A–134

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MT–605

M.A./M.Sc. MATHEMATICS (MAMT/MSCMT)

(Mathematical Programming–I)

3rd Semester Examination, 2024 (June)

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) 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) 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Discuss the procedure of Revised Simplex Method.

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 :

$$-x_1 + 3x_2 \leq 6$$

$$7x_1 + x_2 \leq 35$$

$$x_2 \leq 7,\ x_1, x_2 \geq 0$$

   and are integers.

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

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) 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

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 :

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

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

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

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.

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