Experiment - 06

AIM: Implementation of Python Basic Libraries such as Statistics, Math, Numpy and Scipy.

◉ SOURCE CODE :

```
import math
import numpy as np
import scipy.linalg as la
import statistics

# (a) Usage of math methods
num1, num2 = 15, 20
print("Floor of 3.7:", math.floor(3.7)) # Rounds down
print("Ceil of 3.2:", math.ceil(3.2))   # Rounds up
print("Square root of 25:", math.sqrt(25))
print("Integer square root of 25:", math.isqrt(25))
print("GCD of 15 and 20:", math.gcd(num1, num2))

# (b) Usage of NumPy array attributes and methods
arr = np.array([[1, 2, 3], [4, 5, 6]])
print("Number of dimensions:", arr.ndim)
print("Shape of array:", arr.shape)
print("Size of array:", arr.size)
print("Sum of elements:", arr.sum())
print("Mean of elements:", arr.mean())
print("Sorted array:", np.sort(arr, axis=None))
print("Sine of elements:", np.sin(arr))

# (c) Usage of determinant and eigenvalues
a = np.array([[3, 2], [1, 4]])
print("Determinant:", la.det(a))
print("Eigenvalues:", la.eigvals(a))

# (d) Reshaping 1D list to 2D and 3D matrices
lst = np.arange(1, 13)  # List from 1 to 12
matrix_2d = lst.reshape(3, 4)  # Reshape to 3x4 matrix
matrix_3d = lst.reshape(2, 2, 3)  # Reshape to 2x2x3 matrix
print("2D Matrix:\n", matrix_2d)
```

```
print("3D Matrix:\n", matrix_3d)

# (e) Generating random matrices
random_matrix = np.random.rand(3, 3)  # 3x3 matrix with random values
print("Random Matrix:\n", random_matrix)
```

◉ OUTPUT :

```
Floor of 3.7: 3
Ceil of 3.2: 4
Square root of 25: 5.0
Integer square root of 25: 5
GCD of 15 and 20: 5
Number of dimensions: 2
Shape of array: (2, 3)
Size of array: 6
Sum of elements: 21
Mean of elements: 3.5
Sorted array: [1 2 3 4 5 6]
Sine of elements: [[ 0.84147098  0.90929743  0.14112001]
 [-0.7568025   -0.95892427 -0.2794155 ]]
Determinant: 10.0
Eigenvalues: [2.+0.j 5.+0.j]
2D Matrix:
 [[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]]
3D Matrix:
 [[[ 1  2  3]
  [ 4  5  6]]
 [[ 7  8  9]
  [10 11 12]]]
Random Matrix:
 [[0.03636844 0.85654466 0.15673213]
 [0.16988836 0.82013757 0.31970091]
 [0.55921906 0.87831687 0.87434032]]
```