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MT-610

Mathematical Programming-II

MA/MSC Mathematics (MAMT/MSCMT)

4th Semester Examination, 2022 (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.

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

Maximize $z = 2x_1^2 - 7x_2^2 + 12x_1x_2$

Subject to $2x_1 + 5x_2 \leq 98,$

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

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

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

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

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

3. Using Bellman's principle of optimality,

Minimize $z = y_1^2 + y_2^2 + \ldots y_n^2$

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

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

4. Solve the following LPP by dynamic programming

Maximize $z = 2x_1 + 5x_2$

Subject to constraints $2x_1 + x_2 \leq 430,$

$2x_2 \leq 460,$

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

5. Discuss Convex Separable programming also write its algorithm.

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. Give the characteristics of dynamic programming problems.

2. State Bellman's optimality principle.

3. 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 $x_1 x_2 x_3 x_4 = 16$

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

4. Write four applications of dynamic programming problem.

5. Write a short note on duality in quadratic programming.

6. Give a general framework for constrained non linear programming problem.

7. Write algorithm for Beal's method to solve quadratic programming problem.

8. Define the following :

(a) Separable function.

(b) Convex programming problem.