DBW-010-1022001 Seat No. _____

Post Graduate Diploma in Hospital Management (Sem. II) (CBCS) Examination

July - 2022

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) State the features of Operation Research.

(2) Explain in detail the modeling in Operation Research.

(3) State the standard form of LPP.

(4) What is transportation problem?

(5) Discuss about the components of Linear Programming Problem.

(6) Explain the advantages and limitations of Operation Research.

(7) List the types of transportation problems.

(8) What is Operation Research?

(9) What is assignment problem?

(10) State the structure of transportation problem.

2 Answer the following questions : **14**

(1) A company manufactures two types of boxes, corrugated and ordinary cartons. The boxes undergo two major processes: cutting and pinning operations. The profits per unit are Rs. 6 and Rs. 4 respectively. Each corrugated box requires 2 minutes for cutting and 3 minutes for pinning operation, whereas each carton box requires 2 minutes for cutting and 1 minute for pinning. The available operating time is 120 minutes and 60 minutes for cutting and pinning machines. Determine the optimum quantities of the two boxes to maximize the profits using graphical method. Discuss diagnosis of poison.

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

	J_1	J_2	J_3
A	26	23	27
B	23	22	24
C	24	20	23

OR

2 Answer the following questions : **14**

(1) Explain in detail the types of LPP's.

(2) Formulate the following problem into LPP :
Firm manufactures 3 products A, B and C. The profits are Rs. 3, Rs. 2 and Rs. 4 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 100 A's, 200 B's and 50 C's but not more than 150 A's. Set up an LPP to maximize profit.

3 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 Assignment problem and find the minimum cost.

	J_1	J_2	J_3	J_4
A	2	3	5	3
B	10	7	13	14
C	3	2	1	10
D	3	5	4	6

OR

3 Answer the following questions : **14**

(1) Explain in detail properties of LP - Models.

(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 works for 60 hrs. a week. Profit on an M model is Rs. 3, and on an N model is Rs. 4. 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?

4 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
	1	3	1	7	4	250
Source	2	2	6	5	9	350
	3	8	3	3	2	400
	Demand	200	300	350	150	1000

OR

4 Answer the following questions : 14

(1) Solve the following LPP by Simplex method :

Minimize $Z = x_1 - 3x_2 + 3x_3$

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

$2x_1 + 4x_2 \geq -12$

$-4x_1 + 3x_2 + 8x3 \leq 10$

and

$x_1, x_2, x_3 \geq 0.$

(2) Solve the following LP problem by Graphical method.

Maximize $Z = 5x_1 + 3x_2$

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

$5x_1 + 2x_2 \leq 10$

and

$x_1, x_2 \geq 0.$

5 Answer the following questions : 14

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

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

(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 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

OR

5 Answer the following questions : 14

(1) Solve the following LPP by simplex method

Maximize $Z = 3x_1 + 2x_2$

Subject to $x_1 + x_2 \leq 40$

$x_1 - x_2 \leq 20$

and $x_1, x_2 \geq 0$

(2) Explain the steps for formulating LPP's.