



RAN - 2003000205030049

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T.Y.B.Sc. (Sem. V) Examination October - 2023

Computer Science

Operation Research -507-2

सूचना : / Instructions

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नीचे दृष्टवित निशानीवाणी विगतो उत्तरवली पर अवश्य लपवती.

Fill up strictly the details of signs on your answer book

Name of the Examination:

T.Y.B.Sc. (Sem. V)

Name of the Subject :

Computer Science
Operation Research -507-2

Subject Code No.: 2003000205030049

Seat No.:

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Student's Signature

Q-1 Answer the following.

[14]

- 1) Explain the concepts of slack and surplus variables.
- 2) What is objective function?
- 3) Define the concept of a balanced transportation problem.
- 4) Enumerate the distinctions between the assignment problem and the transportation problem.
- 5) Provide a mathematical representation of a Linear Programming Problem (LPP).
- 6) Define Pure strategy.
- 7) Under what conditions can we establish that a game is strictly determinable?

Q-2 Answer the following.(Any two)

[12]

- 1) Solve the following LPP using simplex method.

Max $Z = 5x_1 + 3x_2$ subject to

$$3x_1 + 5x_2 \leq 15$$

$$5x_1 + 2x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

- 2) Solve the following LPP by graphical method.

$$\text{Maximize } Z = 80x_1 + 120x_2$$

$$\text{Subject to } x_1 + x_2 \leq 9$$

$$x_1 \geq 2$$

$$x_2 \geq 3$$

$$20x_1 + 50x_2 \leq 360 \text{ and } x_1, x_2 \geq 0$$

- 3) A farmer has 100 acre farm. He can sell all tomatoes, potatoes or onions he can raise. The price he can obtain is Rs. 1.00 per kg for tomatoes, Rs. 0.75 for potatoes and Rs. 2.00 per kg for onions. The average yield per acre is 2000 kgs of tomatoes, 3000 kgs of potatoes and 1000 kgs of onions. Fertilizer is available at Rs. 0.50 per kg and the amount required per acre is 100 kgs each for tomatoes and potatoes and 50 kgs for onions. Labor required for sowing, cultivating & harvesting per acre is 5 man - days for tomatoes and onions and 6 man - days for potatoes. A total of 400 man - days of labor are available at Rs. 20.00 per man - day. Formulate this problem as LPP.

Q- 3. Answer the following.(Any two).

[14]

- 1) Find the optimal solution of the following assignment problem.

	X	Y	Z
A	30	31	27
B	28	29	26
C	29	30	28
D	28	31	27
E	31	29	26

- 2) Solve the following assignment problem and determine the minimum cost assignment.

		Machines					
Men		I	II	III	IV	V	
	A	31	62	29	42	15	41
	B	12	19	39	55	71	40
	C	17	29	50	41	22	22
	D	35	40	38	42	27	33
	E	19	30	29	16	20	23
	F	72	30	30	50	41	20

3) Find an optimal solution of the following transportation problem:

	A	B	C	D	Supply
I	2	3	11	7	6
II	1	0	6	1	1
III	5	8	15	9	10
Demand	7	5	3	2	

Q-4 Answer the following. (Any two)

[12]

1) The payoff matrix of a game is given. Find the solution of the game to the player A and B.

	B1	B2	B3	B4	B5
A1	-2	0	0	5	3
A2	3	2	1	2	2
A3	-4	-3	0	2	6
A4	5	3	-4	2	6

2) Solve the following game. Find the saddle point of pay off matrix and find the value of the game. Also check the game is fair or not.

	I	II	III	IV
I	-5	2	1	20
II	5	5	4	6
III	4	-2	0	-5

3) Two competitors A and B are competing for the same product. Their different strategies are given in the following payoff matrix.

		Company B		
		A	B	C
Company B	1	8	5	8
	2	8	6	5
	3	7	4	5
	4	6	5	6

Use dominance principle to find the optimal strategies.
