

GUJARAT TECHNOLOGICAL UNIVERSITY**ME – SEMESTER – III (New)– EXAMINATION – WINTER-2019****Subject Code: 3730007****Date: 14-11-2019****Subject Name: Operation Research****Time: 02:30 PM TO 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) Apply Simplex Method to solve the following Linear Programming Problem 07Maximize $Z = 6X_1 + 8X_2$ Subject To following constraints

$$5X_1 + 10X_2 \leq 60,$$

$$4X_1 + 4X_2 \leq 40$$

$$\text{Where } X_1 \text{ and } X_2 \geq 0.$$

(b) Find the Dual of the following primal problem. 07(1) Maximize $Z = 4X_1 + 10X_2 + 25X_3$ Subject To following constraints

$$2X_1 + 4X_2 + 8X_3 \leq 25,$$

$$4X_1 + 9X_2 + 8X_3 \leq 30,$$

$$6X_1 + 8X_2 + 2X_3 \leq 40$$

$$\text{Where } X_1, X_2 \text{ and } X_3 \geq 0$$

(2) Minimize $Z = 20X_1 + 40X_2$ Subject To following constraints

$$2X_1 + 20X_2 \geq 40,$$

$$20X_1 + 3X_2 \geq 20,$$

$$4X_1 + 15X_2 \geq 30$$

$$\text{Where } X_1 \text{ and } X_2 \geq 0$$

Q.2 (a) Explain solution of minimization problem in Linear Programming using Big M method with example. 07**(b) Explain Sensitivity analysis of Linear programming problem for change in the Coefficient of objective function with example. 07****OR****(b) Explain following scenarios in terms of solution of Linear programming problem with example and using graphical representation. 07**

(1) Degeneracy situation in Solution

(2) Unbounded Solution space with finite solution.

Q.3 (a) Explain Decision tree analysis to take decision using appropriate example. 07**(b) Payoff matrix of a game is given below. Find the value of a game. 07**

		Player B			
		B1	B2	B3	B4
Player A	A1	6	2	4	8
	A2	2	-1	1	12
	A3	2	3	3	9
	A4	5	2	6	10

OR

- Q.3 (a)** The research department of a TV manufacturing company wants to launch 3 types of products LCD, LED and CRT. The marketing manager has to decide one of the product to be launched under the following estimated payoffs for various levels of sales: What will be the marketing manager's decision if (1)MaxiMax (2) MaxiMin (3) Howrich with alpha = 0.4 and (4) Laplace criterions are applied. **07**

Type of Product	Estimated Values of Sales (Units)		
	1.5 Lakh	1 Lakh	50 Thousand
LCD	300	100	100
LED	400	150	50
CRT	550	200	30

- (b)** Consider the details of Project consist activity A to J as shown in below table. **07**

Activity	A	B	C	D	E	F	G	H	I	J
Immediate predecessor(s)	-	-	A,B	A,B	B	C	D	F,G	F,G	E,H
Duration(weeks)	4	3	2	5	6	4	3	7	4	2

- (1) Construct a CPM network.
 (2) Determine the critical path.
 (3) Compute total floats and free floats for non critical activities.

- Q.4 (a)** Minimize $F(X,Y,Z) = X^2 + Y^2 + Z^2$ where $X+Y+2Z = 12$ using direct substitution Method. **07**

- (b)** Explain Interval Halving method to find optimal solution in given range of interval. **07**

OR

- Q.4 (a)** Explain Optimization of unconstrained single and multi variable optimization with example. **07**

- (b)** Explain Unimodal function with example. Also explain method of Exhaustive search to find optimal solution in case of Unimodal function. **07**

- Q.5 (a)** Explain the functionality of various phases of Genetic Algorithm. **07**

- (b)** Explain Kuhn Tucker condition method to find optimal solution of constrained non-linear programming problem with example. **07**

OR

- Q.5 (a)** Explain Simulated annealing algorithm in detail. Also give advantages of Simulated annealing algorithm. **07**

- (b)** Explain Golden section method to find optimal solution in given interval with suitable example. **07**
