



1 Use two-phase Simplex method solve to

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

Subject to  $5x_1 + 7x_2 + 4x_3 \leq 7$

$-4x_1 + 7x_2 + 5x_3 \geq -2$

$3x_1 + 4x_2 - 6x_3 \geq 29/7$

$x_1, x_2, x_3$  all  $\geq 0$

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## UNIT - II

2 A product is produced by four factories A, B, C and D. The unit production costs in them are Rs. 2, Rs. 3, Re. 1 and Rs. 5 respectively. Their production capacities are factory A - 50 units, B - 70 units, C - 30 units and D - 50 units. These factories supply the product to four stores, demands of which are 25, 35, 105 and 20 units respectively. Unit transport cost in rupees from each factory to each store is given in a table below :

### Stores

	1	2	3	4
A	2	4	6	11
B	10	8	7	5
C	13	3	9	12
D	4	6	8	3

Determine the extent of deliveries from each of the factories to each of the store so that the total production and transportation cost is minimum.

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### OR

2 (a) A company has a team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesmen and the nature of districts, the company estimates that the profit per day in rupees for each salesman in each district is as below :

### District

	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

Find the assignment of salesmen to various districts which yield maximum profit.

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- (b) State and explain the principle of optimality in reference to the dynamic programming.

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### UNIT - III

- 3 A large steel manufacturing company has three options with regard to production : (i) Produce commercially, (ii) Built pilot plant, (iii) Slope producing steel. The management has estimated that their pilot plant, if built has 0.8 chance of high yield and 0.2 chance of low yield. If the pilot plant does show a high yield, management assignment a probability of 0.75 that the commercial plant will also have a high yield. If the pilot plant shows a low yield, there is only a 0.1 chance that the commercial plant will show a high yield. Finally management's best assessment of the yield on a commercial size - plant without building a pilot plant first has a 0.6 chance of high yield. A pilot plant will cost Rs. 3,00,000. The profits earned under high and low yield conditions are Rs. 1,20,00,000 and Rs. 12,00,000 respectively. Find the optimum decision for the company.

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OR

- 3 (a) What is game theory ? Include in your answer various approaches in solving for strategies and game values.
- (b) Explain cutting plane method in integer programming.
- (c) Write the various steps in decision theory approach.

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### UNIT - IV

- 4 (a) A manufacture has to supply 12,000 units of a product per year to his customer. The demand is fixed and known, and the shortage cost is assumed is to be infinite. The inventory holding cost is Re. 0.20 per unit per month and the setup cost per run is Rs. 350. Determine :
- (i) The optimum run size ( $q_0$ )
- (ii) Optimum scheduling period ( $t_0$ )
- (iii) Minimum total variable yearly cost.
- (b) The demand for a commodity is 100 unit per day. Every time an order is placed, a fixed cost of Rs. 400 is incurred. Holding cost is Re. 0.08 per unit per day. If the lead time is 13 days, determine the economic lot size and the recorder point.

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OR



- 4 (a) Explain deterministic and stochastic inventory models. 8
- (b) If the probability density of demand of a certain items during a week be

$$f(x) = \begin{cases} 0.1, & 0 \leq x \leq 10 \\ 0, & \text{otherwise} \end{cases}$$

this demand is assumed to occur with a uniform pattern over the week. Let the unit carrying cost of the item in inventory be Rs. 2 per week and unit shortage cost be Rs. 8 per week. How will you determine the optimal order level of the inventory?

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### UNIT - V

- 5 (a) What is Simulation ? When to use Simulation ? 5
- (b) Find the value of  $\pi$  experimentally by simulation. 8
- (c) Explain simulation language 'ARENA'. 3

#### OR

- 5 (a) Consider a situation in which the mean arrival rate is one customer every 4 minutes and the mean service time is  $2\frac{1}{2}$  minutes. If the waiting cost is Rs. 5 per unit per minute and the cost of servicing one unit is Rs. 4, find the minimum cost service rate. 6
- (b) A branch of State Bank of India has only one typist. Since the typing work varies in length (number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letter per hour. The letters arrive at a rate of 5 per hour during the entire 8 - hour working day. If the type writer is valued at Rs. 1.50 per hour, determine :
- Equipment utilization
  - The percent time that an arriving letter has to wait
  - Average system time
  - Average cost due to waiting on the part of typewriter.

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