

# CBCS SCHEME

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18BT52

## Fifth Semester B.E. Degree Examination, June/July 2023 Chemical Reaction Engineering

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define the following with example  
i) Order and molecularity  
ii) Elementary and non elementary reaction  
iii) Single and multiple reaction (12 Marks)  
b. Derive temperature dependency from transition state theory. (08 Marks)

OR

- 2 a. Derive an Integrated rate equation for bimolecular second order irreversible reaction. (12 Marks)  
b. Explain in detail about interpretation of batch reactor data and what are the steps involved in differential analysis for analysis kinetics data. (08 Marks)

### Module-2

- 3 a. Derive the performance equation for batch reactor by considering constant density system and varying volume reactors. (12 Marks)  
b. Explain the following :  
i) Space time and space velocity  
ii) Contacting patterns (08 Marks)

OR

- 4 a. Derive the performance equation for mixed flow reactor. (10 Marks)  
b. Derive the expression for plug-flow reactors connected in series. (10 Marks)

### Module-3

- 5 a. Derive an expression for conversion of first order reaction for CSTR. (10 Marks)  
b. Explain the method of pulse input experiment for measuring RTD. (10 Marks)

OR

- 6 a. Derive an expression for exit age distribution in CSTR. (12 Marks)  
b. Explain the following :  
i) State of aggregation of flowing fluid  
ii) Earliness and lateness of mixing. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Derive equation for  
i) Double reciprocal plot  
ii) Single reciprocal plot  
iii) Hanes wolf plot (12 Marks)  
b. Explain indetail about Enzyme specificity (08 Marks)

**OR**

- 8 a. Define uncompetitive inhibition and derive an equation for the same. (12 Marks)  
b. Determine the fraction of initial velocity to maximum velocity that could be found at a substrate concentration of 0.5 Km, 2Km and 10Km. (08 Marks)

**Module-5**

- 9 a. Explain in detail about the kinetics of growth of filamentous organism. (10 Marks)  
b. Write short notes on oxygen, water and energy source as a media for fermentation. (10 Marks)

**OR**

- 10 a. Describe thermal death kinetics of microorganism. (10 Marks)  
b. Explain substrate and product inhibition on cell growth and product formation. (10 Marks)

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