# JJ343

## Dual Degree-B.Sc. (Hons.) Mathematics-M.Sc.

## Mathematics EXAMINATION, 2020

(Tenth Semester)

(B Scheme) (Re-appear)

(B.Sc. (Hons.) M.Sc. (Mathematics))

MAT616H

OPTIMIZATION TECHNIQUES

*Time :* 2½ *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

**Note** : Attempt *Four* questions in all. All questions carry equal marks.

**1.** Solve the following integer linear programming problem using cutting plane method :

Subject to Constraints :

$$2x_1 + 20x_2 + 4x_3 \leq 15$$

$$6x_1 + 20x_2 + 4x_3 = 20$$

$$x_1, x_2, x_3 \geq 0 \text{ and are integers.}$$

**2.** (a) What do you mean by goal programming ? Write the difference between linear programming problem and goal programming problem.

(b) Solve the given goal programming problem by graphical method :

Min. $z = P_1 d_1^- + 2P_2 d_2^- + P_2 d_3^- + P_3 d_1^+$

Subject to $x_1 + x_2 + d_1^- - d_1^+ = 450$

$x_1 + d_2^- = 250, \quad x_2 + d_3^- = 350$

$x_1, x_2, d_1^-, d_2^-, d_3^-, d_1^+ \geq 0$

**3.** Determine the value of $\mu_1$, $\mu_2$ and $\mu_3$ so as to :

Max. $z = \mu_1.\mu_2.\mu_3$

Subject to constraints :

$$\mu_1 + \mu_2 + \mu_3 = 10$$

$$\mu_1, \mu_2, \mu_3 \geq 0$$

**4.** Max. $z = x_1^2 + x_2^2 + x_3^2$

Subject to : $x_1 + x_2 + x_3 \geq 15$

and $x_1, x_2, x_3 \geq 0$

**5.** Determine $x_1$ and $x_2$ so as to :

Max. $z = 12x_1 + 21x_2 + 2x_1x_2 - 2x_1^2 - 2x_2^2$

Subject to the constraints :

$x_2 \leq 8,\ x_1 + x_2 \leq 10,\ x_1, x_2 \geq 0.$

**6.** Solve the given non-linear programming problem by using Lagrange's multiplier method :

Min. $z = x_1^2 + x_2^2 + x_3^2$

Subject to the constraints :

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

$$5x_1 + 2x_2 + x_3 = 5$$

and $x_1, x_2 \geq 0$

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

Max. $z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1.x_2 - 2x_2^2$

Subject to the constraints : $x_1 + 2x_2 \leq 2$

and $x_1, x_2 \geq 0$

**8.** Explain the concept, formulation and solution of Geometric and Stochastic Programming Problems.