K-448

MT-605

MATHEMATICAL PROGRAMMING-I

MA/MSC Mathematics (MAMT/MSCMT)

3rd Semester Examination, 2023 (Dec.)

Time : 2 Hours]   **[Max. Marks : 35**

Note : This paper is of Thirty Five (35) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nine and Half (9½) marks each. Learners are required to answer any Two (02) questions only.

$(2 \times 9\frac{1}{2} = 19)$

1. Discuss the Necessary and Sufficient condition for Saddle Point in Non-Linear Programming Problems.

2. Find the optimum integer solution to the following LPP :
   Maximize $Z = x_1 + 4x_2$ subject to the constraints :
   $2x_1 + 4x_2 \leq 7$, $5x_1 + 3x_2 \leq 15$; $x_1, x_2 \geq 0$.

3. Use Branch and Bound Method to solve the following LPP :
   Maximize $Z = 7x_1 + 9x_2$ subject to the constraints :
   $-x_1 + 3x_2 \leq 6$, $7x_1 + x_2 \leq 35$, $x_2 \leq 7$, $x_1, x_2 > 0$, and are integers.

4. Discuss the procedure of Revised Simplex Method.

5. Solve the Non-Linear Programming Problem :
   Optimize $Z = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$ subject to the constraints :
   $x_1 + x_2 + x_3 = 15$, $2x_1 - x_2 + 2x_3 = 20$.

SECTION–B
(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Four (04) marks each. Learners are required to answer any Four (04) questions only. (4×4=16)

1. Write short notes on :
   (i) Hyperplane.
   (ii) Convex function.

2. Obtain the set of necessary conditions for the non-linear programming problem :

   Maximize $Z = x_1^2 + 3x_2^2 + 5x_3^2$ subject to the constraints :

   $x_1 + x_2 + 3x_3 = 2,\ 5x_1 + 2x_2 + x_3 = 5,\ x_1, x_2, x_3 > 0.$

3. What are saddle points? How these points are useful in Non-Linear Programming Problems?

4. Discuss various applications of Non-Linear Programming Problems.

5. How will you define :
   (i) Quadratic forms.
   (ii) Lagrangian function.

6. What is Branch and Bound technique?

7. Discuss the concept of Bounded Variables and its importance.

8. Write a short note on Integral Programming.