



Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Final Examination, Fall-2023

Course Code: CSE235, Course Title: Numerical Methods

Level: 2 Term: 2 Batch: 61

Time: 2:00 Hours

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a) Solve the following system of linear equations using the Jacobi method: [8] CO2

$$\begin{aligned} 4x - y - z &= 3 \\ -2x + 6y + z &= 9 \\ -x + y + 7z &= -6 \end{aligned}$$

Use an initial guess of $x_0 = y_0 = z_0 = 0$ and iterate until the solution converges to three decimal places.

- b) Apply Gauss Elimination method to solve the following system of linear equations: [8] CO2

$$\begin{aligned} x - 2y - z &= 2 \\ 2x - y + z &= 4 \\ -x + y - 2z &= -4 \end{aligned}$$

2. Solve the following first-order ordinary differential equation using the 4th order Runge-Kutta method: [8] CO3

$$y' = xy + y^2$$

with initial condition $y(0) = 1$. Find the value of $y(0.2)$ with $h = 0.1$

3. Calculate an approximate value of $\int_2^{10} \frac{dx}{1+x}$ by dividing the range into eight equal parts, using Simpson's $\frac{1}{3}$ rule and Trapezoidal rule. Hence identify between two which is more accurate. [8] CO3

4. Estimate the value of y when $x = 2.8$ so that the exponential equation, $y = ae^{bx}$ fits the data: [8] CO3

x	1	1.5	2	2.5	3	3.5
y	4.5	2.26	5.15	3.15	8.35	6.75