7. Use Wolfe's method to solve the quadratic programming problem : **15**

Maximize $Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

subject to the constraints

$$x_1 + 2x_2 \leq 2 \text{ and } x_1, x_2 \geq 0.$$

Unit IV

8. Determine the value of y_1, y_2 and y_3 so as to : **15**

Maximize $Z = y_1y_2y_3$

subject to the constrains

$$y_1 + y_2 + y_3 = 5$$

$$y_1, y_2, y_3 \geq 0.$$

9. Explain the concept of dynamic programming and the relation between 'dynamic' and 'linear' programming problems.

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OPTIMIZATION TECHNIQUES

ST-303 & ST-304 Opt (i)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) Define optimal solution. **2**

(b) Explain the primal-dual relationship. **4**

(c) What is non-linear programming ? **2**

(d) What is mixed integer programming problem ? **2**

(e) Give an example of geometric programming problem ? **2**

(f) How does a quadratic programming problem differ from a linear programming problem ? **2**

(g) Define the "return function" in dynamic programming. **1**

Unit I

2. Solve the following LPP using two-phase simplex method : **15**

Max. $Z = 2X - Y + Z$

Subject to $X + Y - 3Z \leq 8$

$4X - Y + Z \geq 2$

$2X + 3Y - Z \geq 4$

$X, Y, Z \geq 0.$

3. Solve the following LPP using revised simplex method : **15**

Max $Z = 3X + 5Y$

Subject to $X \leq 4$

$Y \leq 6$

$3X + 2Y \leq 18$

$X, Y \geq 0.$

Unit II

4. Solve the following IPP using Gomory's algorithm : **15**

Max $Z = X + Y$

Subject to $3X + 2Y \leq 5$

$Y \leq 35$

$X, Y \geq 0$ and integers.

5. (a) Solve the following non-linear programming problem : 7

Optimize $Z = 4X^2 + 2Y^2 + Z^2 - 4XY$

Subject to $X + Y + Z = 15$

$2X - Y + 2Z = 20$

$X, Y, Z \geq 0$

(b) Write the Kuhn-Tucker conditions for the following problem : **8**

Min $Z = X^2 + Y^2 - Z^2$

Subject to $2X + Y \leq 5$

$X + Z \leq 2$

$-X \leq -1$

$-Y \leq -2$

$-Z \leq -0$

$X, Y, Z \geq 0$

Unit III

6. When $n = k + 1$, solve the following problem : **15**

Minimize $Z = 7x_1x_2^{-1} + 3x_2x_3^{-2} + 5x_1^{-3}x_2x_3 + x_1x_2x_3$

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

by Geometric programming method.