

# 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/m<sup>2</sup>

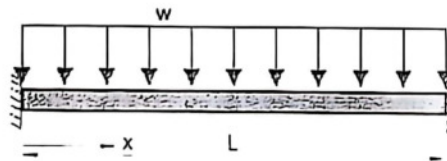


Figure 1

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·m<sup>2</sup>),
- $w$  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]
- $$S = 1*2*3*4 + 5*6*7*8 + \dots + 21*22*23*24$$