

2024

BUSINESS ADMINISTRATION — HONOURS

Paper : BBAA-501-C11

(Quantitative Techniques for Management)

Full Marks : 80

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Section - A

(Marks : 30)

1. Answer *any five* questions : 2×5

- (a) Explain Two Person Zero Sum Game.
- (b) What do you mean by 'Unbalanced Problem' in Transportation?
- (c) What is 'feasible region' in graphical method for linear programming?
- (d) State the condition for Degeneracy in Assignment problems.
- (e) State the types of events in network analysis.
- (f) Discuss PERT method under Network Analysis.
- (g) Explain 'Critical Path' under Critical Path Method.
- (h) What are random numbers used in simulation?

2. Answer *any five* questions : 4×5

- (a) Write a short note on Dominance Property.
- (b) Find out the saddle point, given the following pay-off matrix :

		Player B's strategy		
		B1	B2	B3
Player A's strategy	A1	24	-10	-5
	A2	12	14	7
	A3	-15	-12	5

- (c) Discuss the steps involved in solving Unbalanced Assignment Problems.
- (d) List the steps required in Monte Carlo Simulation.
- (e) Write a short note on the types of activities in network analysis.

Please Turn Over

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(f) Prepare Initial Transportation table using LCM Method :

Origin/ Destinations	D1	D2	D3	Supply
O1	4	14	8	15
O2	6	6	2	24
O3	10	8	14	21
O4	2	12	4	42
Demand	21	27	54	102

(g) Find the Optimum Strategy of each of the players and the value of the game.

		PLAYER B		
PLAYER A			B1	B2
	A1	2	1	
	A2	1	5	

(h) List the steps involved in Duality linear programming.

Section - B

(Marks : 50)

Answer *any five* questions.

10×5

3. A Project has the following activities and other characteristics :

Activity	Proceeding Activity	Time Estimates (in weeks)		
		Most Optimistic	Most Likely	Most Pessimistic
A	Nil	4	7	16
B	Nil	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E, F	1	4	7
I	G	4	19	28

- (a) Draw a PERT network diagram.
- (b) Identify the critical path.
- (c) Find the expected duration and variance for each activity.

(3)

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4. Obtain an initial basic feasible solution to the following transportation problem by 'Vogel's Approximation Method'.

Warehouse	Stores				Availability
	I	II	III	IV	
A	7	3	5	5	34
B	5	5	7	6	15
C	8	6	6	5	12
D	6	1	6	4	19
Demand	21	25	17	17	80

5. Solve the following game using Dominance Property and find the Value of the Game :

$$\begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 6 \\ 4 & 1 \\ 2 & 2 \\ -5 & 0 \end{bmatrix}$$

6. Find the optimal assignment for the following :

Worker/ Jobs	A	B	C	D
W1	6	4	3	9
W2	8	10	3	7
W3	7	5	6	8
W4	6	8	8	9

7. Using graphical method, find the maximum value of

$$Z = 5x_1 + 7x_2$$

subject to the constraints

$$x_1 + x_2 \leq 40$$

$$3x_1 + 8x_2 \leq 240$$

$$10x_1 + 7x_2 \leq 350$$

$$x_1, x_2 \geq 0$$

Please Turn Over

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8. Find the dual of the following problem :

$$\text{Maximize } Z = 2x_2 + 5x_3$$

subject to the constraints

$$-x_1 - x_2 \leq -2$$

$$-2x_1 - x_2 - 6x_3 \geq -6$$

$$x_1 - x_2 + 3x_3 = 4$$

$$x_1, x_2, x_3 \geq 0$$

9. What is the optimal strategy in the game described by the matrix with two Players Y and N considering player N is the paying player?

$$\begin{bmatrix} -5 & 5 & 4 \\ 2 & 6 & 0 \\ 0 & 4 & 2 \\ 7 & 8 & -3 \end{bmatrix}$$

10. Prepare Transportation table using NWCM Method :

Origin/ Destinations	D1	D2	D3	Supply
O1	8	2	14	21
O2	14	6	8	19
O3	4	6	10	20
Demand	15	24	21	60