Seat No. : _____

ND-103

November-2023

B.B.A., Sem.-V

CC-304 : Operations Research and Quantitative Technique

Time : 2½ Hours] **[Max. Marks : 70**

Instructions : (1) Graph Paper will be provided by request.

(2) Use of simple calculator is allowed.

1. (A) Write Mathematical Form of Linear Programming Problem. 7

1. (B) A furniture manufacturer makes two products: Chairs and Tables. Processing of these products is done on two machines A and B. A chair requires 2 hours on machines A and 6 hours on machine B. A table requires 5 hours on machine A and no time on machine B. There are 16 hours per day available on machine A and 30 hours on machine B. Profit gained by the manufacturer from a chair and a table is ₹ 2 and ₹ 10 respectively. Solve this problem graphically to find the daily production of each of the two products to earn maximum profit. 7

OR

1. (A) Give application of OR (Operations Research) in various fields. 7

1. (B) Use the graphical method to solve the following LP Problem : 7

Maximum $Z = 2x + y$

subject to the constraints

$x + 2y \leq 10$

$x + y \leq 6$

$x - y \leq 2$

$x, y \geq 0$

2. (A) Define Transportation Problem and explain Mathematical Model of Transportation Problem. 7

2. (B) Obtain initial basic feasible solution by Matrix Minima Method. 7

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

OR

2. (A) Explain Vogel's approximation method. 7

2. (B) Obtain Optimum Solution. 7

	D_1	D_2	D_3
S_1	8 [120]	15	16
S_2	15	10 [80]	12
S_3	3 [30]	9	10 [50]

3. (A) Write any 5 rules of constructing a Network. 7

3. (B) Draw the project network and obtain Total Float. 7

Activity	1-2	2-3	2-4	2-5	3-6	4-6	5-7	6-7
t_0	1	1	1	5	2	5	4	1
t_p	5	3	5	11	6	7	6	5
t_m	3	4	3	8	4	6	5	3

OR

3. (A) The following table gives the activities in a construction project. Draw PERT Chart and find Free Float. 7

Activity	A	B	C	D	E	F	G
Immediate Predecessor	-	-	-	A	C	A	D, B, E
Days	4	6	2	5	2	7	4

3. (B) The following network diagram represents activities associated with a project, draw PERT Network and find Total Float. 7

Activity	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
Days	5	18	26	16	15	6	7	7	3

4. (A) What is Assignment Problem and explain the method of solving any Assignment Problem ? 7

4. (B) Solve the game whose payoff matrix is given below : 7

Player A	Player B			
	B_1	B_2	B_3	B_4
A_1	30	20	40	0
A_2	30	40	20	40
A_3	40	20	40	0
A_3	0	4	0	8

OR

4. (A) Find the Assignment of salesmen to districts that will result in maximum sales. 7

		Districts				
		A	B	C	D	E
Salesmen	P	32	38	40	28	40
	Q	40	24	28	21	36
	R	41	27	33	30	37
	S	22	38	41	36	36
	T	29	33	40	35	39

4. (B) Find the optimal strategies and value of the game. 7

Player A	Player B			
	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

5. Do as directed: (any **seven**) **14**

1. In LPP, _____ method is utilized when there are more than two variables.

2. The right-hand side constant of a constraint in a primal problem becomes _____ in the objective function of dual problem.

3. Penalty Method is also known as _____ Method.

   (a) North West Corner

   (b) Matrix Minima

   (c) Vogel's

   (d) MODI

4. North-West Corner Method does not take into account the _____ of transportation on any route of transportation.

5. One player's gain is equal to the loss of another player is known as _____.

   (a) Pay-off Matrix

   (b) Game

   (c) Two Person Zero Sum Game

6. _____ exists when maximin and minimax value of the game are same.

7. The size of the payoff matrix of a game can be reduced by using _____.

8. Longest Path of the network is known as _____.

   (a) PERT

   (b) CPM

9. When value of the game is Zero, the game is said to be _____ game.

10. Define: Decision Variable

11. Any project starts with an event and ends with an _____.

   (a) Activity

   (b) Event

12. In transportation problem when total demand is not equal to total supply, the problem is _____.