Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – WINTER 2015

Subject Code: 171503 **Date:09/12/2015**

Subject Name: Resource Optimization Techniques

Time: 10:30am to 1:00pm **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)** Discuss OR as applied to various business situations. Also discuss characteristics of OR problem. **07**

(b) Discuss various features of OR approach to a problem. **07**

Q.2 **(a)** The data collected in running a machine, the cost of which is Rs. 60000, are given below: Determine the optimum period of replacement of the machine. **07**

Year	1	2	3	4	5
Resale value (Rs.)	42000	30000	20400	14400	9650
Cost of spares (Rs.)	4000	4270	4880	5700	6800
Cost of labour (Rs.)	14000	16000	18000	21000	25000

(b) Discuss different methods for calculating group replacement policy. **07**

Or

(b) Discuss when replacement of item becomes necessary. Discuss theory of replacement. **07**

Q.3 **(a)** Define and discuss saddle point and zero sum games. **07**

(b) Solve following game. **07**

Player B

		B1	B2	B3	B4
Player A	A1	3	-5	0	6
	A2	-4	-2	1	2
	A3	5	4	2	3

Or

Q.3 **(a)** Discuss (i) Balking ii) Jockeying and iii) Queue discipline. **07**

(b) At a retail shop, Consider Poisson Average arrival rate per hour as 15 and exponential service rate with a mean of 200 seconds. Find **07**

a. Average no. of units in system
b. Average waiting time for customer
c. Average length of queue.
d. Probability that a customer arriving at the shop will have to wait.

Q.4 **(a)** Discuss Least-cost method to determine IBFS of a Transportation problem. Take any example. **07**

(b) A Product is manufactured at four factories A,B,C, and D. The unit production costs in them are Rs.2, Rs.3, Rs. 1, and Rs. 5, respectively. Their production capacities are 50, 70, 30 and 50 units, respectively. These factories supply product to four stores, demands of which are 25, 35, 105 and 20 units, respectively. Unit transportation cost in rupees from each factory to each store is given in the table below: **07**

Stores

Factories					
	A	2	4	6	11
	B	10	8	7	5
	C	13	3	9	12
	D	4	6	8	3

Determine the extent of deliveries from each of the store to minimize transportation cost.

Or

Q.4 **(a)** Discuss Degeneracy in Transportation problem. Quote example. **07**

Q.4 **(b)** Solve following transportation problem for minimum transportation cost. Unit shipping costs in Rs. Are given as under. **07**

Factory/Warehouse	a	b	c	d	Supply
A	8	9	6	3	18
B	6	11	5	10	20
C	3	8	7	9	18
Demand	15	16	12	13	

Q.5 **(a)** Discuss typical characteristics of LPP. **07**

(b) Solve following LPP graphically: **07**

$$\text{Min } Z = -X_1 + 2x_2$$

s/t

$$-X_1 + 3X_2 \leq 10$$

$$X_1 + X_2 \leq 6$$

$$X_1 - X_2 \leq 2$$

$$x_1, x_2 \geq 0$$

Or

Q.5 **(a)** The Owner of Metro Sports wishes to determine how many advertisements should be placed in magazines A, B, And C. He wishes to maximize exposure to the principle buyers. Percentage of readers of each magazines are known. Exposure in any particular magazine is the no. of Ads placed x No. of principle buyers. Use the following data: **07**

	Magazine		
	A	B	C
Readers in lakhs	1	0.6	0.4
Principle buyers	10%	15%	7%
Cost per Advertisement (Rs.)	5000	4500	4250

Budget amount is Max. Rupees 1,00,000. Owner has decided that 'A' will have no more than 6 ads, 'B' and 'C' will have at least 2 Ads. Formulate the LPP.

(b) Use the Simplex method to solve following LPP. **07**

Max $Z = 3x_1 + 5x_2 + 4x_3$

s/t $2x_1 + 3x_2 \leq 8$

$2x_2 + 5x_3 \leq 10$

$3x_1 + 2x_2 + 4x_3 \leq 15$

$x_1, x_2, x_3 \geq 0$

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