CVL728: ENVIRONMENTAL QUALITY MODELLING

Minor II

Time: 1 Hr. **Marks: 30**

Date: 21.03.2016

NOTE: Precise answers of the questions are expected. Provide neat sketches/figures wherever required.

Q1. Answer the following

(a) Describe the process of mathematical modelling through a sketch. [2]

(b) Define mathematical modelling [1]

(c) What type of model best suits to predicting the rise in earth temperature due to GHG effects? [1]

(d) State differences between Empirical model and Theoretical model. [1]

(e) A model is to be formulated for an urban intersection to predict $PM_{2.5}$ concentrations during peak, lean and average hours. List out the features which must be considered in developing this model. The broad categories of input data to be considered for identifying features are source and meteorology. [3]

(f) What are the different basic laws governing the fluid motion? List them. [3]

Q2.(a) Define [1]

(i) Receptor modelling

(ii) Source profile

(b) Differentiate between Chemical Mass Balance and Multivariate models [2]

(c) Write the mass balance equation used in receptor modeling and describe the terms. [2]

Q3. (a) Define extensive property and give two examples. [2]

(b) What is the difference between a variable and a parameter? [1]

(c) Explain the different algorithms for WQM. [3]

(d) Name two environmental modifications to change the system's environment in water quality modeling. [2]

Q4. An exterior paint industry discharges 275 mg/L of Chromium in to a lake which has a volume of 5000 m^3. The chromium gets destroyed in the lake at a rate of 0.21/day. The flow rate at the inlet and the outlet is equal to 100 m^3/day. [6]

Assumption 1: The pollutant gets destroyed according to the first order kinetics

Assumption 2: The lake acts as a Steady-State CSTR

(i) Find out the concentration of the chromium at the outlet?

(ii) If the flow rate of the inlet is increased to 200 m^3/day, determine the rate constant required for maintaining the same outlet concentration as obtained in (i)?