

RAN-2508000605030002

B.Com Data Science (Sem. V) Examination March - 2026
Minor - Optimization Techniques

[Total Marks: 50**સૂચના : / Instructions**

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book

Seat No.:

Student's Signature

Q:1.**Answer the following Short questions (any five)****(10)**

- What is Optimization?
- Define Maximization problem in Optimization.
- What is Linear Programming?
- A factory owner wants to purchase two types of machines A and B. 2 workmen are required on machine A and 3 workmen are required on machine B. According to rules and regulations not more than 18 workmen can be engaged on each day and looking to the availability of space not more than 7 machines can be kept. Profit of Rs. 20 can be earned from machine A and that of Rs. 24 can be earned from machine B. Formulate this maximization problem as a Linear programming problem.
- Give the meaning of Integer Programming.
- Obtain the total transportation cost by matrix minima method for the following transportation problem.

	D ₁	D ₂	Supply
F ₁	28	48	40
F ₂	32	40	60
Demand	56	44	

- Explain the term: Optimum feasible solution.

Q.2. (A)

A person requires three types of chemical A, B and C for his garden.

(08)

The minimum requirements of these chemicals are respectively 10, 12 and 12 units. These chemicals are available in liquid form in jars or in powder form in packets. A jar contains 5, 2 and 1 units of A, B and C respectively. A packet contains 1, 2 and 4 units of A, B and C respectively. The price of a jar is Rs.3 and that of a packet is Rs. 2. Find the number of jars and packets to be purchased so that the cost is minimum and the requirement is fulfilled. Solve the linear programming problem by graphical method.

- (B) Find the initial basic feasible solution for the following transportation problem by Min(Min-Max) method. (06)

Warehouse	Centre				Supply
	C ₁	C ₂	C ₃	C ₄	
A	21	16	25	17	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	10	12	15	43

OR

- Q.2. (A) Solve the following linear programming problem graphically. (07)

Find the minimum value of

$$Z = 3x_1 + 4x_2$$

$$5x_1 + 4x_2 \leq 200,$$

$$3x_1 + 5x_2 \leq 150,$$

$$5x_1 + 4x_2 \geq 100,$$

$$8x_1 + 4x_2 \geq 80$$

$$x_1, x_2 \geq 0$$

- (B) Find the initial basic feasible solution for the following transportation problem by VAM. (07)

	I	II	III	IV	Supply
A	8	9	6	3	19
B	6	11	5	10	12
C	3	8	7	9	14
Demand	15	6	11	13	

- Q.3. (A) Find the maximum value of Objective function $Z = 5x_1 + 8x_2$ subject to the following constraints by using graphical method. (08)

$$x_1 \leq 4, x_2 \geq 2, 2x_1 + 3x_2 \geq 12, 2x_1 - x_2 \geq -2, -3x_1 + 4x_2 \leq 12, x_1, x_2 \geq 0$$

- (B) Find the initial basic feasible solution for the following transportation problem by Max (Min-Max) method. (06)

Factory	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	20	18	22	13	10
O ₂	10	20	17	24	9
O ₃	19	17	18	12	11
Demand	10	7	8	5	

OR

- Q.3. (A) Solve the following assignment problem to minimize the total cost. (07)

Job	Worker				
	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	55	80	80	110
E	55	35	70	80	105

(B) Solve the following assignment problem to minimize the total cost.

(07)

Works	Persons			
	A	B	C	D
1	24	6	15	9
2	4	4	11	26
3	13	17	13	16
4	8	10	80	12
5	15	17	10	10

Q-4. Write short notes on: (Any three)

(12)

1. Give the mathematical formulation of LPP and State its assumptions.
 2. Explain the applications of LPP.
 3. Give the mathematical formulation of TP and Describe the matrix minima method for solving TP.
 4. Explain the Vogel's Approximation method for finding IBFS in TP.
 5. Describe the Hungarian method for solving AP.
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