Unit IV

7. Develop a model for Non-Interacting system for two tank liquid-level system. Two non-interacting tanks are connected in series. The time constants $\tau_2 = 1$ and $\tau_1 = 0.5$; $R_2 = 1$. Sketch the response of the level in tank (2) if a unit step change is made in the inlet flow rate to tank (1).   **15**

8. Develop the model equations of a double pipe Heat Exchanger.   **15**

AA-181

M. Tech. EXAMINATION, Dec. 2017

(First Semester)

(B. Scheme) (Main & Re-appear)

(CHE)

CHE-501-B

MODELLING AND SIMULATION

Time : 3 *Hours*]   [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. As isothermal, irreversible reaction : **15**

$$A \xrightarrow{\ k\ } B$$
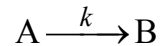
takes place in the liquid phase in a constant volume reactor. The mixing is not perfect. Observation of flow patterns indicates that a two-tank system with back mixing, as shown in the sketches below, should approximate the imperfect mixing. Assuming F and F_R are constant, write the equations describing the system.
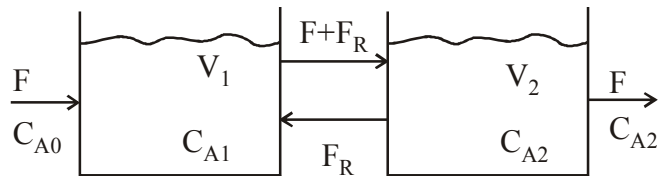
2. Write short notes on any *three* of the following : **15**

(a) Continuity Equation

(b) Energy Equations

(c) Use of Mathematical models

(d) Deterministic and Stochastic processes.

Unit II

3. (a) Find the root of $x^3 - 2x - 5 = 0$, correct upto 3 places of decimal using Newton-Raphson method. **8**

(b) Solve, by Euler's method, the equation : **7**

$$\frac{dy}{dx} - 1 = y^2$$

given $y(0) = 0$; choose $h = 0.1$ and compute $y(0.1)$ and $y(0.2)$.

4. Develop the mathematical model for gas phase pressurized CSTR. **15**

Unit III

5. Develop the model for a Batch Reactor system. **15**

6. Develop a model for Ideal Binary Distillation Column. **15**