

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –IIst SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1721806****Date: 12/07/2012****Subject Name: Environmental Modeling****Time: 10:30 am – 13:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define and differentiate between Black box model and white box model. Support your answers with appropriate example. **08**
- (b) Enlist and explain the factors related to pollutant and receiver affecting the environmental modeling. **06**
- Q.2** (a) Describe and explain the relationship given as $C = C_0 \exp^{(kX/u)}$ **07**
- (b) What makes lake modeling different than river modeling? Cite appropriate example. **07**
- OR**
- (b) Enlist and explain the importance of conventional parameters in river modeling. **07**
- Q.3** (a) Define and explain the following terms with reference to pollutant transport: **07**
- (i) Advection (ii) Diffusion (iii) Dispersion
- (b) Briefly explain modeling approach for conservative and non conservative parameters. **07**
- OR**
- Q.3** (a) Explain with the help of neat sketch the concept of waste load allocation for a perennial river. **08**
- (b) Briefly describe the transport of toxic chemicals in water. **06**
- Q.4** (a) Derive the equation for finding the steady state concentration of a pollutant discharged in to a lake. **07**
- (b) Write down the stoichiometric equation for finding the primary productivity in the lake. Highlight the importance of stoichiometry in the water quality management in lakes. **07**
- OR**
- Q.4** (a) Calculate the steady state concentration of a toxic chemical in the lake under following conditions. Assume a steady state ($dC/dt=0$) and constant volume ($Q_{in} = Q_{out}$) and a constant degradation rate of 50 kg/d.
 $C_{in}=100\mu\text{g/L}$.
 $Q_{in}=Q_{out}=10 \text{ m}^3/\text{s}$
 $\text{Reaction} = -50\text{Kg/day}$ **07**
- (b) Write a note on types of Environmental models. **07**
- Q.5** (a) Give the classification of lakes based on: **08**
- (i) Biological zones
(ii) Temperature variations
- (b) Write a note on ‘Phosphorus as a limiting nutrient’. **06**
- OR**
- Q.5** (a) Write a note on “Elements in a mass balance using control volume concept”. **07**
- (b) For a lake, it was observed that 0.7 μg per liter of phosphate was removed per day. Assuming the stoichiometric relationship for algal protoplasm, estimate the nutrient uptake rate for nitrate and CO_2 . Also estimate the rate of algal production in one month. **07**
