



# CBCS SCHEME

20MBA24

## Second Semester MBA Degree Examination, June/July 2024 Operations Research

Time: 3 hrs.

Max. Marks: 100

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

- 1 a. Define Operations Research. (03 Marks)  
b. Discuss the scope of operations research. (07 Marks)  
c. Define Model. Discuss the steps of modeling. (10 Marks)
- 2 a. What is Linear Programming? (03 Marks)  
b. Explain the assumptions of linear programming problem. (07 Marks)  
c. Solve the following LP problem using graphical method:  
Maximize  $Z = 6x_1 + 8x_2$   
Subject to  
 $5x_1 + 10x_2 \leq 60$   
 $4x_1 + 4x_2 \leq 40$   
 $x_1 \text{ and } x_2 \geq 0$  (10 Marks)
- 3 a. Define transportation problem. (03 Marks)  
b. Consider the following transportation problem involving 3 sources and 4 destinations. The cell entries represent the cost of transportation/unit. Obtain the initial basic feasible solution using least cost cell method.

		Destination				Supply
		1	2	3	4	
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	1200

(07 Marks)

- c. Consider the following transportation problem. Find the basic feasible solution using Northwest corner cell method.

		Market					Supply
		1	2	3	4	5	
Plant	1	10	2	16	14	10	300
	2	6	18	12	13	16	500
	3	8	4	14	12	10	825
	4	14	22	20	8	18	375
Demand		350	400	250	150	400	

(10 Marks)

- 4 a. Define assignment problem. (03 Marks)  
b. Discuss practical applications of assignment problem. (07 Marks)

- c. Solve the following assignment problem using Hungarian method. The matrix entries represent the processing times in hours.

		Operator				
		1	2	3	4	5
Job	1	10	12	15	12	8
	2	7	16	14	14	11
	3	13	14	7	9	9
	4	12	10	11	13	10
	5	8	13	15	11	15

(10 Marks)

- 5 a. What are the types of decisions? (03 Marks)  
 b. What is decision tree? Illustrate with an example. (07 Marks)  
 c. A retail store desires to determine the optimal daily order size for a perishable item. The store buys the perishable item at the rate of Rs.80/ kg and sells at the rate of Rs.100/kg. If the order size is more than the demand, the excess quantity can be sold at Rs.70/kg in the secondary market; otherwise the opportunity cost for the store is Rs.15/kg for the unsatisfied portion of the demand. Based on the past experience, it is found that demand varies from 50kg to 250kg in steps of 50kg. The possible values of the order size are from 75kg to 300kg in steps of 75kg. Determine the optimal order size which will maximize the daily profit of the store. (10 Marks)
- 6 a. Define pure strategy and mixed strategy in game theory. (03 Marks)  
 b. Discuss the different terminologies of game theory. (07 Marks)  
 c. Consider the payoff matrix with respect to player A and solve it optimally.

		R	
		1	2
A	1	6	9
	2	8	4

(10 Marks)

- 7 a. What is Project? (03 Marks)  
 b. Solve the following network by critical path method. Identify total project duration and critical path:

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

(07 Marks)

- c. From the following data relating to project:  
 i) Find the expected duration and variance of each activity.  
 ii) Draw the network diagram and find expected project length.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6	6-7	5-7
NAMP	A	B	C	D	E	F	G	H	I
$t_0$	1	3	2	1	3	2	4	6	3
$t_p$	7	7	8	1	9	8	14	10	11
$t_M$	1	5	2	1	6	5	6	8	7

(10 Marks)

## CASE STUDY (Compulsory)

From the following information draw a network diagram and calculate  $E_{st}$ ,  $E_{ft}$ ,  $L_{st}$ ,  $L_{ft}$  for all activities. And find the critical path.

Name of the activity	Pre-requisite activity	Duration
A	-	2
B	-	3
C	-	4
D	A	6
E	B	7
F	C	5
G	D and E	8
H	B	9
I	H and F	5

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(20 Marks)

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