M. Tech. –II (Chemical Engineering) (CBCS – 2015 Course) :
SUMMER - 2019
SUBJECT: MODELING AND SIMULATION OF CHEMICAL PROCESSES

Day: Monday		**Time:** · 11.00 AM TO 02.00 PM
Date: 03/06/2019	**S-2019-3422**	**Max. Marks: 60**

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the sections should be written in **SAME** Answer book.
4) Assume suitable data **WHEREVER** necessary.
5) Draw neat and labeled diagram wherever necessary.

SECTION-I

Q.1 A batch reactor in which consecutive first order reactions occurs with exothermic heats of reactions λ_1 & λ_2 . [10]

$$A \xrightarrow[\lambda_1]{K_1} B \xrightarrow[\lambda_2]{K_2} C$$
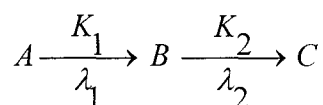
i) Write total continuity equation.
ii) Write component continuity equations.
iii) Write energy equation.

OR

Compare the following types of models. [10]

i) Lumped Vs distributed
ii) Steady state Vs unsteady state
iii) Continuous Vs discrete
iv) Linear Vs nonlinear

Q.2 Develop a mathematical model for simple and variable hydraulic tank. State the assumptions. [10]

OR

Postulate a dynamic lumped model for steam jacketed vessel. [10]

Q.3 Write the model equations for multicomponent distillation column and check degrees of freedom. [10]

OR

a) Write the equations for flash distillation. [05]

b) Compare the modeling of continuous binary distillation in tray and packed column. [05]

P.T.O.

SECTION-II

Q.4 Define simulation. Explain typical steps involved in developing a simulation **[10]** model.

OR

Elaborate integrating algorithms for simulation of chemical engineering **[10]** systems.

Q.5 Discuss the solution strategies for lumped parameter models. **[10]**

OR

How parameter estimation is done? Explain discrimination between two **[10]** models for parameter estimation.

Q.6 Classify the tools employed for simulation. Explain their advantages and **[10]** limitations over each other.

OR

Enumerate the genetic programming and genetic algorithm for simulation of **[10]** chemical system.

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