UPES
End Semester Examination, December 2024

Course: Programming in petroleum engineering   **Semester: I**
Program: M. Tech (Petroleum Engineering)   **Time**   **: 03 hrs**
Course Code: PEGI7023   **Max. Marks: 100**

Instructions: (a) This is a closed book exam. Possessing a mobile phone and any other communication devices during the exam is strictly prohibited.
(b) All programs should be written in clear and correct indentation.

SECTION A (5Q x 4M = 20 Marks)

S. No.	Statement (s) of the question (s)	Marks	CO
Q 1	Write a python code to (a) define a tuple named **para** containing the following four elements below: **90** **3.14** **crude oil** **sour water** (b) define or create an object named *sec* that belongs to an empty class named ***time***	2 + 2	CO1
Q 2	Write a python code to (a) define a dictionary named **silicone_oil** that can store its physical properties, density (970), viscosity (0.04) and specific heat (2.136). (b) Use a method to find the value associated with viscosity	2 + 2	CO1
Q 3	Write a python code to print star patterns (*) with 10 numbers of rows. Each row contains 4 numbers of stars. Use of loop is compulsory.	4	CO2
Q 4	(a) Write a python program to create a user-define function named **cub** that returns the cube of an input number. (Example: cube of 2 is $2^3 = 8$) (b) Print the following words in its exact form as output containing all alphabets and special characters below: **"python's \n code"**	2 + 2	CO1
Q 5	Write a python code to (a) create a matrix that contain only zero (s) (100 rows, 100 columns), and (b) create an identity matrix with same number of rows and columns. Use of numpy package is compulsory.	2 + 2	CO3

SECTION B (4Q x 10M = 40 Marks)

Q 6	(i) Write a python program to create a function named **result** that returns a list containing the values of $f(x)$. **Here**, $f(x) = x^3 + 2x^2 + 4x - 3$ (Use of loop is compulsory)	6 + 2 + 2	CO2

	(ii) Call the function to return a list containing the values of $f(0.1), f(0.2), f(0.3), …. f(0.8), f(0.9), f(1.0)$. Assign the list to a variable named **sol1**		
	(iii) Call the function to return a list containing the values of $f(0.4), f(0.6), f(0.8), …. f(1.6), f(1.8), f(2.0)$. Assign the list to a variable named **sol2**		
Q 7	(a) Write a python program to create a matrix (named **mat1**) containing 1 *2* 3 (elements of 1st row), 4 *5* 6 (elements of 2nd row) and 7 *8* 9 (elements of 3rd row). Use of numpy is compulsory. (b) Use slicing, to create a variable named **mat2** that contains the elements of mat1 that are bold and italics. **OR** Write a python code to print the following number pattern, exactly as shown in **Fig. 1**.	5 + 5 10	CO2
Q 8	Write a python program to create three numbers of classes, named as **A**, **B**, and **C**. **B** contains a method to find the sum of number series (such as 1, 2, 3, 4, 5, 6, and many more). While, **A** contains method to find the factorial of numbers. The class **C** do not have any methods defined. $$\frac{3 + 4 + 5 + 6 + 7 + 8 + 9 + 10}{100!}$$ Write a python program to evaluate the above expression only using the object that belongs to class **C**. Use appropriate names of your choice. (Use of inheritance is compulsory)	10	CO2
Q 9	Write a python code to plot the data shown in **Table 1**. The exact final output is shown in **Fig. 2.** The use of a package is compulsory.	10	CO4
SECTION C (2Q x 20M = 40 Marks)			

Q 10	Analyze the python codes below to predict the outputs: (2 marks each)
	(i) print(6 // 3) Output: _____
	(ii) print(8 % 3) Output: _____
	(iii) str1 = "python's code"
	  print(str1[6]*3) Output: _____
	(iv) print(str1[1:11:2]) Output: _____
	(v) water = []
	   water.append("fluid")
	   print(water) Output: _____
	(vi) word = "he"
	   for i in word:
	      print("welcome {}".format(i)) Output: _____
	(vii) a, b, c, d = 1, 2, 3, 4
	   print(d > c**b) Output: _____
	(viii) print(c > b or a > d) Output: _____
		20	CO2

	(ix) print(5 in [7.675, "float", 5]) Output: _____ (x) print(type((1, 2, "hello"))) Output: _____			
Q 11	(i) Write python code to create a function named **sorting** that takes a list as input parameter and returns a tuple containing two lists as an output parameter. One list containing only even numbers and other list only contains odd numbers. (ii) Write a python program to create a function named **length** that returns the number of characters present in a string. The function len() is not allowed. **OR** Imagine that an excel file named **data.csv** is stored in IDLE working directory or folder. The data in rows and columns are shown in **Table 1.** Write a python program to find the concentration (c) of acetic acid for all samples. $\left(c = \dfrac{volume\ of\ acetic\ acid}{volume\ of\ acetic\ acid + volume\ of\ water}\right)$	**10 + 10** **20**		**CO 3**

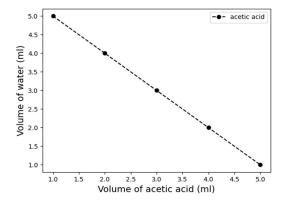| Table 1: Sample of volume of acetic acid and volume of water mixed at different ratios.		
Sample	**acetic acid (ml)**	**water (ml)**
A	5	1
B	4	2
C	3	3
D	2	4
E	1	5

```
    9
   9 8
  9 8 7
 9 8 7 6
5 4 3 2 1
```

Fig. 1: Triangular pattern

Fig 2: Expected output of the graph