

Daffodil International University

B. Sc. in Civil Engineering

Final Examination, Spring - 2025

Course Code: CSE 202

Course Title: Computer Programming Lab

Section: BN21

Level-Term: 2-1

Teacher's Initial: SNA

Full Marks: 40

Date: May 28, 2025

Time: 2.0 Hours

Right margin indicates full marks. Answer all the questions in google colab notebook.

1. a). Assign the following data in a DataFrame using a dictionary [CO1, C2] [02]
Names: Alice, Bob, Charlie, David
Marks: 85, 90, 95, 88
- b). Add a new column called "Grade" based on the following: [CO1, C2] [05]
If Marks $\geq 90 \rightarrow$ 'A'
 $80 \leq$ Marks $< 90 \rightarrow$ 'B'
Else $\rightarrow$ 'C'
- c). Display only the students who got an A. [CO1, C2] [03]
2. A fixed beam of length $L = 6 + 0.5 \cdot \sin(\text{last_two_digit_of_student_id})$ m is subjected to a uniformly distributed load $w = 10$ kN/m along its entire length. The beam has a constant flexural rigidity $EI = 2 \times 10^7$ kN/m²

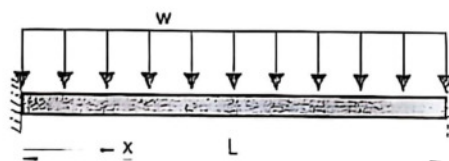


Figure 1

The deflection curve of the beam under this loading can be given by the formula:

$$y(x) = -\frac{w}{24EI} (x^4 - 2Lx^3 + L^2x^2)$$

where:

- $y(x)$ is the vertical deflection at distance x from the left support (in meters),
- EI is the flexural rigidity (in kN·m²),
- w is the uniformly distributed load (in kN/m),
- L is the span length (in meters).

Demonstrate a plot in python that shows deflection of the beam. [CO3, C2] [10]

3. The following data defines the sea-level concentration of dissolved oxygen for fresh water as a function of temperature:

T (°C)	0	8	16	24	32	40
DO (mg/L)	14.621	11.843	9.870	8.418	7.305	6.413

- a). *Demonstrate* a linear regression model to predict DO level based on temperature. [05]
[CO3, C2]
- b). *Show* the model in a plot along with the given data points in scatter plot. [CO3, C2] [05]
- c). *Determine* dissolved oxygen for fresh water for 18 degree Celsius temperature. [CO3, [03]
C2]

4. *Apply* a for loop to calculate the sum of given series. [CO2, C3] [07]
 $S = 1*2*3*4 + 5*6*7*8 + + 21*22*23*24$

