Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA Integrated – IV • EXAMINATION – SUMMER - 2016

Subject Code: 4440602 **Date:05/05/ 2016**

Subject Name: Operation Research (OR)

Time:10.30 AM TO 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)** Explain applications and scope of Operation Research. **07**

(b) A company produces two types of leather belts; say A and B. Belt A is of a superior quality and belt B is of a lower quality. Profits on the two types of belts are Rs. 4 and Rs. 3 per belt respectively. Each belt of type A requires twice as much time as required by belt of type B. If all belts were of type B the company could produce 1000 belts per day. But the supply of leather is sufficient only for 800 belts per day. Belt A requires a fency buckle and only 400 fency buckles are available per day. How should company manufacture two types of belts in order to have a maximum overall profit? (DO NOT SOLVE) **07**

Q.2 **(a)** Solve the following using Graphical Method: **07**

Max Z = 100x + 150y

Subject to :

$5x + 2y \leq 180$, $3x + 3y \leq 135$, $y \leq 2x$, $x, y \geq 0$

(b) Use the penalty (Big-M) Method to solve the following LP problem. **07**

Minimize $Z = 5x_1 + 3x_2$

Subject to :

$2x_1 + 4x_2 \leq 12$, $2x_1 + 2x_2 = 10$, $5x_1 + 2x_2 \geq 10$ $x_1, x_2 \geq 0$

OR

(b) Solve the following LPP by Simplex Method: **07**

Maximize $Z = 2x_1 + 4x_2 + x_3$

Subject to :

$x_1 + 2x_2 \leq 4$, $2x_1 + x_2 \leq 3$, $x_2 + 4x_3 \leq 3$, $x_1, x_2, x_3 \geq 0$

Q.3 **(a)** What is Simulation? Explain advantages and disadvantages of Simulation? **07**

(b) Obtain the Initial basic feasible solution by NWCM & LCM. **07**

	(1)	(2)	(3)	(4)	Supply
A	4	3	9	2	30
B	7	6	8	9	30
Demand	18	16	12	12	60

OR

Q.3 **(a)** Solve the following assignment for minimization. **07**

	A	B	C	D
P	42	35	28	21
Q	30	25	20	15
R	30	25	20	15
S	24	20	16	12

(b) (1) Explain Two-Person-Zero-Sum game with examples. **07**

(2) For the game with payoff matrix:

Player A	Player B			
	B_1	B_2	B_3	B_4
A_1	20	15	12	35
A_2	25	14	8	10
A_3	40	2	10	5
A_4	-5	4	11	0

Find (i) Value of the game. (ii) Saddle point. (iii) Optimal Strategy for A & B.

Q.4 (a) Explain Service Process in queuing System. **07**

(b) A Firm is considering replacement of a machine, whose cost price is Rs. 12,200. And the scrap value Rs. 200. The running cost are found from experience to be as follows: **07**

Year	1	2	3	4	5	6	7	8
Running Cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

OR

Q.4 (a) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out **07**

(a) average queue length.

(b) average time spent in the system.

(c) probability that there would be two customers in the queue.

(b) What is inventory? Give its advantages and disadvantages. **07**

Q.5 (a) Explain Difference between PERT and CPM. **07**

(b) A particular item has a demand of 250 units per month. The ordering cost is Rs. 100 per order and the unit holding cost is Rs. 2.40 per unit per year. Determine (i) the economic lot size (ii) total inventory cost per year. (iii) the time between orders and (iv) the number of orders per year. **07**

OR

Q.5 (a) Find the sequence that minimizes the total elapsed time and processing time in hours required to complete the following jobs: **07**

Job	1	2	3	4	5	6
Machine A	5	9	4	7	8	6
Machine B	7	4	8	3	9	5

(b) A small project is composed of 7 activities whose time estimates are listed in the table below. **07**

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Optimistic	1	1	2	1	2	2	3
Most likely	1	4	2	1	5	5	6
Pessimistic	7	7	8	1	14	8	15

(i) Draw PERT Diagram.

(ii) Find the expected duration and variance for each activity. What is the expected project length.

(iii) Calculate the variance and standard deviation of the project length.

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