

H

Roll No.

MB-201(SC1)

M. B. A. (SECOND SEMESTER) END SEMESTER

EXAMINATION, June, 2023

OPERATIONS RESEARCH

Time : Three Hours

Maximum Marks : 100

- Note :** (i) This questions paper contains two Sections—Section A and Section B.
(ii) Both sections are compulsory.
(iii) Answer any *two* sub-questions among (a), (b) and (c) in each main question of Section A. Each sub-question carries 10 marks.
(iv) Section B consisting of case study in compulsory. Section B is of 20 marks.

Section—A

1. (a) What do you understand by Operations research ? Define its application areas and limitations. (CO1)
(b) Find the maximum value of : (CO1)

$$z = 4x_1 + 3x_2$$

P. T. O.

(2)

MB-201(SC1)

subject to :

$$3x_1 + x_2 \leq 15$$

$$3x_1 + 4x_2 \leq 24$$

$$x_1 \geq 0$$

$$x_2 \geq 0$$

(c) Maximize : (CO1)

$$Z = 3x - 4y$$

subject to :

$$x - 2y \leq 0$$

$$-3x + y \leq 4$$

$$x - y \leq 6$$

$$x, y \geq 0$$

2. (a) Differentiate between assignment and transportation. (CO2)

(b) Solve the given transportation problem using Vogel's approximation method : (CO2)

	Destination centers				
Factories	D ₁	D ₂	D ₃	D ₄	Supply
F ₁	3	2	7	6	50
F ₂	7	5	2	3	60
F ₃	2	5	4	5	25
Demand	60	40	20	50	

(3)

MB-201(SC1)

(c) A dairy plant has five milk tankers I, II, III, IV and V. These milk tankers are to be used on five delivery routes A, B, C, D and E. The distances (in kms) between dairy plant and delivery routes are given in the following distance matrix : (CO2)

	I	II	III	IV	V
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How the milk tankers should be assigned to the chilling centers so as to minimize the distance travelled ?

3. (a) What are the assumptions and application areas of Queuing Theory ? (CO3)

(b) A repair shop attended by a single mechanic has an average of 4 customers per hour who brings small appliances for repair. The repairman takes 6 minutes on

(4)

MB-201(SC1)

the average. Find out system length and queue length. (CO3)

- (c) In a self service store with one cashier, 8 customer arrive on an average of every 5 mins. and the cashier can serve 10 in 5 mins. If both arrival and service time are exponentially distributed, then determine :

(CO3)

- (i) Average number of customer waiting in the queue for average.
- (ii) Expected waiting time in the queue.
- (iii) What is the probability of having more than 6 customers ? In the system.

4. (a) What do you understand by game theory ? Discuss in detail. (CO4)

- (b) Solve the following pay-off matrix :(CO4)

	Player B			
	Strategies	I	II	III
	I	6	8	6
Player A	II	4	12	2

(5)

MB-201(SC1)

- (c) Solve the following game by graphical method : (CO5)

	Player B			
	Strategies	I	II	III
	I	6	4	3
Player A	II	2	4	8

Section—B

5. Case study : (CO5)

Consider the inventory system with the following data : annual demand is 10000/year, unit cost is rupees 10 and holding cost is rupees 0.80 per month, cost of ordering is rupees 200 per order. Determine optimal order quantity, numbers of order per year and time between two orders.