

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

$$\text{Min } z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

Subject to

$$\text{and } x_1 + 2x_2 = 2$$

$$x_1, x_2 \geq 0$$

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

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

$$x_1 + 3x_2 \geq 3,$$

Subject to constraints, $x_2 + 2x_3 \geq 5,$

$$x_1, x_2, x_3 \geq 0$$

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