

Enrolment No. /Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA INTEGRATED – SEMESTER IV- EXAMINATION –WINTER-2024

Subject Code:2648602

Date: 06/12/2024

Subject Name: Operations 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.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

- Q.1 (a)** What is Inventory? Explain Different Inventory Cost Component? **07**
(b) What is LPP? Discuss in brief components of an LPP. Also give its limitations. **07**

- Q.2 (a)** There are seven jobs, each of which has to go through the machines A and B in the order AB. **07**
Processing times in hours are as follows:

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 of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

- (b)** Use the graphical method to solve the following LP problem. **07**
Maximize $Z = 15x_1 + 10x_2$
subject to the constraints
(i) $4x_1 + 6x_2 \leq 360$, (ii) $3x_1 + 0x_2 \leq 180$, (iii) $0x_1 + 5x_2 \leq 200$ and $x_1, x_2 \geq 0$.

OR

- (b)** Use the graphical method to solve the following LP problem. **07**
Maximize $Z = 2x_1 + x_2$
subject to the constraints
(i) $x_1 + 2x_2 \leq 10$, (ii) $x_1 + x_2 \leq 6$, (iii) $x_1 - x_2 \leq 2$, (iv) $x_1 - 2x_2 \leq 1$
and $x_1, x_2 \geq 0$.

- Q.3 (a)** Define Operation Research and explain briefly its application? **07**
(b) A super market has a single cashier. During the peak hours, customers arrive at a rate of 20 **07**
customers per hour. The average no of customers that can be processed by the cashier is 24
per hour. Find

- The probability that the cashier is idle.
- The average no of customers in the queue system.
- The average time a customer spends in the system.
- The average time a customer spends in queue.
- The any time a customer spends in the queue waiting for service.

OR

- Q.3 (a)** Find the Initial basic feasible solution to the following transportation problem using Vogel's **07**
Approximation

		Destination				Supply
		D1	D2	D3	D4	
Source	01	3	1	7	4	300
	02	2	6	5	9	400
	03	8	3	3	2	500
Demand		250	350	400	200	1200

- (b)** What is replacement? Describe some important situations. **07**

- Q.4 (a)** Solve the assignment problem At the head office of a company there are five registration counters. Five persons are available for service. How should the counters be assigned to persons so as to maximize the profit? **07**

P \ C	A	B	C	D	E
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

- (b)** The production department of a company requires 3600 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 percent of the investment in the inventories. The price is Rs.10 per kg. purchaser manager wishes to determine an ordering policy for raw materials. **07**

OR

- Q.4 (a)** Give three different examples of sequencing problems in your daily life. **07**
(b) 1) Difference Between Transportation Problem And Assignment Problem **03**
 2) Discuss on History and Definitions of Operations Research **04**

- Q.5 (a)** Explain Calling population for queuing system. **07**
(b) Explain the difference between PERT and CPM. **07**

OR

- Q.5 (a)** What is simulation Explain types of Simulation? **07**
(b) What is the main objective of sequencing problem? State the assumptions generally made while dealing with sequencing problems. **07**
