COURSE CODE: 14M31CE112   MAX. MARKS: 25
COURSE NAME: SIMULATION AND MODELING
COURSE CREDITS: 03   MAX. TIME: 1.5 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume suitable data if required.

Q1.a) What do you mean by "Steady-State" behavior of environmental systems? How do the derivative provide as a powerful tool for analyzing the behavior of a reservoir over time?   **[03 Marks]**

b) What is the common behavior patterns normally found in dynamic environmental systems? Explain with the help of figures, rate equation and solution to the rate equation for each of the behavior pattern.   **[05 Marks]**

Q2.a) Derive Streeter-Phelps model to simulate DO-BOD relationship in streams.   **[02 Marks]**

b) With the help of a neat sketch, indicate the Inflows and Outflows of O_2 and CO_2 in an aquatic environment   **[03 Marks]**

Q3.a) What assumptions are made in estimating DO and BOD values at the point where effluent discharge mixes with river water.   **[02 Marks]**

b) An Industrial wastewater is discharged into a municipal wastewater sewer. The characteristics of the two wastes area as follows: **[03 Marks]**

Characteristics	Industrial	Municipal
Flow	3500 m^3/day	0.20 m^3/s
BOD$_5$	1200 mg/L	210 mg/L
Temperature	28°C	15°C
Phosphate	140mg/L	2.3g/m^3
Nitrate	3.0mg/L	10.0mg/L
TDS	2520mg/L	125mg/L

Determine the characteristics of the mixture.

Q4.a) Mention (at least four) the various sources of surface water pollution and their associated impacts and types of pollution they generate.   **[04 Marks]**

b) The BOD$_5$ of a wastewater is determined to be 150mg/L at 20°C. The k value is known to be 0.23 per day. What would the BOD$_8$ be if the test were run at 15°C? Assume temperature correction factor (θ) to be 1.047.   **[03 Marks]**