

# Daffodil International University

B. Sc. in Civil Engineering

Mid-term Examination, Spring - 2025

Course Code: CSE 201

Course Title: Numerical Methods and Computer Programming

Section: BN1, BN2

Level-Term: 2-1

Teacher's Initial: IHB

Full Marks: 25

Date: March 17, 2025

Time: 1.5 Hours

*Note: There are four sets of questions in total. Answer all of them. Right hand margin indicates full marks.*

1. Apply **Regula Falsi method** to determine the value of maximum deflection of the [06]  
beam depicted in Figure-1, where  $y = \frac{w_0}{120EI}(-x^5 + 2L^2x^3 - L^4x)$ ,  $L = 236 \text{ in}$ ,  $E = 72.5 \times 10^6 \text{ psi}$ ,  $I = 721 \text{ in}^4$ ,  $w_0 = 1427 \text{ lb/in}$ . Employ initial guesses of 50 and 200 in with a stopping criterion of  $c_a = 0.1\%$ . [CO1, C3]

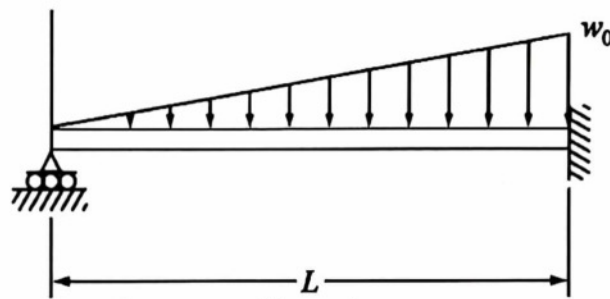


Figure-1

2. Apply the **Gauss Jordan** technique to solve the displacements of Figure-2 if  $m_1 = 2.5 \text{ kg}$ ,  $m_2 = 3 \text{ kg}$ ,  $m_3 = 3.5 \text{ kg}$  and  $k = 12 \text{ kg/s}^2$  [CO1, C3]

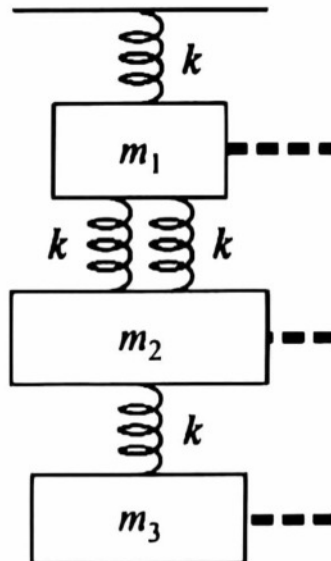


Figure-2

3. Apply least-square regression method to fit a second-order polynomial to the x and y [06]  
values of the following table- [CO2, C3]

x	0	1.3	2.4	3.5	4.7	5.8
y	4.3	14.5	27.8	38.9	47.6	63.5

4. Write python codes to determine the drag coefficient c needed for a parachutist of mass [06]  
m=76 kg to have a velocity of 65 m/s after free-falling for time t = 10 s using **secant**  
**method**, where  $v = \frac{gm}{c}(1 - e^{-(c/m)t})$  [CO3, C3]

$$s_n = (y - a_0 - n a_1 - n^2 a_2)^2$$