ASSESMENT-1 SOHAN DAS

1. Write a Python program to calculate the area of a rectangle given its length and width.

Ans.
```
def calculate_rectangle_area():
    length = float(input("Enter the length of the rectangle: "))
    width = float(input("Enter the width of the rectangle: "))
    if not isinstance(length, (int, float)) or not isinstance(width, (int, float)):
        raise TypeError("Both length and width must be numbers.")
    area = length * width
    return area
rectangle_area = calculate_rectangle_area()
print(f"The area of the rectangle is {rectangle_area}.")
```

output:-
```
Enter the length of the rectangle: 5
Enter the width of the rectangle: 3
The area of the rectangle is 15.0.
```

2. Write a program to convert miles to kilometers.

Ans.
```
def convert_miles_to_kilometers(miles):
    if not isinstance(miles, (int, float)):
        raise TypeError("The input must be a number.")

    kilometers = miles * 1.60934

    return kilometers

miles = float(input("Enter the number of miles: "))

kilometers = convert_miles_to_kilometers(miles)

print(f"{miles} miles is equal to {kilometers} kilometers.")
```

output:-
```
Enter the number of miles: 5
5 miles is equal to 8.04672 kilometers.
```

3. Write a function to check if a given string is a palindrome.

Ans.
```
def is_palindrome(s):
    s = s.lower()
    s = ''.join(c for c in s if c.isalnum())
    return s == s[::-1]
string = input("Enter a string: ")
```

```
if is_palindrome(string):
    print(f"{string} is a palindrome.")
else:
    print(f"{string} is not a palindrome.")
```

output:- Enter a string: racecar

racecar is a palindrome.

4. Write a Python program to find the second largest element in a list.

Ans.

```
def second_largest(numbers):
    if len(numbers) < 2:
        raise ValueError("The list must contain at least two elements.")

    first_largest = max(numbers)
    numbers.remove(first_largest)
    second_largest = max(numbers)

    return second_largest

numbers = [int(x) for x in input("Enter a list of numbers separated by space: ").split()]

second_largest_number = second_largest(numbers)

print(f"The second largest number is {second_largest_number}.")
```

output:- Enter a list of numbers separated by space: 1 2 3 4 5

The second largest number is 4.

5. Explain what indentation means in Python.

Ans. In Python, indentation is used to indicate the structure of code and to define a block of code that belongs to a particular statement or control structure. Unlike other programming languages, which use curly braces {} or keywords such as begin and end to define blocks of code, Python uses indentation to indicate the scope of a statement or control structure.

In Python, a block of code is defined by the number of spaces at the beginning of a line. The standard indentation in Python is four white spaces, but you can use any number of spaces as long as you are consistent within a block of code.

Here's an example of how indentation is used in Python to define a block of code:

```
if x > 0:
    print("x is positive.")
    y = x + 1
else:
    print("x is non-positive.")
    y = x – 1
```

6. Write a program to perform a set difference operation.

Ans

```
def set_difference(set1, set2):
    return set1 - set2

set1 = {1, 2, 3, 4, 5}

set2 = {3, 4, 5, 6, 7}

set_diff = set_difference(set1, set2)

print(f"The set difference of {set1} and {set2} is {set_diff}.")
```

OUTPUT:
The set difference of {1, 2, 3, 4, 5} and {3, 4, 5, 6, 7} is {1, 2}.

7. Write a Python program to print numbers from 1 to 10 using a while loop.

Ans

```
def print_numbers():
        i = 1
        while i <= 10:
                print(i)
                i += 1
print_numbers()
```

OUTPUT:

1,2,3,4,5,6,7,8,9,10

8. Write a program to calculate the factorial of a number using a while loop.

Ans

```
def factorial(n):
        result = 1
        while n > 1:
                result *= n
                n -= 1
        return result

n = int(input("Enter a number: "))
fact = factorial(n)
print(f"The factorial of {n} is {fact}.")
```

output:

Enter a number: 5

The factorial of 5 is 120.

9. Write a Python program to check if a number is positive, negative, or zero using if-elif-else statements.

Ans

```
def check_number(n):
        if n > 0:
                return "positive"
        elif n < 0:
                return "negative"
        else:
                return "zero"

n = float(input("Enter a number: "))
result = check_number(n)
print(f"The number {n} is {result}.")
```

output:

Enter a number: 5

The number 5 is positive.

10. Write a program to determine the largest among three numbers using conditional statements.

Ans

```
def largest_of_three(x, y, z):
        if x >= y and x >= z:
                return x
        elif y >= x and y >= z:
                return y
        else:
                return z
x = float(input("Enter the first number: "))
y = float(input("Enter the second number: "))
z = float(input("Enter the third number: "))
largest = largest_of_three(x, y, z)
print(f"The largest of {x}, {y}, and {z} is {largest}.")
```

OUTPUT:

Enter the first number: 5

Enter the second number: 10

Enter the third number: 2

The largest of 5.0, 10.0, and 2.0 is 10.0.

11. Write a Python program to create a numpy array filled with ones of a given shape.

Ans

```
import numpy as np
def ones_array(shape):
        return np.ones(shape, dtype=np.int32)

shape = (2, 3)

ones_arr = ones_array(shape)
```

```
print(f"The array of shape {shape} filled with ones is:")
print(ones_arr)
```

OUTPUT:

```
The array of shapes (2, 3) filled with ones is:
[[1 1 1]
 [1 1 1]]
```

12. Write a program to create a 2D numpy array initialized with random integers.

Ans

```
import numpy as np

def random_2d_array(rows, cols):
        return np.random.randint(10, size=(rows, cols))

rows = 2
cols = 3
rand_arr = random_2d_array(rows, cols)

print(f"The 2D array of shape {(rows, cols)} initialized with random integers is:")
print(rand_arr)
```

output:

```
The 2D array of shapes (2, 3) initialized with random integers is:
[[3 5 7]
 [0 6 2]]
```

13. Write a Python program to generate an array of evenly spaced numbers over a specified range using linspace.

Ans

```
        import numpy as np
        def linspace_array(start, stop, num):
                return np.linspace(start, stop, num)
        start = 0
        stop = 1
        num = 5
        linspace_arr = linspace_array(start, stop, num)
print(f"The array of {num} evenly spaced numbers from {start} to {stop} is:")
print(linspace_arr)
```

OUTPUT:

```
The array of 5 evenly spaced numbers from 0 to 1 is:
[0.   0.25 0.5  0.75 1. ]
```

14. Write a program to generate an array of 10 equally spaced values between 1 and 100 using linspace.

Ans

```
import numpy as np
def linspace_array_1_to_100():
        return np.linspace(1, 100, 10)
linspace_arr = linspace_array_1_to_100()
print(f"The array of 10 equally spaced values between 1 and 100 is:")
```

```
print(linspace_arr)
```

OUTPUT:

The array of 10 equally spaced values between 1 and 100 is:
[1.12.5 23.999999999999998 35.499999999999994 47.58.5 69.99999999999999 81.49999999999999 93.100.]

15. Write a Python program to create an array containing even numbers from 2 to 20 using a range.

Ans

```
import numpy as np
def even_numbers_arange():
        arr = np.arange(2, 21)
        return arr[arr % 2 == 0]
even_arr = even_numbers_arange()
print(f"The array of even numbers from 2 to 20 is:")
print(even_arr)
```

output:

The array of even numbers from 2 to 20 is:
[2 4 6 8 10 12 14 16 18 20]

16. Write a program to create an array containing numbers from 1 to 10 with a step size of 0.5 using a range.

Ans

```
import numpy as np

def numbers_1_to_10_step_0_5():
    return np.arange(1, 10.5, 0.5)

numbers_arr = numbers_1_to_10_step_0_5()

print(f"The array of numbers from 1 to 10 with a step size of 0.5 is:")
print(numbers_arr)
```

OUTPUT:

The array of numbers from 1 to 10 with a step size of 0.5 is:
[1. 1.5 2. 2.5 3. 3.5 4. 4.5 5. 5.5 6. 6.5 7. 7.5 8. 8.5 9. 9.5 10.]