GUJARAT TECHNOLOGICAL UNIVERSITY ME SEMESTER II EXAMINATION – SUMMER 2017

Subject Code: 2724003Date:25/05/2017Subject Name: Optimization in Rubber IndustriesTotal Marks: 70			
Instr	1. 2. 3.	ns: Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	-
Q.1	(a)	Write necessary any sufficient conditions for extreme values of unconstrained single and multivariable objective functions.	07
	(b)	Determine the optimum dimensions (minimum area) of a closed cylindrical tank which is to be used to store a given volume of liquid.	07
Q.2	(a)	You are asked to determine optimum scheduling and sizing for a rubber plant having four stages process taking 2hrs, 3 hrs, 6 hours and 1 hrs of stage wise operation time. Discuss the process of generating design alternatives for optimal use of resources.	09
	(b)	Differentiate flow shop and job shop scheduling.	05
		OR	
	(b)	Discuss the concept of installing parallel units against intermediate storage for optimization of batch production plant with strengths and limitations of each.	05
Q.3	(a)	Explain how the Rosenbrock method gives acceleration in both direction and distance.	07
	(b)	Using the method of Penalty function find the minimum of $y = 4x_1^2 + 5x_2^2$ subject to $2x_1 + 3x_2 \ge 6$.	07
		OR	
Q.3	(a)	Explain the basics of Multi objective optimization (MOO). Discuss applications of MOO.	07
	(b)	Carry out three stages of a Hook-Jeeves search to minimize a function $f(x) = 2x_1^2 + 3x_2^2 + 5x_3^2$ with an initial point of (2,-1,1) and $\delta = 0.4$.	07
Q.4	(a)	Explain working of Population based Evolutionary Algorithms (EAs) for optimization. Highlight strength and limitations of EAs.	07
	(b)	Discuss role of fitness selection and survival selection operators in Genetic Algorithm. Discuss one method for each.	07

OR

Q.4 In searching for the minimum of the objective function $y = x_1^2 + 3x_2^2 + 5x_3^2$ using the Sequential Simplex method calculate first simplex. Distance between vertices is a = 0.4 and one of the vertex at the point {-2, 1.3, -2.4}. Carry out vertex rejection-regeneration in first table till pattern starts rotating and same points re-appear in pattern. Complete the first table, reduce the size of pattern using a = 0.02 and construct the new pattern for next iteration. Carry out two vertex rejection-regeneration for second stage of search.

- Q.5 (a) An open top box is to be made out of a piece of cardboard measuring 2m X 3m by cutting off equal surfaces from the corners and turning up the side. Find dimensions of the box for maximum volume.
 - (b) A log has the form of a frustum of cone 30 feet long, the diameters of its ends being 2 feet and 1 foot. A beam of square section is to be cut from the log. Find the length if the volume is maximized using region elimination method.

OR

Q.5 Find the maximum of the function

 $y = 6x_1 + 5x_2$ Subject to the restrictions $-2x_1 - 5x_2 \le -20$ $5x_1 + x_2 \le 5$ $3x_1 + 11x_2 \le 33$ with $x_1 \ge 0$ and $x_2 \ge 0$

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