**Printed Pages : 3**

**ECH-608**

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 182602**

**Roll No.**

# B. Tech.

## (SEM. VI) THEORY EXAMINATION, 2014-15

## INTRODUCTION TO MODELING & SIMULATION

Time : **2** Hours] [Total Marks : **50**

Note : (i) Attempt all questions.
(ii) Make suitable assumption, if required with justification.

1 Attempt any FOUR parts of the following: 3×4=12

(a) Differentiate lumped parameter model and distributed parameter model of chemical engineering systems.

(b) Discuss the general forms of mass, energy and momentum balance equations based on the conservation law.

(c) What is mathematetical model? Why do we need mathematical modelling for process analysis?

(d) Discuss the application of mathematical models in the design of chemical processes/equipment.

(e) Define simulation. Discuss each steps involve in simulation process.

(f) Differentiate between static model and dynamic model. Explain with the help of example.

2 Attempt any TWO parts of the following: 7×2=14

(a) Write modeling equation for isothermal PFR with complete assumptions.

(b) Develop a mathematical model of counter current packed absorption column for the separation of ammonia from ammonia-air mixture using water as the solvent. Assume that the solubility of air in water and the vapour pressure of liquid water as the operating conditions of column are negligible.

(c) Derive the modelling equations for a batch reactor considering the following consecutive exothermic reactions $A \xrightarrow{K_1} B \xrightarrow{K_2} C$ where both $A \rightarrow B$ and $B \rightarrow C$ has first order kinetics.

3. Attempt any TWO parts of the following : 6×2=12

(a) Discuss all the assumtions and develop the mathematical model for evaorator.

(b) Derive the modelling equations for a shell and tube heat exchanger with; suitable assumption.

(c) Discuss modular based flow sheeting along with its advantages and disadvantages.

4. Attempt any TWO parts of the following : 6×2=12

(a) What do you understand by reactive seperation processes. Also enumerate the modeling equation of this process.

(b) Discuss the role of partitioning and tearing in process plant simulation with examples.

(c) Define static model. Also discuss in detail Recycling convergence method.

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