Seat No.: _____ Enrolment No._____

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 $C= C_o\exp^{(kX/u)}$	**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: (i) Advection (ii) Diffusion (iii)Dispersion	**07**
	(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 (Qin = Qout) and a constant degradation rate of 50 kg/d. Cin=100µg/L. Qin=Qout=10 m3/s Reaction= -50Kg/day	**07**
	(b)	Write a note on types of Environmental models.	**07**
Q.5	**(a)**	Give the classification of lakes based on: (i) Biological zones (ii) Temperature variations	**08**
	(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**

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