GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019

Subject Code: 2180503   **Date: 29/11/2019**

Subject Name: Process Modeling, Simulation & Optimization

Time: 02:30 PM TO 05:00 PM   **Total Marks: 70**

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	**(a)**	List the applications of optimization in chemical process engineering.	03
	(b)	A poster is to contain 300 cm^2 of printed matter with margins of 6cm at the top and bottom and 4cm at each side. Find the overall dimensions that minimize the total area of the poster.	04
	(c)	Explain the six steps for solving optimization problems. List the general obstacles to solve optimization problems.	07
Q.2	**(a)**	Minimize the quadratic function $f(x) = x^2 - x$ by Qausi Newton method. Use the range of -3 to +3	03
	(b)	Explain the necessary and sufficient conditions for an extermum of an unconstrained function.	04
	(c)	Minimize $f(x) = x^4 - x + 1$ using Newton's method. Take any suitable initial guess. Show at least 4 iterations.	07

OR

	(c)	Explain the steps for finding the optimum L / D ratio for a pressurizes cylindrical storage vessel. List all the variables and the important assumptions.	07
Q.3	**(a)**	Explain equation solving approach in brief.	03
	(b)	Explain black box model.	04
	(c)	Give a detail classification of models.	07

OR

Q.3	**(a)**	Compare lumped parameter model and distributed parameter model.	03
	(b)	Compare linear and non linear model.	04
	(c)	Explain partitioning ,tearing, sequential modular approach.	07
Q.4	**(a)**	Classify the methods to solve unconstrained problems.	03
	(b)	Explain Random search and grid search method for unconstrained multivariable optimization.	04
	(c)	What is linear programming ? State the linear programming in standard form and write down its application in chemical industries.	07

OR

Q.4	**(a)**	List out essential features of optimization.	03
	(b)	Determine convexity or concavity for the following function, $f(x) = 2x_1^2 - 3x_1x_2 + 2x_2^2$	04
	(c)	Discuss the optimizing recovery of waste heat with suitable figure and equations.	07

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Q.5 **(a)** List the various professional simulators and equation   **03**
solver software.

(b) Explain modular approach in brief.   **04**

(c) Describe any one chemical process simulation and its   **07**
silent features.

OR

Q.5 **(a)** Define , simulation, optimization and tearing.   **03**

(b) Differentiate between steady state and dynamic   **04**
simulation.

(c) Explain what are the obstacles towards solving   **07**
optimization problems.

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