Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2720821

Subject Name: Engineering Optimization

Date: 31/05/2016

Time: 10:30 am to 01:00 pm Total I Instructions:		0:30 am to 01:00 pm Total Marks:	Aarks: 70	
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.		
Q.1	(a)	What is optimization? Explain Classification of Optimization Problems in engineering.	07	
	(b)	Explain Lagrange Multiplier Method of optimization with its necessary and sufficient conditions.	07	
Q.2	(a)	A box in cube shape with the edge length 1m stands in front of a wall. A ladder leans against the wall and just touches the box at an edge. Find the length of shortest ladder?	07	
	(b)	Find the angular orientation of Cannon (Missile) to maximize the range of projectile.	07	
	(b)	OR Analyze the function $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$ and classify the stationary	07	
		points as maxima, minima and points of inflection.		
Q.3	(a) (b)	Explain Dual Simplex Method and its Algorithm.	07	
	(D)	subject to $2x_1 + x_2 - x_3 \le 2$	07	
		$-2x_1 + x_2 - 5x_3 \ge -6$		
		$4x_1 + x_2 + x_3 \le 6$; $x_i \ge 0$, $i = 1, 2, 3$ Use simplex method.		
Q.3	(a)	What is an inflection point and how do you identify it?	07	
	(b)	Minimize $f(x) = x_1^2 + x_2^2 + x_3^2$	07	
		subject to $x_1 + x_2 + 3x_3 = 2$ $5x_1 + 2x_2 + x_3 = 5$ using Lagrange Multiplier Method.		
0.4	(a)	Find the minimum of $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ by the cubic interpolation method	07	
Q.1	(b)	Explain steepest descent method of unconstrained optimization.	07	
04	(a)	OR Minimize $f(x) = (100 - x)^2$ over the bounded interval $60 \le x \le 150$ using	07	
Q.4	(a)	Golden section Method.	07	
	(b)	Explain the flow of computations for topology design using the material distribution method for topology optimization.	07	
Q.5	(a)	Explain computation procedure of Neural Network Based optimization.	07	
	(b)	Find the maximum of the function $f(x) = -x^2 + 2x + 11$ in the range $-2 \le x \le 2$ using the PSO method.	07	
		Use 4 particles (N = 4) with the initial positions $x_1 = -1.5$, $x_2 = 0.0$, $x_3 = 0.5$,		
		and $x_4 = 1.25$. Show the detailed computations for iterations 1 and 2.		
Q.5	(a)	Explain the flowchart of Simulated Annealing procedure.	07	
-	(b)	Explain basic Genetics operators used in Genetics Algorithms	07	
