00227

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc/B.Ed Degree Programme
Applied Mathematics – Level 05
ADU5300 – LINEAR PROGRAMMING
NO BOOK TEST (NBT) – 2024/2025
DURATION: ONE (01)–HOUR

Date: 05.10.2024. **Time: 01.00 p.m.- 02.00 p.m.**

ANSWER **ALL** QUESTIONS

1. Solve the following linear programming problem using **Big M method**.

$$\begin{aligned} \textit{Minimize} \quad & Z = 7x_1 + 15x_2 + 20x_3 \\ \textit{subject to} \quad & 2x_1 + 4x_2 + 6x_3 \geq 24 \\ & 3x_1 + 9x_2 + 6x_3 \geq 30 \\ & x_1, x_2, x_3 \geq 0 \end{aligned}$$

(40 points)

2. a) What is the **dual problem** of the following linear programming problem?

$$\begin{aligned} \textit{Minimize } Z = & \; 3x_1 + 5x_2 - x_3 + 2x_4 - 4x_5 \\ \textit{subject to} \quad & x_1 + x_2 + x_3 + 3x_4 + x_5 \leq 6 \\ & -x_1 - x_2 + 2x_3 + x_4 - x_5 \geq 3 \\ & x_1, x_2, x_3, x_4, x_5 \geq 0 \end{aligned}$$

(20 points)

b) Consider the following linear programming problem.

$$\begin{aligned} \textit{Minimize } Z = & \; 3x_1 + x_2 \\ \textit{subject to} \quad & x_1 + x_2 \geq 1 \\ & 2x_1 + 3x_2 \geq 2 \\ & x_1, x_2 \geq 0 \end{aligned}$$

Solve the problem using the **Dual Simplex method**. (40 points)

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