Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014**

**Subject code: 1722905** **Date: 20-06-2014**

**Subject Name: Optimization Techniques**

**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 marks.**

| | | | |
|---|---|---|---|
| **Q.1** | **(a)** | Discuss scope of optimization? Give detailed classification of optimization problems. | **07** |
| | **(b)** | For each of the following functions :( i) $f(x) = 3x^2$ ( ii) $f(x) = -5x^2$ (iii) $f(x) = 2x^2$ ï $x^3$ .Determine if f(x) is convex, concave, strictly convex, strictly concave, all or none of these classes in the range -Ð Òx ÓÐ. | **07** |
| **Q.2** | **(a)** | Build a simplex table and describe its components. | **07** |
| | **(b)** | State necessary and sufficient conditions for stationary points. Sketch $y = x^2 - 4x$ and find stationary points. | **07** |
| | | **OR** | |
| | **(b)** | Bracket the minimum function $f(x) = x^2 + 54/x$ in the interval (0,5) | **07** |
| **Q.3** | **(a)** | Solve the NLPP Max $z = 4x_1 - x_1^2 + 8x_2 - x_2^2$ subject to $x_1 + x_2 = 2$ $x_1, x_2$ Ó0 . | **07** |
| | **(b)** | Discuss three different types of optimality criteria. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Differentiate the simplex solution procedure for a maximization and minimization problem of LPP. | **07** |
| | **(b)** | State advantages of duality. Obtain dual of following LPP; Min $Z = x_1 - 3x_2 - 2x_3$ Subject to the constraints, $3x_1 - x_2 + 2x_3$ Ò7 $2x_1 - 4x_2$ Ó12 $-4x_1 + 3x_2 + 8x_3 = 10$ | **07** |
| **Q.4** | **(a)** | Use Lagrange multipliers to optimize Min $Z = 4x_1^2 + 5x_2^2$ Subject to the constraints, $2x_1 + 3x_2 - 6 = 0$. | **07** |
| | **(b)** | Discuss Box methodôs algorithm to obtain optimal solution. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Why stochastic programming is required? Explain stochastic programming with a suitable example. | **07** |
| | **(b)** | ñPenalty method transforms a constrained problem into a sequence of unconstrained problemò. Justify the statement. | **07** |
| **Q.5** | **(a)** | Why are engineers interested in optimization? State procedure for solving optimization problems. | **07** |
| | **(b)** | Discuss Quadratic Programming for NLP. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | State steps for GRG algorithms for unconstrained situation. | **07** |
| | **(b)** | Discuss a case study in dynamic programming. | **07** |

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