Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1722905 **Date: 10/07/2012**

Subject Name: Optimization Techniques

Time: 10:30 am – 13:00 pm **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Build a simplex table and describe its components. **07**

(b) Show that (0,0) is the saddle point to the function $f(x_1, x_2) = 18x_1x_2 + 5x_2^2$ **07**

Q.2 **(a)** Discuss the scope and methodology of optimization techniques. How it can be helpful to get better optimum solution in power electronics engineering field. **07**

(b) Obtain the solution of the following problem by using Lagrange multipliers. **07**

$$Minz = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

Subject to

$$x_1 + 2x_2 = 2$$

and

$$x_{1,}x_2 \geq 0$$

OR

(b) Discuss types of stationary points. sketch the curve and find its stationary points, $y = x^2 - 4x$ **07**

Q.3 **(a)** Write the difference in the simplex solution procedure for a maximization and minimization problem of LPP. **07**

(b) Solve the NLPP by using Kuhn _Tucker condition **07**

$$\min z = 6x_1^2 + 5x_2^2$$

Subject to constraints ,

$$x_1 + 5x_2 = 3, x_1, x_2 \geq 0$$

OR

Q.3 **(a)** Demonstrate a LPP as a mathematical model. **07**

(b) Use Two_Phase simplex method to obtain a optimum value, **07**

$$\max z = 5x_1 + 3x_2$$

Subject to constraints,

$$2x_1 + x_2 \leq 1$$

$$x_1 + 4x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

Does the solution possess any Feasible solution. If not, give the reason.

Q.4 **(a)** How does a Region_Elimination method play a fundamental rule for single variable optimization problem. Comment. **07**

(b) Bracket the minimum of the function $f(x) = x^2 + \frac{54}{x}$ in the interval (0, 5). **07**

OR

Q.4 **(a)** Briefly discuss three different types of optimality criteria. **07**

Q.4 **(b)** Discuss pattern search algorithm. **07**

Q.5 **(a)** Discuss a case in Dynamic programming. **07**

(b) Summarized the iterative procedure of an integer LPP by Gomory's fractional cut method. **07**

OR

Q.5 **(a)** Discuss Golden section search algorithm. **07**

(b) Find the dual of the following LPP **07**

$$\min z = 4x_1 + 6x_2 + 18x_3$$

Subject to constraints,

$$x_1 + 3x_2 \geq 3,$$
$$x_2 + 2x_3 \geq 5,$$
$$x_1, x_2, x_3 \geq 0$$

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