Unit II

4. A company has three factories (F1, F2, F3) and three warehouses (W1, W2, W3). The supply at each factory and demand at each warehouse is given below :

	W1	W2	W3	Supply
F1	4	8	8	100
F2	16	24	16	200
F3	8	16	24	300
Demand	100	200	300	

Use the North-West Corner Rule or Least Cost Method to find the initial basic feasible solution. Then apply the MODI method to find the optimal solution.

5. A company has 4 tasks to be completed but only 3 employees are available. The time (in hours) each employee takes to complete each task is given in the table below :

No. of Printed Pages : 07 Roll No. .....

55161

M.B.A. (NEP-2020) EXAMINATION, 2026

(Second Semester)

OPTIMIZATION MODELS FOR BUSINESS DECISIONS

Time : 3 Hours] [*Maximum Marks : 70*

Before answering the question-paper, candidates must ensure that they have been supplied with correct and complete question-paper. No complaint, in this regard will be entertained after the examination.

Note : Attempt *Five* questions in all. Part A, comprising of four short answer type questions carrying 3.5 marks each, is compulsory. Part B is comprising of eight questions (two questions from each Unit)

carrying 14 marks each. Attempt four questions selecting *one* question from each Unit.

Part A

1. Explain briefly the following :

(a) How does optimization models support decision-making in complex business problems ?

(b) What is the concept of lead time in inventory management ?

(c) What is the utilization factor in a queueing system ?

(d) What are the advantages of simulation ?

Part B

Unit I

2. Maximize :

$$Z = 5x_1 + 3x_2 + 2x_3$$

Subject to the constraints :

$$2x_1 + x_2 + x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15$$
$$x_1 + 3x_2 + 2x_3 \leq 12$$
$$x_1, x_2, x_3 \geq 10$$

Use the simplex method to find the optimal values of x_1 and x_2

3. Maximize :

$$Z = 4x_1 + 3x_2$$

Subject to the constraints :

$$x_1 + 2x_2 \leq 10$$
$$2x_1 + x_2 \geq 8$$
$$x_1 \leq 6$$
$$x_2 \geq 0$$
$$x_1 \geq 0$$

Solve the problem using the Graphical method. Plot all the constraints on a graph and identify the feasible region. Find the values of x_1 and x_2 that maximize the objective function.

	Task A	Task B	Task C	Task D
Employee 1	9	2	7	8
Employee 2	6	4	3	7
Employee 3	5	8	1	8

Use the Hungarian method to find the optimal assignment such that total time is minimized.

Unit III

6. A project consists of the following activities with their optimistic (O), most likely (M) and pessimistic (P) time estimates in weeks :

Activity	Predecessor	Optimistic (O)	Most Likely (M)	Pessimistic (P)
A	—	2	4	6
B	A	3	5	9
C	A	4	5	6
D	B, C	2	3	4

(a) Calculate the expected time and variance for each activity.

(b) Construct the PERT network diagram.

(c) Determine the critical path and expected project completion time.

7. Explain the Deterministic Inventory Model in inventory management. How does it differ from probabilistic models ?

Unit IV

8. In a two-player game, Player A has the option to play either Strategy X or Strategy Y and Player B has the option to play either Strategy A or Strategy B. The payoffs for each combination of strategies are given below :

	Player B : A	**Player B : B**
Player A : X	3	1
Player A : Y	2	4

(a) Find the mixed strategy Nash equilibrium for this game.

(b) What is the expected payoff for Player A and Player B in the equilibrium ?

9. Explain the concept of the Minimax Regret criterion. How is the regret table constructed, and what does it represent ? How is the Minimax Regret criterion applied to make a decision ?

❖❖❖❖❖❖❖