

Printed Pages : 3



ECH-608

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

PAPER ID : 182602

Roll No.

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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: $3 \times 4 = 12$
- (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 mathematical 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: $7 \times 2 = 14$
- (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 : $6 \times 2 = 12$
- (a) Discuss all the assumptions and develop the mathematical model for evaporator.
- (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 : $6 \times 2 = 12$
- (a) What do you understand by reactive separation 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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