

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech- VII Semester (CSE/IT)

COURSE CODE (CREDITS): 19B1WCI737 (3)

MAX. MARKS: 25

COURSE NAME: Optimization Methods in Business Analytics

COURSE INSTRUCTORS: Meghna Dhalaria

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 Calculator is allowed

Q.No	Question	CO	Marks																														
Q1	Find the solution using Two phase method $\text{Min } Z = 3x_1 + 5x_2$ Subject to $x_1 + 2x_2 \geq 8$ $3x_1 + 2x_2 \geq 12$ $5x_1 + 6x_2 \leq 60$ and $x_1, x_2 \geq 0$	2	[7]																														
Q2	A company manufactures goods at three factories (F1, F2, F3) and supplies them to four customers (C1, C2, C3, C4). The company has calculated the profit per unit (in ₹) of transporting goods from each factory to each customer as shown in the following table: <table><tr><td></td><td>C1</td><td>C2</td><td>C3</td><td>C4</td><td>Supply</td></tr><tr><td>F1</td><td>40</td><td>25</td><td>22</td><td>33</td><td>100</td></tr><tr><td>F2</td><td>44</td><td>35</td><td>30</td><td>30</td><td>30</td></tr><tr><td>F3</td><td>38</td><td>38</td><td>28</td><td>30</td><td>70</td></tr><tr><td>Demand</td><td>40</td><td>20</td><td>60</td><td>30</td><td></td></tr></table> The objective is to determine the initial feasible allocation of goods from factories to customers using the Vogel's Approximation Method (VAM) such that the total profit is maximized.		C1	C2	C3	C4	Supply	F1	40	25	22	33	100	F2	44	35	30	30	30	F3	38	38	28	30	70	Demand	40	20	60	30		3	[7]
	C1	C2	C3	C4	Supply																												
F1	40	25	22	33	100																												
F2	44	35	30	30	30																												
F3	38	38	28	30	70																												
Demand	40	20	60	30																													
Q3	A company has 4 machines (M1, M2, M3, M4) and 4 jobs (J1, J2, J3, J4). Each machine can be assigned to perform exactly one job, and each job must be completed by exactly one machine. The costs (in ₹) of assigning each machine to each job are given below:	3	[7]																														

	J1	J2	J3	J4
M1	1	8	15	22
M2	13	18	23	28
M3	13	18	23	28
M4	19	23	27	31

Determine the optimal assignment of machines to jobs such that the total cost is minimized, using the Hungarian Method.

Q4.

A company has three production facilities S1, S2 and S3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D1, D2, D3 and D4 with requirement of 5, 8, 7 and 14 units (in 100s) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below:

	D1	D2	D3	D4	Capacity
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

Use North west corner method to find an initial basic feasible solution to the transportation problem

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