Comilla University

Department of Computer Science and Engineering

Final Examination - 2015

Course Code: CSE-216 **Course Title: Numerical methods**

Session: 2013-2014 **Semester: 2nd year1st Semester**

[Answer any four of the following questions. Figures in the right-hand margin indicate full marks.]

Time: 2 hours **Full Marks:30**

1. a) Define Bi-Section method. Obtain a root, correct to two decimal places for the equation $x^3-2x-5=0$ using this method. 4+3.5

   b) What is exact and approximate number? Draw the relationship between absolute, relative and percentage error.

2. a) Describe the Secant method for finding the roots of the equation. 3.5+4

   b) Find a real root of the equation $x^3 - 2x - 5 = 0$ using the false position method.

3. a) Using Newton's divided difference formula, find the values of $f(9)$ and $f(15)$ from the follwing table: 3.5+4

x:	4	6	8	10	12	14
$f(x)$:	48	100	294	900	1210	2028

   b) Solve the following equations using Gauss elimination method.

$$2x+y+z = 10$$
$$3x+2y+3z = 18$$
$$x+4y+9z=16$$

4. a) Derive the 1st order derivatives of numerical differentiation. Then find the solution of the table. 4.5+3

x	1.5	2.0	2.5	3.0	3.5	4.0
Y = f(x)	3.375	7.000	13.625	24.000	38.875	59.000

   b) Define Runge-Kutta method with proper notation.

5. a) Describe Newton-Raphson method. Find a real root, correct to three decimal position of the equation $x^3 - 6x^2 + 11x - 6 = 0$, using this method. 4+3.5

   b) Prove that i) $\blacktriangle \equiv \blacktriangledown E$ and ii) $\mu \equiv 1\backslash 2(E^{1/2}+E^{-1/2})$

6. a) State the general equation of Simpson's 3/8 rule for numerical integration. 4+3.5

   b) Derive the Euler's formula for the solution of differential equations.