIRST HALF

Answer question No 1 and any two from the rest

1. Answer all the questions (show necessary calculations)

i. A water sample requires 100 ml diluted water to make it odor free. Calculate TON of the sample.
ii. A water sample has total alkalinity=630 mg/L as $CaCO_3$ and Phenolphthalein alkalinity =100 mg/L as $CaCO_3$. Find the alkalinity species present and their concentrations.
iii. A standard cyclone has diameter 0.5m. Calculate the entrance area of the cyclone.
iv. The difference of intensity level of two noises is 1dB. Find the ratio of intensities of higher to lower.
v. Calculate the Theoretical Oxygen Demand (TOD) of 1gm glucose dissolved in 1L water.

(5x1=5)

2. With a neat sketch draw a flow diagram of activated sludge system. Mention function of each f the units. Why is it named 'activated sludge' system? Why wastewater treatment is necessary?

(3+3+1+3=10)

3. Mention the green house gases in atmosphere and its effect. Define Pollutant Standards Index (PSI) and its significance. Name two engineering systems for removal of gaseous and particulate pollutants from air.

(4+4+2=10)

4. Define equivalent continuous noise level (L_{eq}) and its significance. Three noises of 70dB each occurred simultaneously. Calculate the resultant noise intensity level. Mention the health effect of noise pollution.

(3+3+4=10)

SECOND HALF

Answer question No 5 and any two from the rest

5. Answer briefly to the point. Answer should not be more than 2-3 lines for each short question

a) What is "Sentinel Species? Give an example

b) Mention two important ecological services of Mountain

c) What is "dioxin"? Why is it bad?

d) What is "pampa"? Where is it located?

e) What is the main cause of death of Aral Sea?

(5x1 = 5)

6. a) A truck fitted with hydraulic compactor of compaction ratio 4, makes 3 runs daily for waste collection. The available time for collection is 4.5 hrs in a day. If average distance between two houses is 80 m, at each house point there is $0.2m^3$ of waste with 2 containers from each house and time to empty each container 10 sec, how many houses will be served per day by the truck and what is the volume of the truck? Assume other data, if necessary.

b) What is composting? Where the end-product of composting is used?
c) What is bio-gasification? Mention the major steps of bio-gassification
d)Why leachate collection and monitoring is important for engineered landfill?

(4+2+2+2=10)

7. a) Draw the "energy pyramid" diagram in relation to the terrestrial ecosystem and explain the rule of 10% (diagram should be self-explanatory).

b) What is nutrient? Why "Nitrogen" and "Sulphur" are important for us?
c) What is EIA and at what stage of project-implementation it is done? Mention two benefits of EIA
d) What is LCA of a product? Draw the diagram explaining the concept of "cradle to grave"

(4+2+2+2=10)

8. a) Chloroform is considered to be a probable carcinogen. If a person of 70 Kg body-mass drinks 2.5L of water containing 0.1 mg/L chloroform, every day for 70 years, what is CDI and what is the upper-bound cancer risk for this person? [Given PF = $6.1x10^{-3}(mg/kg\text{-}day)^{-1}$. Assume other data, if necessary]

b) What is LD_{50}? LD_{50} (chemical A) = 35 mg/kg and LD_{50} (chemical B) = 50 mg/kg, which one is more toxic and why?

c) How a hazardous material is defined? Explain if "arsenic" is hazardous as per the definition.

d)What is hazard quotient (HQ)? What does it mean if HQ > 1?

(4+2+2+2=10)