Name: Enrolment No:	

UPES

End Semester Examination, May 2025

Course: Programming **Semester: IV**

Program: B. Tech (Chemical Engineering) **Time : 03 hrs.**

Course Code: CSEG1030 **Max. Marks: 100**

Instructions: (a) This is a closed book exam. Possession of a mobile phone, smart watch or any other communication electronic device during exam will be considered as unfair means.
(b) Use python operations and methods (compulsory) to obtain the solution of the question.

SECTION A (4Q × 5M=20Marks)

S. No.	Statement of question	Marks	CO
Q 1	(a) Write a python program to store the properties of a material in a variable named **water**. The properties are density (997), viscosity (0.001), conductivity (10^{-5}), specific heat (4.18), boiling point (100). (b) Modify the value of conductivity to 10^{-4}.	**3 + 2**	**CO1**
Q 2	Write python program to create numpy arrays (a) that represents a identity matrix of size 4×4, (b) that consist only of 1, and (c) that consist only of 0.	**2+2+1**	**CO3**
Q 3	Create numpy arrays to represent the simultaneous equations in the form of [A] {X} = {B}. Use variables named ***a***, ***b***, and ***x*** to store all the coefficients, constants, and zeros, in the form of arrays. $2x_1 - x_2 = 0$ $x_2 = 2$	**5**	**CO3**
Q 4	Write a python program to define a function named **length** that counts and returns the number of characters present in a string. Here len() and sum() is not allowed. Make sure the space character between name, middle name and surname, should not be counted.	**5**	**CO2**
SECTION B (4Q × 10M= 40 Marks)			
Q 5	In order to analyze a string dataset, write a python program to accumulate all the words that contain "***a***" as its second character in the word. Make the accumulation in an empty list named **second** (*list comprehension is not allowed*). Start with the code below str = "gasoline was refined from natural crude oil"	**10**	**CO4**
Q 6	(a) In order to analyze a dataset, write a python code to define a function named **data_analysis** that calculates and returns the mean and standard deviation of a dataset stored in a list. The formula is $\sigma = \sqrt{\frac{(x_i-\bar{x})^2}{n-1}}$. Here, σ, x_i, $\bar{x}$, and n, represents the standard	**10**	**CO4**

	deviation, \data points, mean and number of data points, respectively. (b) Call the function to calculate the mean and standard deviation of the dataset below: x = [-2, 4, 5, 9, 2, 4, -9, 20, 15]		
Q 7	(a) Write a python code to find the sum of all numbers starting from 20 to 30. Here, sum() is not allowed. (b) Use while loop (compulsory) and write a python code to find the solution of the series as below: $0.1^2 + 0.3^2 + 0.5^2 + \ldots\ldots\ldots + 29.9^2 + 30.0^2$	**4 + 6**	**CO2**
Q 8	Develop a python program to conduct a quiz with questions stored in a file named **question.csv**. *Only use open() to read the csv file*. The csv file has 50 questions and should appear one by one. The quiz should ask for the name and roll number of the candidates. After completion of the quiz, the total marks or total score should be displayed (+1 marks for every correct answer and -0.5 marks for every wrong answer). The first 5 questions in the csv file are shown in **Table 1** just to show you the format or layout of the data in the file. **OR** Write a general python code to solve the simultaneous equation using Gauss-elimination method. Remember linalg module and scipy package are not allowed. (There are no marks for manually solving the problem. You only need to write the python code) $3x_1 - 0.1x_2 - 0.2x_3 = 7.85$ $0.1x_1 + 7x_2 - 0.3x_3 = -19.3$ $0.3x_1 - 0.2x_2 - 10x_3 = 71.4$	**10**	**CO3**
SECTION-C (2Q × 20M=40 Marks)			
Q 9	To analyze functions, write python codes to plot two graphs in a single figure with all components exactly as shown in **Fig. 1**. The two functions are (a) $e^{2+0.1x}$, and (b) cos(x). Here x is an array consisting of only float values starting from 0 to 10 with an increment of 0.5. Include different colors (of your choice) for --- , -- , ● , and ▲. (seaborn is not allowed) **OR** To analyze functions, write python codes to plot two graphs in a single figure with all components exactly as shown in **Fig. 1**. The two functions are (a) $e^{3+0.2x}$, and (b) cos(2x). Here x is an array consisting of only float values starting from 0 to 10 with an increment of 0.5. Include different colors (of your choice) for --- , -- , ● , and ▲. (seaborn is not allowed)	**20**	**CO4**
Q 10	Guess the output of the python codes below: (2 marks each) (i) print(5 // 3) Output: _____ (ii) print(5 % 3) Output: _____ (iii) str1 = "python's code" print(str1[-3]) Output: _____ (iv) print(str1[: :2]) Output: _____	**20**	**CO1**

	(v) water = [] water.append("density") print(water) Output: _____ (vi) word = "abc" for i in word: print("welcome {}".format(2*i)) Output: _____ (vii) a, b, c, d = 1, 2, 3, 4 print(d > c**b and a < b) Output: _____ (viii) print(c > b or a > d) Output: _____ (ix) print(5 in [7.675, "float", 5]) Output: _____ (x) print(type((1, 2, "hello"))) Output: _____		

Table 1: Snapshot of the first 5 questions stored in the file named **question.csv**. Please remember, in total there are 50 such questions (or 50 such rows containing questions). This table is displayed just to show the layout of data in the csv file

Question Number	Question	Correct Option	Option A	Option B	Option C	Option D
1	What do plants need to make food?	A	Sunlight	Moonlight	Wind	Soil
2	Which part of the plant conducts photosynthesis?	B	Root	Leaf	Stem	Flower
3	What gas do humans need to breathe?	C	Carbon Dioxide	Nitrogen	Oxygen	Hydrogen
4	Which planet is known as the Red Planet?	D	Earth	Venus	Jupiter	Mars
5	What is the main source of energy for Earth?	A	Sun	Moon	Wind	Electricity

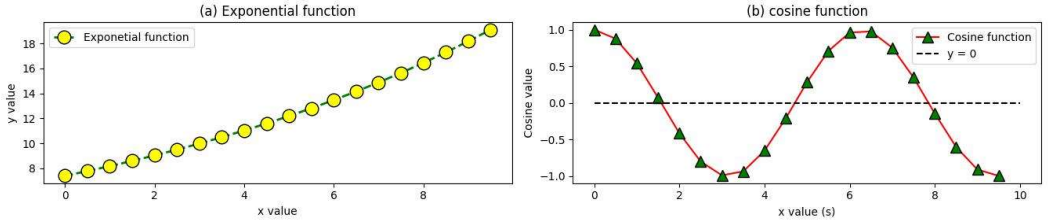

Fig. 1: Sample plots for Question 10.