Roll No. | | | | | | | | | | | | | **Total No. of Pages :02**

Total No. of Questions : 07

M.Sc.Mathematics (Sem.-4)

OPERATIONS RESEARCH

Subject Code :MSM-503-18

M.Code :77873

Date of Examination : 08-07-22

Time : 3 Hrs. **Max. Marks :70**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of FIVE questions carrying TWO marks each.**
2. **SECTION - B &C have THREE questions each.**
3. **Attempt any FOUR questions from SECTION B& C carrying FIFTEEN marks each.**
4. **Select atleast TWO questions from SECTION - B &Ceach.**

SECTION-A

1. Answer the following :

a) Define Basic Feasible Solution.

b) Write economic interpretation of duality.

c) Write Mathematical form of Transportation problem.

d) Write KT conditions for constrained programming problems.

e) State Complementary Slackness problem.

SECTION-B

2. Use Big M method to solve :

Minimize $z = 8x_2$

Subject to $x_1 - x_2 \geq 0$; $2x_1 + 3x_2 \leq 6$; x_1, x_2 unrestricted

3. Use Dual Simplex method to solve :

Maximize $z = -2x_1 - x_2$

Subject to $3x_1 + x_2 \geq 3$; $4x_1 + 3x_2 \geq 6$; $x_1 + 2x_2 \geq 3$; $x_1, x_2 \geq 0$

4. a) How does a change in cost vector affects optimal solution of the given problem? Discuss in detail.

b) Discuss the effect of changing the right hand side vector on optimality of the given problem.

SECTION-C

5. A manufacturing company has four zones A, B, C, D and four Sales Engineers P, Q, R, S respectively for assignment. Since the zones are not equally rich in sales potential, it is estimated that a particular engineer operating in a particular zone will bring the following sales:

Zone A: 4,20,000; Zone B: 3,36,000; Zone C: 2,94,000; Zone D: 4,62,000

The engineers are having different sales ability. Working under the same conditions their yearly sales are proportional to 14,9,11 and 8 respectively. The criteria of maximum expected total sales is to be met by assigning the best engineer to the richest zone, the next best to the second richest zone and so on.

6. Use Wolfe's method to solve the Quadratic Programming Problem

Minimize $z = 2x_1 + 3x_2 - 2x_1^2$

Subject to $x_1 + 4x_2 \leq 4$; $x_1 + x_2 \leq 2$; $x_1, x_2 \geq 0$

7. Use Kuhn Tucker conditions to solve the following non-linear programming problems.

Minimize $z = 2x_1^2 + 12x_1x_2 - 7x_2^2$

Subject to $2x_1 + 5x_2 \leq 98$; $x_1, x_2 \geq 0$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.