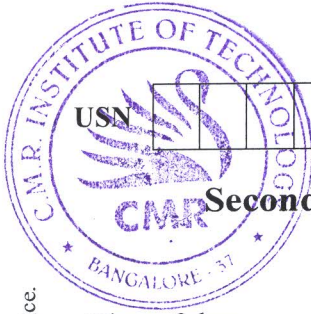20MBA24

Second Semester MBA Degree Examination, June/July 2023
Operations Research

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer any FOUR full questions from Q.No.1 to Q.No.7.*
2. *Question No. 8 is compulsory.*

1	a.	Explain physical models of Operations Research.
	b.	Discuss the special cases of linear programming problems.
	c.	Examine the techniques of Operations Research.

(03 Marks)
(07 Marks)
(10 Marks)

2   a. Outline any two assumptions of linear programming models. **(03 Marks)**

     b. A Company manufactures 3 types of parts A, B and C which use precious metals platinum and gold. Due to shortage of these precious metals, the government regulates the amount that may be used per day. A requires 2 gms of platinum and 3 gms of gold. B requires 4 gms of platinum and 2 gms of gold. C requires 6 gms of platinum and 4 gms of gold. Daily allotment of platinum and gold are 160 gms and 120 gms respectively. A earns a profit per unit of Rs 500 , B Rs 600 and C Rs 1,200. Formulate the linear programming problem.

(07 Marks)

     c. Explain Decision Making methods under uncertainty. **(10 Marks)**

3   a. Outline the concept of Modified Distribution method. **(03 Marks)**

     b. The following is the transportation problem :

Warehouse	Market			Supply
	A	B	C	
1	10	12	7	180
2	14	11	6	100
3	9	5	13	160
4	11	7	9	120
Demand	240	200	220	

Solve the above using North West Corner method. **(07 Marks)**

     c. A Sales manager has to assign 4 Salesmen to 4 territories. The possible profit for each salesman in each territory is given below. Recommend the assignment that maximizes the profit.

Salesman	Territories			
	A	B	C	D
1	35	27	28	37
2	28	37	29	40
3	35	24	32	33
4	24	32	25	28

(10 Marks)

4   a. Compare Minimax and Maximin principle. **(03 Marks)**

     b. Explain the assumptions of sequencing problems. **(07 Marks)**

c. A Company manufactures around 150 EV scooters. The daily production varies from 146 to 154 depending on the availability of raw materials and other working conditions.

Production per day	146	147	148	149	150	151	152	153	154
Probability	.04	.09	.12	.14	.11	.10	.20	.12	.08

The finished scooters are transported in a specially arranged lorry accommodating only 150 scooters. Using the following random numbers 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57, simulate the process to find out.
  i)   What will be the average number of scooters waiting in the factory?
  ii) What will be the average number or empty spaces on the lorry?   **(10 Marks)**

5 a. Distinguish zero sum game and non zero sum game.   **(03 Marks)**
   b. Solve the following game :

		Player B		
		5	20	-10
Player A		10	6	2
		20	15	18

          (07 Marks)
   c. Compare PERT and CPM.   **(10 Marks)**

6 a. Explain Event and Activity in a network diagram.   **(03 Marks)**
   b. Explain the applications of simulation technique in Operations Research.   **(07 Marks)**
   c. The following is the list of activities and time duration :

Activity	1-2	1-3	2-6	3-4	3-5	4-6	5-6	5-7	6-7
Duration	4	6	8	7	4	6	5	19	10

  i)   Construct the network.
  ii) Determine the earliest and latest start and finish time.
  iii) Identify the critical path.   **(10 Marks)**

7 a. What is Crashing of a project?   **(03 Marks)**
   b. Explain the phases of Project Management.   **(07 Marks)**
   c. The following table gives the list of jobs along with their time estimates :
  i)   Construct the project network.
  ii) Determine the expected time and variance for the activities.

Jobs	Time (days)		
	t_o	t_m	t_p
1 – 2	4	6	8
1 – 6	5	7	15
2 – 3	4	8	12
2 – 4	15	20	25
3 – 5	10	18	26
4 – 5	8	9	16
6 – 7	4	8	12
5 – 8	1	2	3
7 – 8	6	7	8

          (10 Marks)

8   **CASE STUDY (Compulsory)** :

a. Solve the following using Graphical method :
Maximise $Z = 60x_1 + 40x_2$
Subject to $x_1 \le 25$
$x_2 \le 35$
$2x_1 + x_2 \le 60$ and $x_1, x_2 \ge 0$.   **(10 Marks)**

b. Solve the following transportation problem using Vogel's Approximation method.

		Distribution Centre				
		D_1	D_2	D_3	D_4	Supply
Plant	P_1	2	3	11	7	6
	P_2	1	0	6	1	1
	P_3	5	8	15	9	10
	Demand	7	5	3	2	

(10 Marks)

*****