THE OPEN UNIVERSITY OF SRI LANKA

B.Sc./ B.Ed. Degree Programme

APPLIED MATHEMATICS - LEVEL 05

ADU5307 - Numerical Methods

OPEN BOOK TEST - 2024/2025

DURATION: ONE HOUR

Date: 25. 08. 2024 **Time: 4.00 p.m. to 5.00 p.m.**

ANSWER ALL QUESTIONS

1. (a) For the given function $f(x) = x^3 - x - 1$, a real root lies in between the interval [1, 2]. Find the minimum number of iterations required to find the root up to the accuracy of two decimal points using Bisection method.

(b) Find the roots of the equation $x^3 - 11 = 0$ near to the point $x = 2$ corrected to two decimal places, by using the Newton-Raphson method.

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2. Suppose we have the closing prices of a stock over a few days, recorded at the end of each trading day

Day	1	2	3	4
stock price	100	105	111	120

(i) State Newton - Gregory forward difference formula.

(ii) What is the estimated stock price at the end of the third day at midday, denoted as 3.5 days?

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3. The temperature at various distances from a heat source is given by the following data points

x	0	2	4	6
T	0	10	20	0

Where x is the distance from the reference point (cm) and T is the temperature ($^\circ C$).

(i) Find the third-order polynomial to the above data points by applying Lagrange's interpolation formula. .

(ii) Calculate the temperature at a distance of $x = 3$ cm from the heat source.
