Graphic Era HILL UNIVERSITY

Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination December 2024

Roll no. [redacted]

Name of the Course and semester: B.TECH CSE (AI/ML SPECIALIZATION) III
Name of the Paper: PYTHON PROGRAMMING
Paper Code: TCS-346
Time: 3 hour

Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty). Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

a. What are various data types in Python? Explain the following inbuilt functions of Python with a piece of code:

i. print()
ii. input()
iii. type()
iv. id()
v. len()

Also explain membership and identity operators in Python along with an example. (CO1)

b. Write a program in Python which contains two functions with the following criteria: (CO2)

i. First function accepts any number of positional arguments
ii. Second function accepts any number of keyword arguments

Write a Python program to calculate the sum of digits of a number. Additionally, explain lambda function.

c.

i. What do you mean by exception handling in Python? Explain the role of the following keywords through ZeroDivisionError:
   - try
   - except
   - finally
   - assert

ii. Write a Python program to create a calculator module named **calculator.py** that performs the following operations:
   - Addition
   - Subtraction
   - Multiplication
   - Division
   - Exponentiation
   - Square root

   Then, write a main program to import and use this module. (CO2)

Q2. (2X10=20 Marks)

a. What do you mean by lists in Python? Explain slicing in brief with reference to lists with an example. Create a list by taking input from user and perform the following operations:

i. Reverse the created list
ii. Delete the last element of the list
iii. Add an element in the list at a specified index
iv. Sort the list
v. Delete all the elements of list (CO3)

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b.
i. Write a python program to show the usage of for loop to retrieve the elements of a dictionary. Also write a piece of Python code to check whether a key exists in the dictionary or not.
ii. Draw a comparative table stating five differences between tuples and dictionaries. (CO3)

c. What is the difference between the following modes of opening a file: r, w, and a? Explain with example. What happens if you try to open a file in write mode (w) but the file does not exist? Write a python program to create a file, write into the same file and then print the file's content. (CO3)

Q3. (2X10=20 Marks)

a. What are the main pillars of OOPS? State the significance of creation of objects and also state the consequence if we do not create an object of a class. Create a class student with the following attributes and methods:
i. Attributes: name, roll_num, marks
ii. Methods: set() for assigning the values, get() for printing the values
Also create an object and call the created methods through object. (CO4)

b. What do you mean by method overriding? How can we overcome it? Also explain operator overloading through '+'& 'len()'.State and explain types of inheritance with example? (CO4)

(CO4)

c.
i. Write a Python program that demonstrates the use of an interface to define a common structure for different classes. Implement an interface to represent a shape, and create two classes: Circle and Rectangle that implement the interface. Each class should have a method area() to compute the area of the shape.
ii. Describe encapsulation. What role does the access specifiers play in data hiding? Explain with supportive examples.

Q4. (2X10=20 Marks)

a. What is the NumPy library and how does it differ from Python lists? Create a NumPy array of shape (3, 4), filled with random integers between 0 and 100. Explain how NumPy handles missing data using NaN. Provide an example. (CO5)

b. How does Pandas simplify data manipulation? What is a Pandas DataFrame, and how is it different from a Pandas Series? Explain how to merge two DataFrames using merge() and concat(). Demonstrate with examples. (CO5)

c. State the significance of the following AI/ML libraries with respect to their features: (CO5)
i. Matplotlib
ii. Seaborn

Q5. (2X10=20 Marks)

a. What do you mean by Data Science? Explain the significance of data cleaning. Additionally explain few techniques to clean data.(C05)
b. Explain (with help of example) various methods to find the summary of data sets using statistics.(CO6)
c. What is meant by data visualization? Explain any two visualization techniques. (CO6)