4

5. (a) Solve the following game:

		Player B			
		B1	B2	B3	B4
PlayerA	A1	19	6	7	5
	A2	7	3	14	6
	A3	12	8	18	4
	A4	8	7	13	-1

(b) A garment manufacturer plans to add four regional warehouses to meet the increased demand. Solve the problem for optimal assignment when the following bids (in lacs of Rupees) have been given for the construction of the warehouses: 7,8

		Warehouse		
	A	B	C	D
Contractor 1	30	27	31	39
2	28	18	28	37
3	33	17	29	41
4	27	18	30	43
5	40	20	27	36

6. Write short notes on the following:

(a) Transportation problem as a linear programming model

(b) Dominance and modified dominance in a competitive game

(c) General linear programming problem   5,5,5

Attempt any five questions.

Use of simple calculator is allowed.

1.(a) The following data are available for a firm which manufactures three items A, B and C:

Product	Time required(in hrs.)		Profit
	Assembly	Finishing	
A	10	2	800
B	4	5	600
C	5	4	300
Firm's capacity	2,000	1,009	

(i) Formulate the l.p.p.
(ii) Solve the formulated l.p.p. so as to maximize the profit from production.

(b) Food A contains 20 units of Vitamin X and 40 units of Vitamin Y per gram. Food B contains 30 units each of Vitamin X and Vitamin Y per gram.

The daily minimum human requirements of Vitamin X and Vitamin Y are 900 units and 1200 units respectively. Use the principle of duality to determine how many grams of each type of the food should be consumed so as to minimize the cost if food A costs 60 paisa per gram and food B costs 80 paisa per gram. 7, 8

2. (a) Solve the given the l.p.p. ;

$$\text{Minimize } z = 3x_1 + 6x_2 + x_3$$

subject to the constraints:

$$x_1 + x_2 + x_3 \geq 6$$
$$x_1 + 5x_2 - x_3 \geq 4$$
$$x_1 + 5x_2 + x_3 \geq 24$$
$$x_1, x_2, x_3 \geq 0.$$

Discuss the effect of changing the requirement vector [6, 4, 24] to [6, 2, 12] on the optimum solution.

(b) Use dual simplex method to solve the following problem:

$$\text{Min } Z = 2x_1 + x_2 + 3x_3$$

subject to the constraints:

$$x_1 - 2x_2 + x_3 \geq 4$$
$$2x_1 + x_2 + x_3 \leq 8$$
$$x_1 - x_3 \geq 0$$
$$x_1, x_2, x_3 \geq 0 \qquad 7, 8$$

3. (a) An aircraft uses rivets at an approximately constant rate of 5,000 kgs per year. The rivets cost Rs. 20 per kg and the company purchase manager estimates that it costs Rs. 200 to place an order, and the carrying cost of inventory is 10% per year.

How frequently should orders for rivets be placed and what quantities should be ordered for?
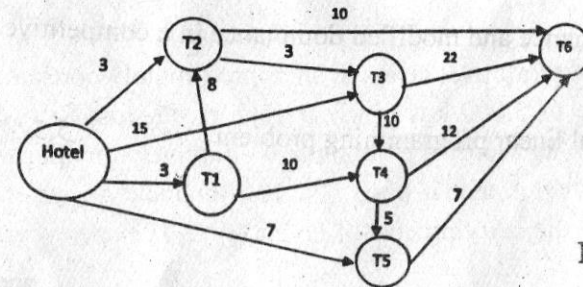
(b) Obtain an expression for the economic order quantity for an inventory model with finite rate of replenishment when shortages are allowed. 7,8

4. (a) A transport company ships truckloads of grains from three warehouses with supply capacity of 25, 25 and 10 truckloads to four mills with the demands of 5, 15, 15 and 15 truckloads respectively. The unit transportation cost per truckload on the different routes is given below:

		Mills		
	1	2	3	4
A	10	2	20	11
B	12	7	9	20
C	4	14	16	18

(Warehouse)

Solve the problem to get the optimal transportation schedule in order to minimize the transportation cost.

(b) In a travel guide map a distance (in miles) from the hotel to all the places of tourist interest (T1 to T6) is given below in network flow diagram. Obtain the shortest route and shortest distance to each tourist place from the hotel. 7,8

P. T. O.