The Open University of Sri Lanka
B.Sc. Degree Programme - Level 05
Open Book Test-2015/2016
APU3240/APE5240 –- Numerical Methods

Duration: One and Half (1 ½) Hours

Date: 10. 04. 2016 **Time: 10.30 a.m. –12.00 noon**

ANSWER ALL QUESTIONS.

1. (a) Find the root of the equation $x^3 - 18 = 0$ correct to 2 decimal places using bisection method.

   (b) Applying Newton -Raphson method for the equation $x^x = 1000$, show that

   $$x_{n+1} = x_n - \frac{x_n \log x_n - 3}{\log x_n + \log e}.$$

   Hence find the approximation of x correct to 3 decimal places with $x_0 = 4.5$.

2. (a) Use Newton- Gregory forward interpolating polynomial to find $f(22)$ corresponding to the data points (20, 12), (25, 15), (30, 20), (35, 27), (40, 39) and (45, 52).

   (b) Use Gauss backward interpolating polynomial to find $f(76)$ corresponding to the data points (40, 17), (50, 20), (60, 27), (70, 32), (80, 36) and (90, 38).

3. (a) Applying Newton's divided difference formula, find the polynomial of degree four, passing through the points (8, 1515), (7, 778), (5, 138), (4, 43) and (2, 3).

   (b) Applying Lagrange's formula inversely, obtain the root of the equation $f(x) = 0$, given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$ and $f(42) = 18$.