JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech- VII Semester (ECE)

COURSE CODE (CREDITS): 19B1WEC733(3) MAX. MARKS: 25

COURSE NAME: Optimization Techniques

COURSE INSTRUCTORS: Dr. Alok Kumar MAX. TIME: 1 Hour 30 Minutes

Note: *(a) All questions are compulsory.*

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

Q.No	Question	CO	Marks
Q1	A manufacturer wants to ship 22 loads of his product as shown below. The matrix gives the kilo-meters from sources of supply to the destinations. The shipping cost is Rs 10 per load per km. What shipping schedule should be used in order to minimize the total transportation cost?	CO-2	5
Q2	Explain the concept of a non-degenerate basic feasible solution (BFS) in the context of linear programming. How does it differ from a degenerate basic feasible solution? Why is the distinction between degenerate and non-degenerate BFS important in the simplex method?	CO-2	3
Q.3	Write the dual of the following LP problem Maximize $Z = x_1 - x_2 + 3x_3$, Subject to the constraints (i) $x_1 + x_2 + x_3 \leq 10$, (ii) $2x_1 - x_2 - x_3 \leq 2$ (iii) $2x_1 - 2x_2 - 3x_3 \leq 6$ and x_1 , x_2 , and $x_3 \geq 0$	CO-1	3
Q. 4	A company makes two kinds of leather belts, belt A and belt B. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs 4 and Rs 3 per belt. The production of each of type A requires twice as much time as a belt of type B, and if all belts were of	CO-1	5

Destination

Source	D_1	D_2	D_3	D_4	D_5	Supply
S_1	5	8	6	6	3	8
S_2	4	7	7	6	5	5
S_3	8	4	6	6	4	9
Demand	4	4	5	4	8	25 / 22

	type B, the company could make 1,000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 of these are available per day. There are only 700 buckles a day available for belt B. What should be the daily production of each type of belt? Formulate this problem as an LP model and solve it using the simplex method.		
Q.5	Use penalty (Big-M) method to solve the following LP problem. Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$, Subject to the constraints (i) $x_1 + 2x_2 + 3x_3 = 15$, (ii) $2x_1 + x_2 + 5x_3 = 20$ (iii) $x_1 + 2x_2 + x_3 + x_4 = 10$ and x_1 , x_2 , x_3 and $x_4 \geq 0$	CO-1	5
Q.6	Goods have to be transported from sources S1, S2 and S3 to destinations D1, D2 and D3. The transportation cost per unit, capacities of the sources, and the requirements of the destinations are given in the following table. Determine a transportation schedule using North-West Corner Method so that cost is minimized.	CO-2	4

	D_1	D_2	D_3	*Supply*
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	80
Demand	150	80	50	