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B.Tech
Optimization Techniques
Subject Code: UMA 031

Time: 3 Hrs; Max. Marks: 50

1. The materials science division of TIET needs circular metallic plates of diameters 3 c.m. and 6 c.m. to perform experiments on heat treatment studies, and the requirement of these plates are 2000 and 1500, respectively. These are to be cut from parent metallic sheets of dimension $6 \times 15\ cm^2$. Formulate the problem as a Linear Programming Problem so that the minimum number of parent metallic sheets are used. **(Marks 8)**

2. Solve the following L.P.P. by Simplex method **(Marks 8)**
$Min\ z = x_1 - 2x_2 + x_3\ s.t.\ x_1 + 2x_2 - 2x_3 \leq 4,\ x_1 - x_3 \leq 3,\ 2x_1 - x_2 + 2x_3 \leq 2,\ x_1, x_2, x_3 \geq 0.$

3. Use branch and bound method to solve the following L.P.P. **(Marks 8)**
$Max\ z = 3x_1 + 2x_2,\ x_1 \leq 2,\ x_2 \leq 2,\ x_1 + x_2 \geq \frac{7}{2},\ x_1, x_2 \geq 0$ & all are integers.

4. State and proof weak duality theorem. **(Marks 5)**

5. Write Dual of $Max\ x_0 = 3x_1 + 4x_2\ s.t.\ x_1 + 7x_2 \geq 35,\ 2x_1 + 5x_2 \leq 60,\ x_1,\ x_2 \geq 0$. **(Marks 5)**

6. Find the Initial BFS of the following transportation problem (where cost matrix is given) by using north-west corner method: **(Marks 8)**

	D	E	F	G	Available
A	1	3	7	4	250
B	6	8	4	1	250
C	2	4	3	10	350
Demand	150	200	250	250	

7. Solve the following assignment problem by Hungarian method: **(Marks 8)**

	A	B	C	D
I	8	26	17	11
II	13	28	4	26
III	38	19	18	15
IV	19	26	14	10