Q. Code:227591

Reg. No. | | | | | | | | | | | | | |

M.E/ M. TECH.DEGREE EXAMINATIONS, MAY 2024

Second Semester

CL22204 – SOFTWARE APPLICATIONS IN CHEMICAL INDUSTRIES (INTEGRATED)

(Chemical Engineering)

(Regulation 2022)

TIME: 2 HOURS **MAX. MARKS: 60**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Perform computer aided analysis of Chemical Industries	**5**
CO 2	Execute steady state and dynamic simulation of process plants.	**5**
CO 3	Apply Computational Fluid Dynamics software to solve fluid flow and heat transfer problems.	**4**
CO 4	Formulate and Solve optimization problems using software tools.	**5**
CO 5	Apply machine learning algorithms in process plant simulation.	**4**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Write a short note on sequential modular simulation.	**1**	**2**
2.	Enumerate the important functions of process simulators.	**1**	**2**
3.	Annotate the SIMPLE algorithm for flow field computations.	**2**	**2**
4.	Illustrate the application of Time-averaged Navier-Stokes equation.	**2**	**3**
5.	Compare the short-cut and rigorous methods in heat exchanger simulation.	**3**	**2**
6.	Enumerate the theoretical principles of process heat integration.	**3**	**2**
7.	Highlight the significance and application of plant-wide optimization.	**4**	**2**
8.	Explicate the meta-heuristic algorithms for optimization.	**4**	**2**
9.	Mention the role of data analytics and machine learning in process plants.	**5**	**2**
10.	Brief about Industry 4.0.	**5**	**2**

PART- B (3x 10=30 Marks)

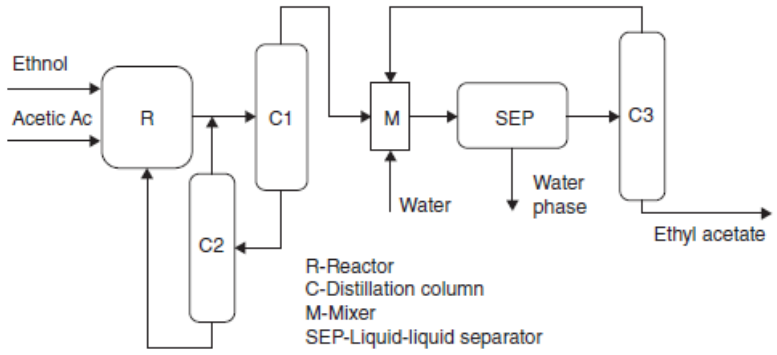
		Marks	CO	RBT LEVEL
11. (a)	Discuss the mixing length, k-ε and Reynolds stress equation turbulence models and their applications in computational fluid dynamics.	**(10)**	**3**	**3**
	(OR)			
(b)	Explain the various differencing schemes for convection – diffusion problems.	**(10)**	**3**	**3**

		Marks	CO	RBT LEVEL
12. (a)	Enumerate the various control schemes employed for the dynamic simulation of a distillation column.	**(10)**	**4**	**3**
	(OR)			
(b)	Demonstrate the application of Genetic algorithm (GA) in optimization problems using a suitable example and computer code.	**(10)**	**4**	**3**
13. (a)	Explicate the construction of support vector machines for regression and classification applications with suitable illustrations.	**(10)**	**5**	**4**
	(OR)			
(b)	Explain the formulation of an Artificial neural network model for simulation and optimization of data with a suitable example from a process industry.	**(10)**	**5**	**4**

PART- C (1x 10=10 Marks)

(Q.No.14 is compulsory)

		Marks	CO	RBT LEVEL
14.	A simplified process flow diagram for the production of Ethyl acetate is given in the figure below. Formulate the simulation and sensitivity analysis procedure to be followed in ASPEN PLUS.	**(10)**	**1**	**5**



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