**Program**

**Aim:** Python program to perform all matrix operations using numpy

**Program:**

import numpy  
x=numpy.array([[7, 2, 4], [3, 4, 5], [33, 6, 7]])  
y=numpy.array([[7, 22, 5], [5, 44, 3], [3, 2, 1]])  
print ("Addition of two matrices:" )  
print (numpy.add(x,y))  
print ("Subtraction of two matrices: ")  
print (numpy.subtract(x,y))  
print ("Multiplication of two matrices: ")  
print (numpy.multiply(x,y))  
print ("Division of two matrices: ")  
print (numpy.divide(x,y))  
print ("Product of two matrices: ")  
print (numpy.dot(x,y))  
print ("Square root of a matrix: ")  
print (numpy.sqrt(x))  
print ("Summation of column wise elements: ")  
print (numpy.sum(y,axis=0))  
print ("Summation of row wise matrix")  
print (numpy.sum(y,axis=1))  
print ("Transpose of matrix: ")  
print (x.T)

**OUTPUT**

Addition of two matrices:

[[14 24 9]

[ 8 48 8]

[36 8 8]]

Subtraction of two matrices:

[[ 0 -20 -1]

[ -2 -40 2]

[ 30 4 6]]

Multiplication of two matrices:

[[ 49 44 20]

[ 15 176 15]

[ 99 12 7]]

Division of two matrices:

[[ 1. 0.09090909 0.8 ]

[ 0.6 0.09090909 1.66666667]

[11. 3. 7. ]]

Product of two matrices:

[[ 71 250 45]

[ 56 252 32]

[ 282 1004 190]]

Square root of a matrix:

[[2.64575131 1.41421356 2. ]

[1.73205081 2. 2.23606798]

[5.74456265 2.44948974 2.64575131]]

Summation of column wise elements:

[15 68 9]

Summation of row wise matrix

[34 52 6]

Transpose of matrix:

[[ 7 3 33]

[ 2 4 6]

[ 4 5 7]]

**Program**

**Aim: Perform SVD (Singular Value Decomposition using python)**

**Source Code**

from numpy import array  
from scipy.linalg import svd  
A = array([[1, 2], [3, 4], [5, 6], [10, 8]])  
print(A)  
U, s, VT = svd(A)  
print(U)  
print(s)  
print(VT)

**OUTPUT**

[[ 1 2]

[ 3 4]

[ 5 6]

[10 8]]

[[-0.13229621 -0.42605967 -0.48115926 -0.75462351]

[-0.31048578 -0.47327257 -0.51061143 0.64721528]

[-0.48867536 -0.52048548 0.6971847 -0.06499811]

[-0.80454502 0.56884189 -0.14729299 -0.08620317]]

[15.86589447 1.80925193]

[[-0.72813925 -0.68542923]

[ 0.68542923 -0.72813925]]