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MT-610

Mathematical Programming-II

MA/MSC Mathematics (MAMT/MSCMT)

4th Semester Examination, 2023 (June)

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 $z = 7x_1^2 + 5x_2^2 - 6x_1$

Subject to constraints $x_1 + 2x_2 \leq 10$,

$x_1 - 3x_2 \leq 9$,

$x_1 \geq 0$, $x2 \geq 0$.

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

Maximize $z = 4x_1 + 6x_2 - x_1^2 - 3x_2^2$

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

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

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

Minimize $z = y_1 + y_2 + ... + y_n$

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

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

4. Solve the following LPP by dynamic programming

Maximize $z = 50x_1 + 100x_2$

Subject to constraints $10x_1 + 5x_2 \leq 2500$,

$4x_1 + 10x_2 \leq 2000$

$x_1 + 1.5x_2 \leq 450$

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

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. State Bellman's optimality principle.

2. Write recursive relations using dynamic programming to the problem

Maximize $z = x_1x_2x_3$

$x_1 + x_2 + x_3 = 5$

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

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

4. Write a short note on dynamic programming and its applications.

5. Give a general framework for Kuhn-Tucker conditions in a non linear programming problem.

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

7. Minimize $z = y_1^2 + y_2^2 + y_3^2$,

Subject to constraints $y_1 + y_2 + y_3 \geq 15$

$y_1, y_2, y_3 \geq 0$

8. Use dynamic prograrnming to solve the following LPP

Maximize $z = 3x_1 + 5x_2$

Subject to constraints $x_1 \leq 4$

$x_2 \leq 6$

$3x_1 + 2x_2 \leq 18$

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