



Seat No. \_\_\_\_\_

**HP-010-1022001**  
**Post Graduate Diploma in Hospital**  
**Management (Sem.-II) (CBCS) Examination**  
**April - 2023**  
**Operations Research**

**Faculty Code : 010**

**Subject Code : 1022001**

Time :  $2\frac{1}{2}$  Hours / Total Marks : 70

**1** Answer the following questions: (Any **Seven**) **14**

- (1) What is Operation Research?
- (2) State the features of O.R.
- (3) Explain in detail the modeling in O.R.
- (4) Explain the advantages and limitations of O.R.
- (5) List the properties of LP problems.
- (6) Explain in detail: General solution methods for O.R. models.
- (7) Discuss about the components of Linear Programming Problem.
- (8) What is Linear Programming Problem? Discuss about the basic assumptions in LPP.
- (9) State the standard form of LPP.
- (10) State the structure of transportation problem.

**2** Answer the following questions: **14**

- (1) Explain in detail the types of LPP's.
- (2) Explain in detail properties of LP - Models.

**OR**

**2** Answer the following questions: **14**

- (1) Explain the steps for formulating LPP's.
- (2) Formulate the following allocation problem into LPP:

A manufacturer produces two types of models M and N each M model requires 4 hours grinding and 2 hours for polishing whereas each N model requires 2 hours of grinding and 5 hours for polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hrs a week and each polisher's works for 60 hrs a week. Profit on an M model is 3 Rs. and on an N model is 4 Rs. whatever is produced in a week sold in the market. How should the manufacturers allocate this production capacity to the two types of models? So that he may make the maximum profit in a week?

**3** Answer the following questions: **14**

- (1) Formulate the following problem into LPP:

Firm manufacturer 3 products A, B and C. The profits are 3 Rs. 2 Rs. and 4 Rs. respectively. The firm has two machines M1 and M2 below is the required time in minutes for each machine on each product.

Products			
	A	B	C
M1	4	3	5
M2	2	2	4

Machines M1 and M2 have 2000 and 2500 machine minutes respectively. The firm must manufacture 100A's, 200B's and 50C's but not more than 150A's. Set up an LPP to maximize profit.

- (2) Write the Steps for solving LPP by Simplex method.

**OR**

**3** Answer the following questions: **14**

- (1) Explain the Simplex method for solving LPP through algorithm.
- (2) Solve the following Transportation problem using Least cost method.

		Destination				
		A	B	C	D	Supply
Source	1	3	1	7	4	250
	2	2	6	5	9	350
	3	8	3	3	2	400
	Demand	200	300	350	150	1000

4 Answer the following questions: 14

- (1) Solve the following Transportation problem using Vogel's approximation method.

	A	B	C	D	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	250	350	400	200	1200

- (2) Solve the following Transportation problem using North-West corner method.

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

**OR**

4 Answer the following questions: 14

- (1) Solve the following Assignment problem and find the minimum cost.

	J <sub>1</sub>	J <sub>2</sub>	J <sub>3</sub>
A	26	23	27
B	23	22	24
C	24	20	23

- (2) Solve the following Assignment problem and find the minimum cost.

	J <sub>1</sub>	J <sub>2</sub>	J <sub>3</sub>	J <sub>4</sub>
A	2	3	5	3
B	10	7	13	14
C	3	2	1	10
D	3	5	4	6

**5** Answer the following questions : **14**

- (1) Solve the following LPP by Simplex method:

$$\text{Minimize } Z = x_1 - 3x_2 + 3x_3$$

Subject to

$$3x_1 - x_2 + 2x_3 \leq 7$$

$$2x_1 + 4x_2 \geq -12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

and

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

- (2) Solve the following LPP by simplex method

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

Subject to

$$x_1 + x_2 \leq 40$$

$$x_1 - x_2 \leq 20$$

and

$$x_1, x_2 \geq 0.$$

**OR**

**5** Answer the following questions: **14**

- (1) Solve the following LP problem by Graphical method.

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to

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

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

and

$$x_1, x_2 \geq 0.$$

- (2) A new automobile vehicle costs Rs.10000 and it can be sold at the end of any year with the selling price as shown. The operating and maintenance cost table. Find when the automobile vehicle needs to be replacing because of wear and tear.

Year	1	2	3	4	5	6
Scrap value	7000	5000	3000	2000	1000	500
Maintenance cost	1000	1600	1800	2500	3000	3500

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