

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

BBA - V Semester

COURSE CODE (CREDITS): 24BB1HS512 (4)

MAX. MARKS: 25

COURSE NAME: QUANTITATIVE TECHNIQUES FOR MANAGEMENT

COURSE INSTRUCTORS: ASA

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

(c) Use of scientific calculator is allowed.

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Q.No	Question	CO	Marks																														
Q1	Determine an initial basic feasible solution to the following transportation problem by using (a) NWCM, (b) LCM, and (c) VAM; for the three supply centers A, B and C; and four demand centers, D1, D2, D3 and D4, as given below: <table> <tr> <th></th> <th>D1</th> <th>D2</th> <th>D3</th> <th>D4</th> <th>Total Supply</th> </tr> <tr> <td>A</td> <td>8</td> <td>6</td> <td>10</td> <td>9</td> <td>20</td> </tr> <tr> <td>B</td> <td>9</td> <td>7</td> <td>4</td> <td>2</td> <td>30</td> </tr> <tr> <td>C</td> <td>3</td> <td>4</td> <td>2</td> <td>5</td> <td>25</td> </tr> <tr> <td>Total Demand</td> <td>10</td> <td>25</td> <td>30</td> <td>10</td> <td></td> </tr> </table> Per unit cost is given in the cells		D1	D2	D3	D4	Total Supply	A	8	6	10	9	20	B	9	7	4	2	30	C	3	4	2	5	25	Total Demand	10	25	30	10		4	1+2+3=6
	D1	D2	D3	D4	Total Supply																												
A	8	6	10	9	20																												
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C	3	4	2	5	25																												
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Q2	A manufacturer has distribution centers located at Chandigarh, Meerut and Lucknow. These centers have available 15, 25 and 20 units of his product. His retail outlets at A, B, C and D requires 10, 15, 20 and 15 units of the product, respectively. The shipping cost per unit (in thousand rupees) between each center and outlet is given in the below: <table> <tr> <th></th> <th>D1</th> <th>D2</th> <th>D3</th> <th>D4</th> <th>Total Supply</th> </tr> <tr> <td>Chandigarh</td> <td>4</td> <td>6</td> <td>8</td> <td>6</td> <td>15</td> </tr> <tr> <td>Meerut</td> <td>6</td> <td>5</td> <td>7</td> <td>3</td> <td>25</td> </tr> <tr> <td>Lucknow</td> <td>9</td> <td>7</td> <td>4</td> <td>2</td> <td>20</td> </tr> <tr> <td>Total Demand</td> <td>10</td> <td>15</td> <td>20</td> <td>15</td> <td></td> </tr> </table> The basic feasible solution using NWCM is highlighted in bold with grey color. Find the optimal route and optimal solution using MODI principle.		D1	D2	D3	D4	Total Supply	Chandigarh	4	6	8	6	15	Meerut	6	5	7	3	25	Lucknow	9	7	4	2	20	Total Demand	10	15	20	15		5	8
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Q3	Write the dual of the following LP problem: Max $Z = 18x_1 + 10x_2 + 11x_3$ subject to a) $4x_1 + 6x_2 + 5x_3 \geq 480$ b) $12x_1 + 10x_2 + 10x_3 \geq 1200$	3	4																														

	c) $10x_1 + 15x_2 + 7x_3 \leq 1500$ d) $x_3 \geq 50$ e) $x_1 - x_2 \leq 0$ and $x_1, x_2, x_3 \geq 0$		
Q4	What do you understand by Sensitivity Analysis in Linear Programming? What are different approaches used in it, discuss briefly.	2	4
Q5	Briefly discuss the managerial significance of Duality in Linear Programming.	1	3