Roll No. ------------------

**MAMT-10**

**Mathematical Programming**

MA/M.Sc. Mathematics (MAMT/MSCMT)

2ndYear Examination2024 (Dec.)

**TIME: 2 Hours 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**

**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. (2×19=38)**

1. Show that a hyperplane is a closed set.
2. Explain the steps involved in Dynamic Programming with an example of a shortest path problem.
3. Solve the following Nonlinear Programming Problem using the Lagrange Multiplier Method:
4. A company produces two products and . The profit per unit is and respectively. Each unit of requires hours of labor and unit of raw material, while requires hour of labor and units of raw material. The company has labor hours and units of raw material available. Formulate this as a Linear Programming Problem and solve using the Simplex Method.
5. Solve the following Nonlinear Programming Problem using Lagrange Multipliers:

**SECTION – B**

**Short – answer – type questions**

**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.* (4×8=32)**

1. Show that a linear function is convex as well as concave.
2. Define Linear Programming Problem (LPP) and explain its assumptions.
3. Obtain the set of necessary condition for the non-linear programming problem:
4. Explain the Kuhn-Tucker Conditions and their application in Nonlinear Programming.
5. Show that is a convex function.
6. State the advantages and disadvantages of the Simplex Method.
7. Prove that the set of all optimum solutions (global maximum) of general convex programming problem is a convex set.
8. Define the following
9. Branch and Bound Method.
10. Dynamic Programming.
11. Simplex Method.
12. feasible solution, basic feasible solution, and optimal solution