Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2721806 Date: 10/12/2015

Subject Name: Environmental Modeling

Time:2:30 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)** How will you find the concentration of biodegradable pollutant discharged into a lake ? Derive the equation to find the concentration. **07**

(b) Highlight the objectives of environmental modeling. **07**

Q.2 **(a)** Derive the Streeter Phelps equation for finding the DO deficit in a stream. **07**

(b) Prepare a list of different types of Environmental models and explain them. **07**

OR

(b) Write a note on Mass Balance for environmental modeling. **07**

Q.3 **(a)** A municipal wastewater treatment plant discharges 1.0 m^3/s of treated effluent into a stream having flow of 8.5 m^3/s. The ultimate BOD of the mix is 10.0 mg/L and initial DO deficit of 1.5 mg/L. The de oxygenation constant is 0.2 /day and the average speed of river is 0.3 m/s and average depth is 3.0 m. Calculate **12**

(i) The BOD concentration at different downstream distances.
(ii) The DO deficit at different downstream distances.
(iii) The re aeration and de oxygenation rates.

Plot the DO Sag curve if the saturation value for DO at 20^0 C is 9.1 mg/L.

(b) Explain the terms: Calibration and Validation **02**

OR

Q.3 **(a)** Explain the terms: **07**

(i) Ologotrophic (v) Benthic
(ii) Mesotrophic (vi) Epilimnion
(iii) Eutrophic (vii) Hypolimnion
(iv) Euphotic

(b) Enlist the types of equations used to find the growth rate of biomass in lakes and explain each type. **07**

Q.4 **(a)** Explain the phenomena of stratification and over turn in lakes of temperate regions. **07**

(b) Explain the two phenomena on which the transport of toxic chemicals in water principally depends. **07**

OR

Q.4 **(a)** For a lake, it was observed that 0.5 µg per liter of phosphate was removed per day. Estimate the nutrient uptake rate for nitrate and CO_2.Also estimate the rate of algal production in one month. **07**

Q.4 **(b)** Estimate the resulting growth rate in a lake from following data. The maximum growth rate under ideal conditions is 1.5/day. **07**

	NH_4+NO_3 as N	PO_4 as P
Concentration ,µg/L	60	7
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?

Q.5 **(a)** Enlist and explain conventional parameters in stream. **07**

(b) Prepare a list of indicators for trophic status of the lake and explain any two. **07**

OR

Q.5 **(a)** Write short notes giving proper examples on **07**

(i) Waste load allocation.

(ii) River segmentation

(b) Which are the phenomena on which the transport of toxic chemicals in water principally depends? Explain each in brief. **07**

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