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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**

$$4x - y - z = 3$$
$$-2x + 6y + z = 9$$
$$-x + y + 7z = -6$$

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**

$$x - 2y - z = 2$$
$$2x - y + z = 4$$
$$-x + y - 2z = -4$$

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