K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VII
Class:FINAL	Program:B.Tech
Branch Code:CHE	Pattern:2022
Name of Course:Process Modeling and Simulation	Course Code:CHE224001
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains two page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	Explain process modeling. Give the industrial applications of it.	(6)	CO1
Question No. 2			
2a)	Derive modeling equations for two heated tanks.	(6)	CO1, CO2
Question No. 3			
3a)	Develop Model for absorption column. Use as usual notation.	(8)	CO1, CO2
	OR		
3b)	Derive mathematical model for steam distillation.	(8)	CO1, CO2
3c)	Develop a mathematical model for batch distillation operation.	(8)	CO1, CO2
	OR		
3d)	Develop a mathematical model for multi-component distillation.	(8)	CO1, CO2
Question No. 4			
4a)	Derive modeling equations for batch reactor with cooling/ heating system.	(8)	CO1, CO2
	OR		
4b)	Develop a model for non-isothermal CSTR.	(8)	CO1, CO2
4c)	Develop a model for bioreactor.	(8)	CO1, CO2

OR

4d)	Develop model for three CSTRs in series with variable hold up system.	(8)	CO1, CO2

Question No. 5

5a)	What is Process simulation? Explain the types. List out the Chemical process software.	(8)	CO4

OR

5b)	A second order reaction A → B takes place in a batch reactor where k=0.2 (cc/mole. s), C_{A0}= 2 (kmole /cc). Find out outlet concentration at time t=5 sec using Euler's method.	(8)	CO3, CO4
5c)	What are models? How models are used in chemical process industries.	(8)	CO4

OR

5d)	Evaluate density of Van der waal's equation of Cl_2 gas at temperature 230^0C and 150 atm. Critical temperature is 417 ^{0}C and critical pressure is 76.1 atm. Solve by Newton Rapson method.	(8)	CO3, CO4

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