Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 1724003 **Date: 20-06-2014**

Subject Name: Optimization in Rubber Industries

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full mark.**

Q.1 **(a)** A poster is to contain 300 cm^2 of printed matter with margins of 6 cm at the top and bottom and 4cm at each side. Find the overall dimensions that minimize the total area of the poster. **07**

(b) 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. **07**

Q.2 **(a)** 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 = 0.2 and one of the vertex at the point {-1, 2, -2}. **09**

(b) Search for an maximum value of discreet function f(x) using following data: **05**

x	f(x)	x	f(x)	x	f(x)	x	f(x)
2	41	8.1	55	11	83	20	99
2.2	42	8.2	56	12	84	25	91
3	43	8.5	57	13	84.5	25.5	90
5	45	8.8	58	14	85	26	89.9
6	50	9.1	69	15	88	26,2	89.5
7	53	9.9	75	16	90	26.3	85
8	54	10.1	80	16.5	93	26.6	81

OR

(b) Find the value of x in the interval (0,1) which minimizes the function $f = x(x-1.5)$ with ± 0.05 using Golden Section search or Fibonacci search technique. **05**

Q.3 **(a)** It is required to shift a heavy processing machine inside process area through a passage. The machine is 5 ft wide and 20 ft long. The restriction in the passage is a right-angled turn around the corner from 10 ft wide corridor in to a 6 ft wide corridor. Will we be able to complete the job of shifting through the restriction of the passage? Justify your answer. **07**

(b) Carry out two stages of a Hooke-Jeeves search for searching a minimum of the objective function $y = 3x_1^2 + 2x_2^2 + 4x_3^2$. Use δ = 0.5, starting from the base point (1, -2, 2). A stage consists of a local exploration, together with an accelerated move. **07**

OR

Q.3 **(a)** Explain univariant search for searching a minimum of three variable objective function. **05**

(b) Find the minimum of the function $y = 3x_1 + 5x_2$ **09**

Subject to the restrictions

$$x_1 + 3x_2 \geq 14$$
$$2x_1 - x_2 \geq 2$$
$$x_1 - 4x_2 \leq 2$$
$$x_1 + x_2 \leq 20$$

with $x_1 \geq 0$ and $x_2 \geq 0$

Q.4	**(a)**	Explain how the Rosenbrock method gives acceleration in both direction and distance.	**07**
	(b)	Explain the basics of population based search techniques and discuss working of Genetic Algorithm for optimization.	**07**

OR

Q.4		Define a suitable search region and a feasible initial base point for the complex method of search in minimizing $y = 4x_1 + x_2 + 2x_3$ subject to the restrictions that $x_i \geq 0$ and	**14**

$$x_1 + x_2 + x_3 \leq 6$$
$$5x_1 - x_2 + x_3 \leq 4$$
$$x_1 + 3x_2 + 2x_3 \geq 1$$

Setup a Box complex method of search and carryout five cycles of search.

Q.5	**(a)**	Explain the duality concept of Kachiyanôs method	**07**
	(b)	Discuss branch and bound algorithms for scheduling.	**07**

OR

Q.5	**(a)**	Explain Affine Scaling method	**07**
	(b)	Discuss effect of Population size, cross over probability and mutation probability on performance of Genetic Algorithm.	**07**

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