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Total No. of Questions : 08

M.Tech. Civil Engg. (2016 Batch) (Sem.–2)

WATER QUALITY MODELLING

Subject Code : MTCE-206

M.Code : 74299

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

Q1. Write a note on water quality analysis and explain the standards for water quality?

Q2. Give brief description of the water quality models.

Q3. a) If 2×10^6 lb of salt is introduced into 1 m^3 of distilled water, what is the resulting concentration in ppb?

b) A pond having constant volume and no outlet has a surface area A_s and a mean depth H of 2m. It initially has a concentration of 0.8 ppm. Two days later a measurement indicates that the concentration risen to 1.5 ppm.

i) What was the mass loading rate during this time?

ii) If you hypothesize that the only possible source of this pollutant was from the atmosphere, estimate that the flux occurred?

Q4. To study the photo degradation of aqueous bromine, we dissolved the small quantity of liquid bromine in water, placed it in clear jar, and exposed it to sunlight .The following data were obtained :

t (min)	10	20	30	40	50	60
c (ppm)	3.52	2.48	1.75	1.23	0.87	0.61

Determine whether the reaction is zero-, first-, or second-order and estimate the reaction rate?

Q5. A lake has the following characteristics :

Volume = 50,000 m^3

Mean depths = 2 m

Inflow = outflow = 7500 $m^3 d^{-1}$

Temperature = 25° C

The lake receives the input of the pollutant from three sources; a factory discharge of 50 kg d^{-1}, a flux from the atmosphere of 0.6 g m^{-2} d^{-1}, and the inflow stream that has a concentration of 10 mg L^{-1}, if the pollutant decays at the rate of 0.25 d^{-1} at 20° C (θ=1.05)

a) Compute the assimilation factor.

b) Determine the steady state concentration.

c) Calculate the mass per unit time for each term in mass balance and display your results on plot.

Q6. Explain the steps involved in water quality modelling in lakes.

Q7. Write short notes on :

a) BOD

b) Pathogens

c) Sediment oxygen demand

d) Gas transfer

e) Oxygen saturation.

Q8. a) What do you mean by response time?

b) A pond with a single inflow stream has following characteristics :

Mean Depth = 3m

Surface area = 2×10^5 m^2

Residence time = 2 wk

A subdivision will discharge raw sewage into this system. If BOD decays at a rate of 0.1 d^{-1} and settles at a rate of 0.1 m d^{-1}, calculate the 75%, 90 % and 95% response times for the pond.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.