International Islamic University Chittagong

Department of Electronic and Telecommunication Engineering

Final Examination, Spring 2019

Course Code: ETE-2307/2427

Course Title: Numerical Methods/Numerical Analysis

Full Marks: 50 Time: 2h 30min

[Answer any two from Group-A and any three from Group-B of the following questions]

Group-A

1.a) Given a polynomial with following data points: **5**

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$f(x)$	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=1.1$ and $x=1.5$

b) From the following table, find the number of students who have obtained **5**

i) Less than 45 marks

ii) Between 40 and 45 marks

Marks	30-40	40-50	50-60	60-70	70-80
Number of Students	31	42	51	35	31

2.a) Using the following data, find by Sterling's formula, the value of $f(x)=\cot(\pi x)$ at $x=$ 0.225 **5**

x	0.20	0.21	0.22	0.23	0.24
$f(x)$	1.37638	1.28919	1.20879	1.13427	1.06489

b) Find a cubic polynomial in x which take on the values **5**

-3, 3, 11, 27, 57 and 107

when x=0, 1, 2, 3, 4 and 5 respectively

3.a) Solve using Trapezoidal rule: **5**

i) $\int_1^4 (x^2+2x)dx$ (Consider n=6)

ii) $\int_0^1 \frac{1}{1+x^2}dx$ (Consider n=5)

b) **5**

Evaluate $\int_0^6 \frac{1}{1+x^2}dx$ by using:

i) Simpson's $3/8^{th}$ rule

ii) Weddle's rule

Group-B

4.a) From Taylor's series method, find $y(0.1)$ considering upto fourth degree term if $y(x)$ satisfies the equation $\frac{dy}{dx} = x - y^2$ where $y(0) = 1$ **5**

b) Solve by Euler's method the following differential equation for $x = 0.8$, taking $h = 0.2$ **5**

$\frac{dy}{dx} = x^2 + y$ where $y(0) = 0$

5.a) Apply Gauss elimination method to solve the following equations: **5**

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4$$

b) Apply Gauss Jordan method to solve the following equations: **5**

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

6.a) Apply Gauss Seidal iteration method to solve the following equations: **5**

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

b) Fit a straight line $y = ax + b$ for the following data: **5**

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

7.a) Fit a curve of the form $y = ae^{bx}$ for the following data: **5**

x	0	2	4
y	8.12	10	31.82

b) Fit a parabola $y = a + bx + cx^2$ for the following data: **5**

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9