Savitribai Phule Pune University
(Formerly University of Pune)
DEPARTMENT OF TECHNOLOGY

Course – Advance Course in Data Science and Artificial Intelligence (ACDSAI)

[ACDSAILP1]: Programming Lab-I

Subject: Python Programming

Q1. Check whether input number is Armstrong number or not.

Q2. Accept the number and Compute a)square root of number, b) Square of number, c)Cube of number d) check for prime, d) factorial of number e) prime factors.

Q3. Accept a number from the user and print digits of number in reverse order.

Q4. Accept list of N integers and partition list into sub-lists of even and odd numbers.

Q5. Accept from the user the number of Fibonacci numbers to be generated and print the Fibonacci series.

Q6. A)Create a list of integers from 1 to 10 and perform:

i. Add the number 15 at the end of the list.
ii. Insert the number 5 at the 2nd index.
iii. Remove the number 8 from the list.
iv. Sort the list in descending order.
v. Find the length of the list.
vi. Retrieve the first and last elements of the list.

Q6. B) Create a tuple of your favorite colors and perform:

a. Access the first and last elements of the tuple.
b. Concatenate two tuples together.
c. Repeat a tuple three times and display the result.

Q6.C) Write a program that takes a list of dictionaries where each dictionary represents a student with keys name, age, gpa. The program should compute the average GPA of the students.

Q7 A). Write a program that uses a loop to repeatedly ask the user to enter positive numbers. The loop will come to an end when a negative number is entered. After collecting all the positive numbers, the program will compute their sum and display the result to the user.

Q7 B). Write programs to print following patterns :

```
*
**
***
****
*****
```

```
1
222
33333
4444444
555555555
```

```
1
212
32123
4321234
543212345
```

Q.8 A). Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a boolean representing whether or not the balls are 29 colliding. 9 hint: represent a ball on a plane as a tuple of (x, y, r), r being the radius if (distance between two balls centers) <= (sum of their radii) then (they are colliding)

Q8 B). Implement a python Program for factorial of number by using recursion.

Q8 C). Define a function which takes TWO objects representing complex numbers and returns new complex number with an addition of two complex number. Define a suitable class 'Complex' to represent the complex number. develop a program to read N (N>=2) complex numbers and to compute the addition of N complex numbers.

Q9 A).Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

Q9 B). Create a class Movie with attributes title, director, and release_year. The class should have An __init__() method to initialize the attributes.A method get_movie_details() that returns a string with the movie's title, director, and release year.Create an instance of Movie with the title "Inception", director "Christopher Nolan", and release year 2010.Call the get_movie_details() method and print the result.

Q10 A). Write a Python numpy program to create two matrices and perform addition, subtraction, multiplication and division operation on matrix.

Q10 B). Load the dataset "employees.csv"(https://gist.github.com/kevin336/acbb2271e66c10a5b73aacf82ca82784#file-employees-csv) into a Pandas DataFrame.

Display the first 10 rows.

The dataset contains columns Age, Salary, and Department. Some rows have missing values. Write a script to:

- Replace missing values in Age with the mean age.
- Replace missing values in Salary with the median salary.
- Drop rows where Department is missing.

Create a new column in a DataFrame that categorizes employees based on their salary:

- Low (Salary < 50,000)
- Medium (50,000 ≤ Salary < 100,000)
- High (Salary ≥ 100,000)

Group the DataFrame by the Department column and calculate the average salary for each department.