K-453

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MT-610

MATHEMATICAL PROGRAMMING-II

MA/MSC Mathematics (MAMT/MSCMT)

4th 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. (2×9½=19)

1. Solve the following NLPP using the Kuhn-Tucker conditions

Minimize z $= -\log x_1 - \log x_2$

Subject to constraints $x_1 + x_2 \leq 2,$

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

2. Use Beal's method to solve the following quadratic problem

Minimize z $= 2x_1 + 3x_2 - 2x_2^2$

Subject to constraints $x_1 + 4x_2 \leq 4,\ x_1 + x_2 \leq 2,$

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

3. Using Bellman's principle of optimality solve the dynamic problem

Minimize z $= y_1 + y_2 + \ldots + y_n$

Subject to constraints $y_1 . y_2 . \ldots . y_n = b,$

$y_i \geq 0;\ i = 1,2, \ldots, n$

4. Discuss Convex Separable programming also write its algorithm.

5. Use dynamic programming to solve the following LPP

Maximize z $= 3x_1 + 5x_2$

Subject to constraints $x_1 \leq 4$

$x_2 \leq 6$

$3x_1 + 2x_2 \leq 18$

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

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 recursive relations using dynamic programming to the problem

Maximize $z = x_1 x_2 x_3$

$x_1 + x_2 + x_3 = 5$

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

2. Write four differences between dynamic programming and linear programming problem.

3. Write applications of dynamic programming.

4. Give a general framework for Kuhn-Tucker conditions (necessary conditions) in a non linear programming problem.

5. Write algorithm for Wolfe's method to solve quadratic programming problem.

6. Write recursive relations using dynamic programming to the problem

Maximize $z = x_1^2 + x_2^2 + x_3^2 + x_4^2$

Subject to constraints $x_1 x_2 x_3 x_4 = 16$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0\ x_4 \geq 0.$

7. State Bellman's optimality principle.

8. Give a general framework for Kuhn-Tucker conditions (sufficient conditions) in a non linear programming problem.
