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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 solver software.	**03**
	(b)	Explain modular approach in brief.	**04**
	(c)	Describe any one chemical process simulation and its silent features.	**07**

OR

Q.5	**(a)**	Define , simulation, optimization and tearing.	**03**
	(b)	Differentiate between steady state and dynamic simulation.	**04**
	(c)	Explain what are the obstacles towards solving optimization problems.	**07**

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