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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 beam depicted in Figure-1, where $y = \frac{w_0}{120EIL}(-x^5 + 2L^2x^3 - L^4x), L = 236\ in, E = 72.5x10^6 psi, I = 721 in^4, w_0 = 1427\ lb/in.$ Employ initial guesses of 50 and 200 in with a stopping criterion of $\varepsilon_a = 0.1\%$. *[CO1, C3]* [06]

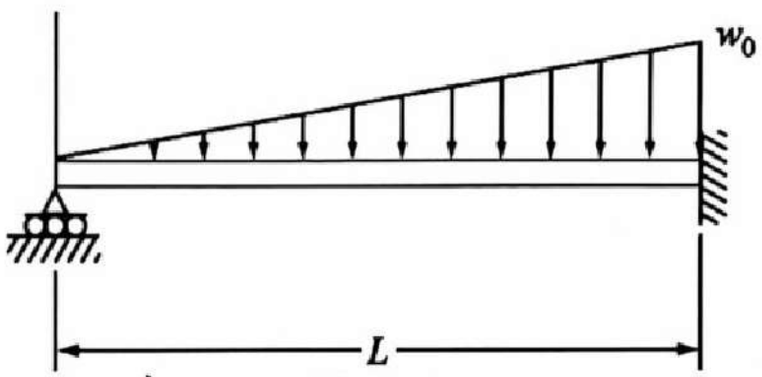


Figure-1

2. Apply the **Gauss Jordan** technique to solve the displacements of Figure-2 if $m_1 = 2.5\ kg, m_2 = 3\ kg, m_3 = 3.5\ kg$ *and* $k = 12\ kg/s^2$ *[CO1, C3]* [07]

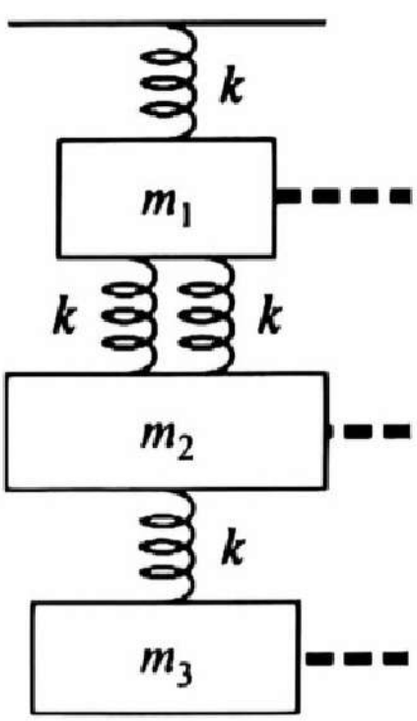


Figure-2

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

wy n^2y

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 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]* [06]

$S_r = \left(y - a_0 - n a_1 - n^2 a_2\right)^2$