Enrolment No.____

GUJARAT TECHNOLOGICAL UNIVERSITY ME - SEMESTER- II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015 Subject Code: 1721806 Date:15/05/2015 Subject Name: Environmental Modelling

Time: 02:30 pm to 5:00 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)	Explain the phenomena of stratification and overturn in lakes.	07
	(b)	Enlist and explain the objectives of environmental modeling?	07

- Q.2 (a) What are the conventional pollutants? Highlight the importance of each with 07 the help of an example.
 - (b) Derive the Streeter Phelps equation for finding the DO deficit in a stream. 07

OR

- (b) Explain the two phenomena on which the transport of toxic chemicals in 07 water principally depends.
- Q.3 (a) Derive the equation [Ce=W/V] for the steady state concentration of a 07 pollutant in the lake.
 - (b) For a lake, it was observed that $0.5 \ \mu g$ per liter of phosphate was removed per **07** day. Estimate the nutrient uptake rate for nitrate and CO₂. Also estimate the rate of algal production in one month.

OR

- Q.3 (a) Explain the terms:
 - (i) State variable
 - (ii) Model parameters
 - (b) A wastewater having flow of 0.25 m3/s and ultimate BOD of 10 mg/L is 07 discharged into a river having flow of 0.9 m3/s and BOD of 6 mg/L. The velocity of river is 0.650 m/s, Ka is 0.370 d⁻¹ and Kd is 0.199 d⁻¹. Estimate the DO of the river at a distance 5.0 Km downstream form the point of disposal. The temperature of river and waste water both is 20° C and the saturated DO at this temperature is 7.9 mg/L.
- Q.4 (a) Give the classification of lakes based on the biological productivity. 07
 - (b) Prepare a list of indicators for trophic status of the lake and explain any two. 07

OR

07

Q.4 (a) Estimate the resulting growth rate in a lake from following data. The 07 maximum growth rate under ideal conditions is 1.3/day.

	NH ₄ +NO ₃ as N	PO ₄ as P
Concentration ,µg/L	40	10
Ks,µg/L	25	5

Based on (1) Growth rate and (2) stiochiometry, which nutrient is likely to be most limiting for the plankton growth?

(b) Enlist and explain the different types of Environmental models.

Q.5 (a) Explain in detail ,the following from river modeling point of view:(i) Waste load allocation.

(ii) River segmentation

Give appropriate examples.

(b) With the help of a neat sketch explain the elements in a mass balance using 07 control volume concept.

OR

- Q.5 (a) Explain in brief, uncertainty analysis related to environmental modeling 07 particularly with respect to the types of errors.
 - (b) Explain the terms relating to model calibration and verification: Validation and 07 Simulation.

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