Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA INTEGRATED– SEMESTER -IV EXAMINATION –WINTER-2021

Subject Code: 2648602 Date: 27/12/2021

Subject Name: Operations Research

Time: 02:30 PM TO 5:00 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 Operation Research? Explain features and application of OR. **07**

(b) What is LPP? Discuss in brief components of an LPP. Also give its limitations. **07**

Q.2 **(a)** Solve the following LP Problem using Simplex Method. **07**

Max Z = 3X1 + 5X2 +4X3

Subject to constraints

(i)$2x1 + 3x2 \leq 8$, (ii) $2x2 + 5x3 \leq 10$ (iii) $3x1 + 2x2 + 4x3 \leq 15$

And X1,X2,X3 ≥ 0

(b) Solve the following LP problem using Graphical method: **07**

Maximize $Z = 20x_1 + 10x_2$

Subject to the constraints

1) $x_1 + 2x_2 \leq 40$

2) $3x_1 + x_2 \geq 30$

3) $4x1 + 3x2 \geq 60$ And $x_1, x_2 \geq 0$.

OR

(b) Determine an initial Basic feasible solution to the following Transportation problem by using (a) Least Cost Method (b)Vogel Approximation Method **07**

	D1	D2	D3	D4	Supply
S1	21	16	15	3	11
S2	17	18	14	23	13
S3	32	27	18	41	19
Demand	6	6	8	23	

Q-3 **(a)** What is replacement? Describe some important situations. **07**

(b) The production department of a company requires 3,600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs 36 and the cost of carrying inventory is 25 per cent of the investment in the inventories. The price is Rs 10 per kg. Help the purchase manager to determine an ordering policy for raw material **07**

OR

Q.3 **(a)** The cost of a 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
Maintenance cosr(Rs):	100	250	400	600	900	1200	1600	2000

When should the machine be replaced?

(b) Discuss the various types of inventories in detail. **07**

Q.4 **(a)** Explain Calling population for queuing system. **07**

(b) Solve the following games by using maximin(minimax) principle, whose payoff matrix are given below: Include in your answer: (i) strategy selection for each player (ii) the value of the game of each player. Does the game have a saddle point? **07**

	Player B			
Player A	B1	B2	B3	B4
A1	1	7	3	4
A2	5	6	4	5
A3	7	2	0	3

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 that each customer requires 6 months 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 simulation Explain types of Simulation? **07**

Q.5 **(a)** Give three different examples of sequencing problems in your daily life. **07**

(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.
(iii) What is the expected project length

OR

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

(b) There are seven jobs, each of which has to go through the machine A and B in the order AB.Processing time in hours are as follows: **07**

Job:	1	2	3	4	5	6	7
Machine A:	3	12	15	6	10	11	9
Machine B:	8	10	10	6	12	1	3

Determine a sequence for these jobs that will minimize the total elapsed time T.Also find T and idle time for machine A and B.

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