**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

**CSE330: Numerical Methods  
Midterm Exam, Fall 2014**

**Duration: 1.15 hour, Total Marks: 45**

**ANSWER ANY 3 (THREE)**

**[Please note in the tables V2 is a dependent variable of V1]**

1. (a) Find the root of the non-linear equation given below using Newton Raphson’s Method. Continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. First approximation, *x0*= -2. [8]

(b) Draw the flow chart of Bisection method for finding root(s) of a non-linear equation. [7]

1. (a) Find the root of the non-linear equation given below using False position method. Continue your steps up to 3rd iteration. Show your results in tabular form including percentage errors. Use *xl = -2*  and *xu=2.* [8]

(b) Using Table 1, find the value of V2 at V1=56 using third order Lagrangian interpolating interpolation. Also find the change of V2 between V1=51 and V1=57 using third order Lagrangian polynomial interpolation.

**[7]**

**Table 1**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 50 | 112 |
| 2 | 55 | 127 |
| 3 | 57 | 131 |
| 4 | 62 | 137 |

1. (a) Using Table 2, form a matrix representation for solving the coefficients for the polynomials having quadratic Splines. [10]

**Table 2**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 10 | 29 |
| 2 | 12 | 33 |
| 3 | 15 | 37 |
| 4 | 17 | 44 |
| 5 | 19 | 47 |

(b) What is the advantage of Secant method over Newton Rapson’s method? Explain. [5]

1. (a) Suppose you are given *(x0,y0),(x1,y1),(x2,y2).....(xn,yn)* data points, derive the linear regression formula to find the value of the coefficients. [7]

(b) Using Table 2, find the value of V2 for V1(18) using third order Newton’s divided [8] difference polynomial method.