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5 SEM BCA (CBCS) OR 5-2

2019

(December)

COMPUTER APPLICATION

Paper : 5-2

(Operations Research)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. (a) Mention two definitions of Operations Research. 2
- (b) Write briefly about the origin and history of Operations Research. 3
- (c) State the advantages of using Operations Research model. 3
- (d) Write the limitations of L.P.P. 4

↳ Complex
↳ unobj
↳ Linear

Contd.

State the assumptions in formulating a linear programming problem.

4

2. (a) What is model formulation? Explain the procedure for converting the Vitamin Requirement problem to a Linear programming problem.

2+4=6

- (b) Solve the following LPP by using graphical method : **(any one)**

6

(i) Max $Z = 100x_1 + 40x_2$

Subject to, $5x_1 + 2x_2 \leq 1000$

$3x_1 + 2x_2 \leq 900$

$x_1 + 2x_2 \leq 500$

$x_1, x_2 \geq 0$

Or

(ii) Min $Z = 3x_1 - 2y$

Subject to $-2x_1 + 3y \leq 9$

$x_1 - 5y \geq -20$

$x_1, y \geq 0$

3. (a) Solve the following LPP by using Simplex Method.

7

Max $Z = 3x_1 + 2x_2 + 5x_3$

Subject to, $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

$x_1, x_2, x_3 \geq 0$

- (b) What is duality? Explain how a primal problem can be converted to its dual form.

2+3=5

Or

Show mathematically that dual of a dual problem is the primal problem.

5

4. (a) Write the dual of the following problem.

4

Min $Z = 2x_1 + x_2 + 3x_3$

Subject to, $2x_1 + x_2 \leq 50$

$x_2 + x_3 \geq 20$

$2x_1 + 3x_2 + 4x_3 = 100$

$x_1, x_2, x_3 \geq 0$

- (b) Explain the concept of unbalanced transportation problem.

3

Or

Explain the concept of Non-degenerate solution in transportation problem.

- (c) For the following transportation problem. Find the initial basic feasible solution. 5

(You can use North-west corner or LCM)

Origin \ Destination					Supply
	D_1	D_2	D_3	D_4	↓
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Demand →	6	10	15	4	

5. (a) Find the initial basic feasible solution for the above problem [Q. No. 4(c)] using Vogels Approximation Method. And perform U-V test to check whether the solution is optimum or Not. 15

$$6+6=12$$

Or

Explain the MODI method in details by taking your own example. 12