

Seat No.: _____

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GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – WINTER • 2014****Subject Code: 173405****Date: 29-11-2014****Subject Name: Operation Research****Time: 10.30 am - 01.00 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) What is OR? What are the characteristic of OR problem? Explain with suitable example. **07**
- (b) Use simplex method to solve the LPP **07**
 Maximize $Z = 4X_1 + 10X_2$
 Subject to $2X_1 + X_2 \leq 50$
 $2X_1 + 5X_2 \leq 100$
 $2X_1 + 3X_2 \leq 90$ and $X_1, X_2 \geq 0$.
- Q.2** (a) Solve the following LPP by simplex method: **07**
 Minimize $Z = 8X_1 - 2X_2$
 Subject to $-4X_1 + 2X_2 \leq 1$
 $5X_1 - 4X_2 \leq 3$ and $X_1, X_2 \geq 0$.
- (b) What is Degeneracy? Discuss a method to resolve degeneracy in LPP. **07**
- OR**
- (b) Use simplex method to solve the LPP **07**
 Minimize $Z = X_2 - 3X_3 + 2X_5$
 Subject to $3X_2 - X_3 + 2X_5 \leq 7$
 $-2X_2 + 4X_3 \leq 12$
 $-4X_1 + 3X_3 + 8X_5 \leq 10$ and $X_2, X_3, X_5 \geq 0$.
- Q.3** (a) Determine basic feasible solution to the following transportation problem using North-West Corner method: **07**

	Sink					Supply
Origin	2	11	10	3	7	4
	1	4	7	2	1	8
	3	9	4	8	12	9
Demand	3	3	4	5	6	-

- (b) The assignment cost of assigning any one operator to any one machine is given in the following table: **07**

	Operators				
Machine		I	II	III	IV
	A	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

Find the optimal assignment.

OR

- Q.3** (a) Looking at the present market condition Star company's managing director and their competitors are proposing following 4 pricing strategies each of these are : **07**

- I: Rapid Penetration Pricing.
 II: Skimming Pricing.
 III: Market Oriented Pricing.
 IV: Time Based Pricing.

The various overheads for the Star Company and their competitor company after adopting above mentioned pricing policy are given for every pair of strategy choice.

		Star Company Strategies.			
		I	II	III	IV
Competitors Strategies	I	20	15	12	35
	II	25	14	8	10
	III	40	2	10	5
	IV	-5	4	11	0

What strategy will the two sides adopt? Also determine the value of the game

- (b) Define the geometric and goal programming and explain its application. **07**

- Q.4** (a) Star bakery keeps stock of a popular brand of cake. Daily demand based on past experience is given below: **07**

Daily Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of the random numbers:-

Random Numbers: 48, 78, 09, 51, 56, 77, 15, 14, 68, 09

Using the Monte Carlo Queuing sequence, simulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decides to make 35 cakes every day. Also estimate the daily average demand for the cakes on the basis of the simulated data.

- (b) The cost of the machine is Rs 6100 and its scrap value is Rs. 100. The maintenance costs found from experience are as follows: **07**

Year	1	2	3	4	5	6	7	8
Main. Cost (Rs)	100	250	400	600	900	1200	1600	2000

Determine the optimum period for replacement of the machine.

OR

- Q.4** (a) Use Big-M method to solve **07**

Minimize $Z = 4X_1 + 3X_2$

Subject to $2X_1 + X_2 \geq 10$

$-3X_1 + 2X_2 \leq 6$

$X_1 + X_2 \geq 6$ and $X_1, X_2 \geq 0$.

- (b) Use the duality to solve the following LPP **07**

Minimize $Z = 2X_1 + 2X_2$

Subject to $2X_1 + 4X_2 \geq 1$

$-X_1 - 2X_2 \leq -1$

$2X_1 + X_2 \geq 1$ and $X_1, X_2 \geq 0$.

- Q.5** (a) Explain in brief the assumptions and limitations of a Queuing Model. **07**

- (b) The annual demand for an item is 3200 units. The unit cost is Rs. 6/-and inventory carrying charges 25% per annum. If the cost of one procurement is Rs. 150; Determine: **07**

1. Economic order quantity

2. Time between two consecutive orders
3. No. of orders per year
4. Optimal total cost.

OR

- Q.5** (a) Distinguish between PERT and CPM **07**
 (b) The following table indicates the details of a project. The durations are in days. 'a' refers to optimistic time, 'm' refers to most likely time and 'b' refers to pessimistic time duration. **07**

Activity	1-2	1-3	1-4	2-4	2-5	3-5	4-5
a	2	3	4	8	6	2	2
m	4	4	5	9	8	3	5
b	5	6	6	11	12	4	7

- a) Draw the network and
- b) Find the critical path.
