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THE OPEN UNIVERSITY OF SRI LANKA

B.Sc/B.Ed Degree Programme

Applied Mathematics – Level 05

ADU5300 – Linear Programming

NO BOOK TEST (NBT) – 2023/24

DURATION: ONE (01)–HOUR

Date: 25.08.2023. **Time: 02.30 p.m.- 03.30 p.m.**

ANSWER **ALL** QUESTIONS

1. Consider the following Linear Programming Problem (LPP).

$$Maximize\ Z = 4x_1 + 3x_2$$

$$Subject\ to\quad x_1 + x_2 \leq 50$$

$$x_1 + 2x_2 \geq 80$$

$$3x_1 + 2x_2 \geq 140$$

$$x_1, x_2 \geq 0$$

a) Write down the above LPP in the standard form. (10 points)

b) Solve the problem written in part a) above using the **Big M method**. (40 points)

2. a) Write down the **dual problem** of the following linear programming primal problem?

$$Minimize\ Z = x_1 - 3x_2 + 7x_3$$

$$Subject\ to\quad 2x_1 + x_2 + 5x_3 \geq 8$$

$$3x_1 + x_2 - 7x_3 \leq 7$$

$$x_1 - 4x_2 + 2x_3 = 5$$

$$x_1, x_2 \geq 0\ , x_3 - unrestricted$$

(15 points)

b) Solve the following linear programming problem using the **Dual Simplex method**.

$$Minimize\ Z = 10x_1 + 6x_2 + 2x_3$$

$$Subject\ to\quad -x_1 + x_2 + x_3 \geq 1$$

$$3x_1 + x_2 - x_3 \geq 2$$

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

(35 points)

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