

Abhiram Mitra



VIT[®]

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: A2/TA2

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST – I

WINTER SEMESTER 2022-2023

Programme Name & Branch: B.Tech & Mechanical

Course Code: BMEE211L

Course Name: Engineering Optimization

Faculty Name(s): S.G. PONNAMBALAM, SUDHAKARA PANDIAN R, SIVAPRASAD DARLA, SOUMEN PAL

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Class Number(s): VL2022230500955, 950, 953, 959

Exam Duration: 90 minutes

Maximum Marks: 50

General instruction(s):

Q.No	Question	Marks
1	A firm can produce three types of clothes say, A,B and C. Three kinds of wool are required for it say red, green and blue. One unit length of type A cloth needs 2 yard of red wool and 3 yards of blue; one unit length of type B cloth needs 3 yards of red wool, 2 yards of green and 2 yards of blue; and one unit length of type C needs 5 yards of green and 4 yards of blue wool. The firm has a stock of only 8 yards of red wool, 10 of green 15 of blue. It is assumed that the income obtained from one unit length of type A is Rs.3, of type B cloth is Rs.5 and of type C cloth is Rs.4. Formulate LPP.	10
2.	Use graphical method to solve the following problem: Maximize $Z = 15x_1 + 20x_2$	10

	subject to $x_1 + 2x_2 \leq 10$ $2x_1 - 3x_2 \leq 6$ $x_1 + x_2 \geq 6$ $x_1, x_2 \geq 0$																																	
3.	Use Big M method to solve Linear Programming Problem. Minimize $Z = 4x_1 + x_2$ Subject to $3x_1 + x_2 = 3$ $4x_1 + 3x_2 \geq 6$ $x_1 + 2x_2 \leq 3$ $x_1, x_2 \geq 0$	10	1	4																														
4.	A transportation problem involving three sources and four destinations is shown in table below. The cell entries represent the cost of transportation per unit. Find out the Initial basicfeasible solution using following methods. i) North West Corner Rule (4) ii) VAM (6) <table border="1"><thead><tr><th>Destination/ Source</th><th>D1</th><th>D2</th><th>D3</th><th>D4</th><th>SUPPLY</th></tr></thead><tbody><tr><td>S1</td><td>3</td><td>2</td><td>7</td><td>6</td><td>50</td></tr><tr><td>S2</td><td>7</td><td>5</td><td>2</td><td>3</td><td>60</td></tr><tr><td>S3</td><td>2</td><td>5</td><td>4</td><td>5</td><td>25</td></tr><tr><td>DEMAND</td><td>60</td><td>40</td><td>20</td><td>15</td><td></td></tr></tbody></table>	Destination/ Source	D1	D2	D3	D4	SUPPLY	S1	3	2	7	6	50	S2	7	5	2	3	60	S3	2	5	4	5	25	DEMAND	60	40	20	15		10	2	4
Destination/ Source	D1	D2	D3	D4	SUPPLY																													
S1	3	2	7	6	50																													
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DEMAND	60	40	20	15																														
5.	Find the optimal solution for the transportation problem given in Question No: 4 using MODI method. Use the Initial Basic Feasible Solution obtained by Vogel's Approximation Method.	10	2	5																														

*****End of Question Paper*****

Programme Name & Branch
Course Code
Course Name
Faculty Name(s)

: B.Tech & Mechanical
: BMEE211L
: Engineering Optimization
: Dr. Rajyalakshmi G, Dr. Mohankumar K V, Dr.
RavitejaBuddala, Dr. John Rajan A, Dr. DegaNagaraju
: VL2022230500946, 0947, 0944, 0948
Max. Marks: 50

Class Number(s)
Duration: 90min.

General instruction(s): Answer All Questions

Graph Sheets required




Q.No	Question	Marks
1.	<p>A factory produces four different products, and that the daily produced amount of the first product is x_1, the amount produced of the second product is x_2, and so on. The profit per unit of product is \$20, \$12, \$40, and \$25 for the first, second, third, and fourth product, respectively.</p> <ul style="list-style-type: none"> Due to manpower constraints, the total number of units produced per day can't exceed fifty. For each unit of the first product, three units of the raw material "A" are consumed. Each unit of the second product requires two units of the raw material "A" and one unit of the raw material "B". Each unit of the third product needs one unit of "A" and two units of "B". Finally, each unit of the fourth product requires three units of "B". Due to the transportation and storage constraints, the factory can consume up to one hundred units of the raw material A and ninety units of "B" per day. <p>Formulate LPP.</p>	10
2.	<p>Solve the following LPP using Graphical Approach</p> <p>Minimize: $Z = 5 X_1 + 8 X_2$ Subject to:</p> $3 X_1 + 2 X_2 \geq 3$ $X_1 + 4 X_2 \geq 4$ $X_1 + X_2 \leq 5$ $X_1 \geq 0, X_2 \geq 0$	10



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3.	<p>Find the optimal solution for the given LPP using Big M Method.</p> <p>Minimize: $Z = 3 X_1 + 2 X_2$ Subject to:</p> $2 X_1 + X_2 \leq 2$ $3 X_1 + 4 X_2 \geq 12$ $X_1 \geq 0, X_2 \geq 0$	10																														
4.	<p>Find the initial basic feasible solution of the given transportation problem using North West Corner rule method and Vogel's Approximation method.</p> <table><tr><td></td><td>D1</td><td>D2</td><td>D3</td><td>D4</td><td>Capacity</td></tr><tr><td>S1</td><td>19</td><td>30</td><td>50</td><td>10</td><td>7</td></tr><tr><td>S2</td><td>70</td><td>30</td><td>40</td><td>60</td><td>9</td></tr><tr><td>S3</td><td>40</td><td>8</td><td>70</td><td>20</td><td>18</td></tr><tr><td>Supply</td><td>5</td><td>8</td><td>7</td><td>14</td><td></td></tr></table>		D1	D2	D3	D4	Capacity	S1	19	30	50	10	7	S2	70	30	40	60	9	S3	40	8	70	20	18	Supply	5	8	7	14		10
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5.	<p>Find the optimal solution for the transportation problem given Question 4 using MODI method. Use the initial basic feasible solution of Question 4 obtained by Vogel's Approximation Methods.</p>	10																														
