Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER III–EXAMINATION (Remedial)– WINTER 2015

Subject code: 730403 **Date: 07/12/2015**

Subject Name: OPTIMIZATION TECHNIQUES

Time: 2:30 PM to 5:00 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)**	(i) Define Objective function with appropriate example.	**03**
		(ii) Define Constrained and Unconstrained optimization problems.	**04**
	(b)	Explain the Steepest descent method of unconstrained optimization methods in detail.	**07**
Q.2	**(a)**	Explain Weierstrass theorem.	**07**
	(b)	Maximize $f = -X_1^2 - X_2^2 + 4X_1 + 4X_2 - 8$ subject to $X_1 + 2X_2 \leq 4$ $2X_1 + X_2 \leq 5$ Using Kuhn-Tucker conditions.	**07**
		OR	
	(b)	Use the simplex method to solve the following LP Unbounded problem: Minimize $f = -3x_1 - 2x_2$ subject to $x_1 - x_2 \leq 1$ $3x_1 - 2x_2 \leq 6$ where $x_1, x_2 \geq 0$.	**07**
Q.3	**(a)**	Find the minimum of the function $f(\lambda) = 0.65 - [(0.75)/(1+\lambda^2)] - 0.65\,\lambda\tan^{-1}(1/\lambda)$ using Newton-Raphson method with starting point $\lambda_1 = 0.1$ and use $\varepsilon = 0.01$ for checking the convergence.	**07**
	(b)	Minimize the function $f(x) = 0.65 - [0.75/(1 + x^2)] - 0.65\,x\tan^{-1}(1/x)$ in the interval [0,3] using the fibonacci method with n = 6.	**07**
		OR	
Q.3	**(a)**	Find the minimum of $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ by the cubic interpolation method.	**07**
	(b)	Minimize the function $f(x) = 0.65 - [0.75/(1 + x^2)] - 0.65\,x\tan^{-1}(1/x)$ by the golden section method using with n = 6.	**07**
Q.4	**(a)**	Write the algorithm of Hooke and Jeeves' Method.	**07**
	(b)	Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $x_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ using Powell's method.	**07**
		OR	
Q.4	**(a)**	Draw and explain the flowchart for Powell's method.	**07**
	(b)	Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ by taking the starting point as $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$, using Newton's method.	**07**
Q.5	**(a)**	Explain the basic approach of the interior penalty function method with algorithm.	**07**

	(b)	Explain augmented Lagrange multiplier method for mixed Equality-Inequality constrained problems with the flowchart.	**07**

OR

Q.5	**(a)**	Explain the iterative procedure of Fletcher – Reeves method.	**07**
	(b)	Explain the sequential programming method with algorithm.	**07**

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