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Mid Term Examinations - October 2026

Date: 05/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: MAT4002 **Course Name:** Introduction to Operations Research

Semester: Third Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	92	88

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Define operations research.	2	CO1	BT1
2	What is the Objective of transportation problem?	2	CO2	BT2
3	List the methods used to arrive at an initial basic feasible solution for a transportation model.	2	CO2	BT1
4	Give Outline of Mathematical formulation of LPP .	2	CO1	BT2
5	List any Two applications of Operations Research.	2	CO1	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	a.Mention Phases of Operations Research. b.A manufacturing unit has three products on their production line. The production capacity for each product is 50, 30 and 45 respectively. The limitation in the production shop is that of 300 manhours as total availability and the manufacturing time required per product is 0.5, 1.5 and 2.0 manhours. The products are priced to result in profits of 10, 15 and 20 respectively. If the company has a daily demand of 25 units, 20 units and 35 units for respective products, formulate the problem as LP model so as to maximise the total profit	10	CO1	BT3
7	a.Write the steps involved in solving linear programming problem by using graphical method Solve the following LPP by Graphical Method b.Maximize Z = 5 x + 4 y Subject to the constraints 6x+4y ≤ 24 X+2 y ≤ 6 - x + y ≤ 1 y≤2 and x, y ≥ 0	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	• A and B are two products to be manufactured. Unit profits are ₹ 40 and ₹ 35 respectively. Max. material available is 60 kgs and labour 96 hours. Each unit of A needs 2 kg of material and 3 manhours, whereas each unit of B needs 4 kg of material and 3 manhours. Find optimal level of A and B to be manufactured.	10	CO1	BT3

9	Solve the Following LPP by Graphical Method. Maximize $Z=2X_1+5X_2$ Sto C 1. $X_1<=4$ $X_2<=3$ $X_1+X_2<=8$ $X_1,X_2>=0$	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	• Determine an initial basic feasible solution to the following T.P. using a) North West corner rule Method and b)Least Cost Method From A: I 3, II 4, III 8, IV 8, V 9, Availability 20 From B: I 2, II 10, III 1, IV 5, V 8, Availability 30 From C: I 7, II 11, III 20, IV 40, V 3, Availability 15 From D: I 2, II 1, III 9, IV 14, V 16, Availability 13 Requirement: 40, 6, 8, 18, 6	10	CO2	BT3
11	Find the basic feasible solution of the given transportation problem by applying VAM: Warehouse / Factory: D, E, F, G, Capacity A: 42, 48, 38, 37, 160 B: 40, 49, 52, 51, 150 C: 39, 38, 40, 43, 190 Requirement: 80, 90, 110, 220, 500	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
12	1. A company is spending Rs1000 on transportation of its units from three plants to four distribution centres. The availability of unit per plant and requirement of units per distribution centre, with unit cost of transportation are given as follows: D. Centres / Plants: D1, D2, D3, D4, Availability P1: 19, 30, 50, 12, 7 P2: 70, 30, 40, 60, 10 P3: 40, 10, 60, 20, 18 Requirement: 5, 8, 7, 15 What is the maximum possible saving by optimum distribution?	10	CO2	BT3
13	A company has factories at A, B and C which supply warehouses at D, E, F, and G. The monthly factory capacities are 160, 150 and 190 units, respectively. Monthly warehouse requirements are 80, 90, 110 and 160, respectively. Unit shopping costs (in rupees) are as follows: From / To: D, E, F, G A: 42, 48, 38, 37 B: 40, 49, 52, 51 C: 39, 38, 40, 43 Determine the optimum distribution for this company to minimize shipping costs.	10	CO2	BT3