Seat No.: _____ Enrolment No._____

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 **07**

Maximize $Z = 6X_1 + 8X_2$ Subject To following constraints
$5X_1 + 10X_2 <= 60$,
$4X_1 + 4X_2 <= 40$
Where X_1 and $X_2 >= 0$.

(b) Find the Dual of the following primal problem. **07**

(1) Maximize $Z = 4X_1 + 10X_2 + 25X_3$ Subject To following constraints
$2X_1 + 4X_2 + 8X_3 <= 25$,
$4X_1 + 9X_2 + 8X_3 <= 30$,
$6X_1 + 8X_2 + 2X_3 <= 40$
Where X_1, X_2 and $X_3 >= 0$

(2) Minimize $Z = 20X_1 + 40X_2$ Subject To following constraints
$2X_1 + 20X_2 >= 40$,
$20X_1 + 3X_2 >= 20$,
$4X_1 + 15X_2 >= 30$
Where X_1 and $X_2 >= 0$

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**

	Estimated Values of Sales (Units)		
Type of Product	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**

****