



# उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल )

## M.A./M.Sc. Mathematics ASSIGNMENT-FIRST YEAR

Last date of Submission: 15/05/2014

(जमा करने की अन्तिम तिथि: 15/05/2014.)

Course Title: Mathematical Programming

Course Code: - M.A. /M.Sc . MAT 510

Year: 2013-14

Maximum Marks: 40

Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answers 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

Briefly discuss the following:

- 1- Prove that a hyper plane is a closed set?
- 2- What are artificial variables and when they are used?
- 3- Solve the following L.P.P.

$$\text{Minimize } Z = 9x_1 + 10x_2$$

$$\text{& t. } x_1 \leq 9, x_2 \leq 8$$

$$4x_1 + 3x_2 \leq 40, x_1 \geq 0, x_2 \geq 0 \text{ and}$$

Both are integers.

- 4- Distinguish between pure and mixed integer programming.
- 5- Write the quadratic form in the form  $X^T AX$   
 $2x_1^2 - 6x_1 x_2 + x_1 x_3 + 2x_2^2 + 6x_2 x_3 - 5x_3^2$
- 6- What are the Kuhn – Tucker conditions and how are they of fundamental importance in the theory of nonlinear programming.
- 7- Solve the following convex separable programming problems:

$$\text{Max. } z = 2x_1 - x_1^2 + x_2$$

$$\text{Such that } 2x_1 + 3x_2 \leq 6$$

$$2x_1 + x_2 \leq 4 \text{ and } x_1, x_2 \geq 0$$

- 8- Solve the following L.P.P. using dynamic programming:

$$\text{Max } z = 3x_1 + x_2$$

$$\text{Subject to } 2x_1 + x_2 \leq 6$$

$$x_1 \leq 2, x_2 \leq 4$$

$$\text{And } x_1, x_2 \geq 0$$

**Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.**

भाग ख में चार दीर्घ उत्तरीय प्रश्न दिये गये हैं इनमें से केवल दो प्रश्नों के उत्तर देने हैं। प्रत्येक प्रश्न के लिए दस अंक निर्धारित हैं ।

1- Solve the following L.P.P. using revised simpler method.

$$\max Z = 2x_1 + x_2 + 3x_3 + 7x_4$$

$$\&.T. 2x_1 + 3x_2 - x_3 + 4x_4 \leq 40$$

$$- 2x_1 + x_2 + 5x_3 - x_4 \leq 35$$

$$x_1 + x_2 - x_3 + 3x_4 \leq 100$$

$$x_1 > 1, x_2 > 2, x_3 > 3 \text{ and } x_4 > 4$$

2- Use Branch and Bound method to solve the folling I.P.P.

$$\max Z = x_1 + x_2 \quad \&.T. \quad x_1 + x_2 \leq 7$$

$$2x_1 \leq 11, 2x_2 \leq 7 \quad x_1, x_2 < 0 \text{ and are integens.}$$

3- State Necessary an sufficient condition for General non linear programming problem.

4- IF  $F(x)$  is a concave function than give the dual of the following quadratic programming problem:

$$\max f(x) = CTx + 1x$$

$$\text{subject to } AX \leq b$$

$$X < 0.$$