4/131

2005E731

Candidate's Seat No :_____

MBA-1 Sem.-2 Examination

MS

Time : 2-30 Hours] **May-2025** **[Max. Marks : 70**

Instructions:

- This paper contains **FIVE** questions, question No.**2, 3, 4** have internal options.
- Use of a scientific calculator is allowed.

Q:1 Minimise $Z = 4x_1 + x_2$ **(14)**

Subject to,

$$3x_1 + x_2 = 2$$
$$4x_1 + 3x_2 \geq 6$$
$$x_1 + 2x_2 \leq 3$$
and $$x_1, x_2 \geq 0$$

1. Determine the product mix.
2. Write the dual of the above LPP.

Q:2 (a) Write a detailed note on the methods of the transportation problem. **(07)**

Q:2 (b) Discuss the general structure of a queue. **(07)**

OR

Q:2 (a) A steel company has three open-hearth furnaces and five rolling mills. Transportation cost (Rs per quintal) for shipping steel from furnaces to rolling mills are shown in the following table. **(07)**

	M_1	M_2	M_3	M_4	M_5	**Supply**
F_1	4	2	3	2	6	8
F_2	5	4	5	2	1	12
F_3	6	5	4	7	7	14
Demand	4	4	6	8	8	

Calculate IBFS using any method of your choice.

Q:2 (b) ABC Company engages in manufacturing 5 brands of packed snacks. It is having five manufacturing setups, each capable of manufacturing any of its brands one at a time. The cost to make a brand on these setups vary according to the table below: **(07)**

	S_1	S_2	S_3	S_4	S_5
B_1	4	6	7	5	11
B_2	7	3	6	9	5
B_3	8	5	4	6	9
B_4	9	12	7	11	10
B_5	7	5	9	8	11

(P.T.O)

Assuming five setups are S_1, S_2, S_3, S_4 and S_5 and five brands are B_1, B_2, B_3, B_4 and B_5. Find the optimal assignment of products on these setups resulting in the minimum cost.

Q:3 **(a)** WELLTYPE Manufacturing Company produces three types of typewriters: Manual typewriters, Electronic typewriters, and Deluxe Electronic typewriters. All the three models are required to be machined first and then assembled. The times required for the various models are as follows: **(07)**

Type	Machine Time (in hours)	Assembly time (in hours)
Manual typewriter	15	4
Electronic typewriter	12	3
Deluxe Electronic typewriter	14	2

The total available machine time and assembly time are 3000 hours and 1200 hours respectively. The data regarding the selling price and variable costs for the three types are:

	Manual	Electronic	Deluxe
Selling Price (Rs.)	4100	7500	14600
Labour, material and other variable costs (Rs.)	2500	4500	9000

The company sells all the three on credit basis, but will collect the amounts on the first of next month. The labour, material and other variable expenses will have to be paid in cash. This company has a loan of Rs 40,000 from a co-operative bank and this company will have to repay it to the bank on 1st April, 1993. The TNC Bank from whom this company has borrowed Rs 60,000, has expressed its approval to renew the loan.

The Balance Sheet of this company is as follows:

Liabilities	Rs.	Assets	Rs.
Equity Share Capital	150000	Land	90000
Capital Reserve	15000	Building	70000
General Reserve	110000	Plant & Machinery	100000
Profit & Loss a/c	25000	Furniture & Fixture	15000
Long Term Loan	100000	Vehicles	30000
Loan from TNC Bank	60000	Inventory	5000
Loan From Co-op. Bank	40000	Receivables	50000
		Cash	140000
Total	**500000**	**Total**	**500000**

The company will have to pay a sum of Rs 10000 towards the salary for top management executives and other fixed overheads for the month. Interest on long-term loans is to be paid every month at 24% per annum. Interest on loans from TNC and Co-operative Banks may be taken to be Rs 1200 for the month. Also, this company has promised to deliver 2 Manual typewriters and 8 Deluxe Electronic typewriters to one of its valued customers next month.

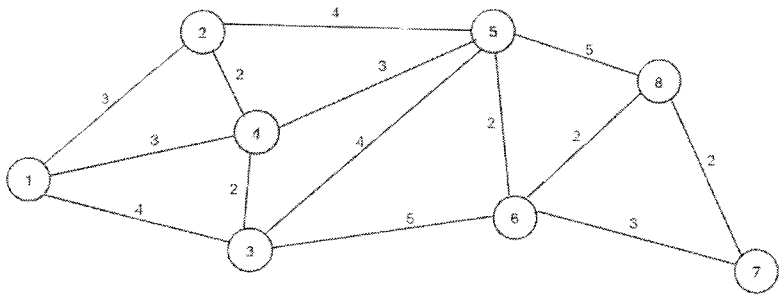
Also, make sure that the level of operations in this company is subject to the availability of cash next month. This company will also be able to sell all three types of typewriters in the market. The Senior Manager of this company desires to know as to how many units of each typewriter must be manufactured in the factory next month so as to maximise the profits of the company.

Formulate this as a linear programming problem. The formulated problem need not be solved.

Q:3 **(b)** Write a detailed note on Hungarian assignment method. **(07)**

OR

Q:3 **(14)**



From the above diagram, find the shortest path from node 1 to node 8.

(P.T.O)

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Q:4 Calculate transition probability from following table and also calculate market share for the next month. **(14)**

Particulars	Starting Customers	Loss			End Customers
		A	B	C	
A	200	0	20	20	220
B	500	35	0	15	490
C	300	25	20	0	290

OR

Q:4 (a) In a bank there is only on window. A solitary employee performs all the service required and the window remains continuously open from 7 am to 1 pm. It has been discovered that the average number of clients is 54 during the day and the average service time is 5 minutes / person. Find **a)** Average number of clients in the system **b)** Average waiting time in the Q **c)** Average number of clients in the Q. **(07)**

Q:4 (b) Use Q:2 (b) and formulate that problem as IPP. **(07)**

Q:5 Answer the following **(14)**

1. Infeasibility & unboundedness in graphical method of LPP
2. Travelling salesman problem v/s assignment problem