City University

Faculty of Science & Engineering
Department of Computer Science and Engineering
Program: B.Sc. in CSE(EVE)
Final Examination   Semester: Summer-2018
Course Code: CSE - 231   Course Title: Numerical Analysis
Total Marks: 40   Duration: 2 hours

Answer any 4 (four) questions   *4 X 10 = 40*

1(a) Derive Newton's forward divided difference formula for equal interval. **6**

(b) Estimate the natural logarithm of 2 using linear interpolation. First, perform the computation **4** by interpolating between $\ln 1 = 0$ and $\ln 6 = 1.791759$. Note that the true value of $\ln 2$ is 0.6931472.

2(a) Derive the formula of Trapezoidal rule from the general quadratic formula. **5**

(b) Use Cramer's rule to solve the following equations. **5**
$0.3x_1 + 0.52x_2 + x_3 = -0.01$
$0.5x_1 + x_2 + 1.9x_3 = 0.67$
$0.1x_1 + 0.3x_2 + 0.5x_3 = -0.44$
Carry five significant figures during the computation.

3(a) Find the value of f(x) when x=2 by applying Lagrange's formula where $f(x) = x^2 + 1$. **5**

x	1	3	4
f(x)	2	10	17

(b) Use Taylor series to approximate derivative $[f'(x_i), f'(x_{i+1})]$ of $f(x) = 4x^3 + 2x^2 + 1$ where x_i **5** = 0.25, h = 0.5 including true percent relative error in each step.

4(a) Solve by Euler's method in the following differential equation for x= 1.00 correct to four **6** decimal places by taking h=0.5, $\dfrac{dy}{dx} = x^2 + 2x + 3$, with the initial condition y (0) = 1 (when x=0, y =1).

(b) Give mathematical definations of differentiation. Differentiate between Ordinary Differential **4** Equations and Partial Differential Equations.

5(a) Describe briefly about the importance of numerical analysis in the field of computer science. **4**

(b) Solve the following equations by inverse matrix method **6**
x + 2y + 2z = 5
3x -4y + z = -6
2x + y - z = -1