The Open University of Sri Lanka
B.Sc. /B.Ed. Degree Programme
Applied Mathematics - Level 05
ADU5300 - Linear Programming
Open Book Test (OBT) - 2024/2025

0117

Duration: One Hour

Date: 31.08.2024 **Time: 01.00 p.m. - 02.00 p.m.**

THERE ARE TWO PAGES IN THIS QUESTION PAPER. ANSWER ALL QUESTIONS.

Question 01

a) Three nutrient components namely, thiamine, phosphorus, and iron are found in a diet of two food items A and B. The nutrient content per ounce is as follows: Food A contains 0.18 mg of thiamine, 0.95 mg of phosphorus, and 1.60 mg of iron, while Food B provides 0.12 mg of thiamine, 2.70 mg of phosphorus, and 1.90 mg of iron.

Food A and B cost Rs.1500.00 per oz. and Rs. 510.00 per oz., respectively. The minimum daily requirements of these nutrients are at least 1.00mg of thiamine, 7.50mg of phosphorus, and 10.00mg of iron. A dietician wants to determine the cheapest mix of food A and B to prescribe to her patient.

i. Identify and define the decision variables in the above linear programming problem.
ii. Define the objective function.
iii. State the constraints in the linear programming model.

[40 Marks]

b) Solve the following linear programming problem by using the Graphical Method

Maximize the profit function: $Z = 50x + 18y$
Subject to:

$$2x + y \leq 100$$
$$x + y \leq 80$$
$$x, y \geq 0$$

[60 Marks]

Question 02

Solve the following Linear Programming problem using the Simplex Method:
Objective function:

Maximize: $Z = 3x_1 + 2x_2 + x_3$

Subject to:

$$4x_1 + x_2 + x_3 \leq 30$$
$$2x_1 + 3x_2 + x_3 \leq 60$$
$$x_1 + 2x_2 + x_3 \leq 40$$
$$x_1, x_2, x_3 \geq 0$$

[100 Marks]