## Modern Education Society's College of Engineering, Pune

NAME OF STUDENT: Sandesh Santosh Pa	abitwar CLASS: Comp A
SEMESTER/YEAR: III sem	<b>ROLL NO: F20111040</b>
DATE OF PERFORMANCE:	DATE OF SUBMISSION:19/11/2021
EXAMINED BY:Prof.Amol Dhawale	EXPERIMENT NO: DSL A-09

#### TITLE: PERFORM VARIOUS OPERATIONS ON MATRICES

**PROBLEM STATEMENT:** Write a **Python** program to compute following computation on matrix:

- a) Addition of two matrices B) Subtraction of two matrices
  - c) Multiplication of two matrices d) Transpose of a matrix

#### **OBJECTIVES:**

- 1. To understand structure of 2DArray.
- 2. To understand how to Create, Display and perform various operations on 2D array.

#### **OUTCOMES:**

- 1. To analyze the problems to apply suitable algorithm and data structure.
- 2. To understand concept of multi-dimensional array.

### **PRE-REQUISITES:**

- 1. Knowledge of python programming
- 2. Knowledge of 2D array and matrix operations.

# APPARATUS: QUESTIONS:

- 1. What is sparse matrix? Explain with example.
- 2. Write algorithm to perform fast transpose on sparse matrix.

```
print('enter elements of matrix one')
 a = list(map(int, input().split()))
 b = list(map(int, input().split()))
 c = list(map(int, input().split()))
 d = list(map(int, input().split()))
 e = list(map(int, input().split()))
 f = list(map(int, input().split()))
 m1 = [a, b, c]
 m2 = [d, e, f]
 m3 = [[0, 0, 0], [0, 0, 0], [0, 0, 0]] # empty matrix to hold output
\phi def addition(<u>m1</u>, <u>m2</u>):
          for j in range(3):
              m3[i][j] = m1[i][j] + m2[i][j]
     print(m3)
 addition(m1, m2)
 def substraction(m1, m2):
      for i in range(3):
              m3[i][j] = m1[i][j] - m2[i][j]
     print(m3)
 substraction(m1, m2)
 |def transpose(<u>m1</u>):
     for i in range(3):
        for j in range(3):
            m3[i][j] = m1[j][i]
     print(m3)
 transpose(m1)
 |def multiplication(m1, m2):
    for i in range(3):
        for j in range(3):
            for k in range(3):
                m3[i][j] += m1[i][k] * m2[k][j]
     print(m3)
 meltiplication(m1, m2)
```

16 17 **18** 

### **Output:**

```
C:\Users\sspab\PycharmProjects\new\venv\Scripts\python.exe
enter elements of matrix one
enter elements of second matrix
addition matrix
[[3, 6, 9], [10, 12, 14], [12, 14, 16]]
subtraction matrix
[[-1, -2, -3], [-2, -2, -2], [2, 2, 2]]
transpose of m1
[[1, 4, 7], [2, 5, 8], [3, 6, 9]]
multiplication of two matrix is:
[[30, 40, 50], [70, 92, 114], [110, 144, 178]]
Process finished with exit code 0
```

$\sim$ $100$
DSL LOS
Question
1. What is sparse makin? Explain with example.
Ans! Sparse matrix:  A matrix can be defined as a buto-
imencional array having m' columns all
and representing Mxn mam no opense maning
Their elements equal to zero. In ther
words, the sparse makin can be defined
of zero elements than the non-zero elements.
0.9.
000090
0 8 0 0 0 0
000005
lets consider above 5x6 matrin containing 6
numbers of non-zero values. This making can
be represented as shown in the below.
Row eolumes values.
5 6
2 0 4
2

In close enample malin, there are only 6 non zoro elements and pulmin size is 5 XX.  We represent this malin as shown in about the rise table is hilled with valves 5, 6d  which indicates that it is a sparse malinum 5 rows, 6 columns & 6 non removally the second no filled with 0, 4 & 9 which indicates the point 0, 4 & 9 which indicates the con-zero value g is at oth row, 4th Column in the sparse malin 2n the same way, the remaining non-zero values also believe similar pattern:		4 25	· ·		
In olone enample makin, there are only 6 non zero elements. and makin as Shown in about the represent this makin as Shown in about the six table is filled with values 5,64 which indicates that it is a sparse making of Sources for south of 4 g which indicates that of the of 4 g which indicates the south of 4 g which indicates the non-zero value g is at oth row, 4th Collumn in the spanse makin an the same			i i i i i i		
In clare enample malnin, there are only 6 non zono elements and molinn sive is 5 X6. We represent this malnin as Shown in about the present this malnin as Shown in about the saw table is filled with valves 5,64 which indicates that it is a sparse malning of 5 mosts, 6 columns of 6 non zero valves the second now filled with 0,4 t g which indicates the non-zero valve g is at oth now, 4th Column in the spane malnin In the same	ROD	Column	values.		
non zero elements. and mother sive is 5 X6.  We represent this makin as Shown in about  the restable is hilled with valves 5,64  which indicates that it is a sparse making the  Source of the south o,4 t g which india  the non-zero valve g is at oth row, 4th  Column in the spane makin an the same	3	5	5		
non zero elements. and mother sive is 5 X6.  We represent this makin as Shown in about  the represent this makin a sparse makin to  Shigh indicates that it is a sparse makin to  Source of the sound the spanse makin the same  Column in the spanse makin an the same	4	2:	2	and the same of th	
non zero elements. and mother sive is 5 X6.  We represent this makin as Shown in about  the represent this makin a sparse makin to  Shigh indicates that it is a sparse makin to  Source of the sound the spanse makin the same  Column in the spanse makin an the same				the state of the s	
non zero elements. and mothern sive is 5 X6. We represent this makin as Shown in about the represent this makin as Shown in about the part table. Here the first row in the part table is filled with valves 5,64 which indicates that it is a sparse making the Sound now filled with 0,4 t g which indicates the non-zero valve g is at oth row, 4th Column in the spane makin an the same	In above	: enampl	e mahiy	there an	e only 6
We represent this makin as shown in ason the some the first you in the soot table. Here the first you in the south values 5,64 with values 5,64 which indicates that it is a sparse making of south young the second now filled with 0,4 fg which indicates the non-zero value g is at oth yow, 4th Column in the sparse makin an the same	non zem	elemen	b. and	mann si	e 15 5 X6.
the partable is filled with valves 5,64 which indicates that it is a sparse making the Sources for filled with 0,4 £ 9 which indicates the spirith 0,4 £ 9 which indicates the column in the sparse making the Column in the sparse making an the same	he n	epresent	this m	ahin as	hown in about
the son table is filled with valvey 5,64  which indicates that it is a sparse making the  Sows, 6 columns & 6 non renovaling the  Second now filled with 0,4 & 9 which indice  the non-zero value g is at oth row, 4th  Column in the sparse makin an the same		Decre -/2	eble.	Here the f	nist now in
Source that it is a sparse making the Sound now filled with 0,4 t g which indicated the non-zero value g is at oth row, 4th Column in the sparse makin an the same	the or	o table	is fille	d with v	alves 5,64
Sound now filled with 0,4 & g which india the non-zero value g is at oth now, 4th Column in the spane makin an the same					
Second now filled with 0,4 t g which india the non-zero value g is at oth now, 4th Column in the spane makin an the same					
The non-zero value g is at oth row, 4th Column in the spane makin an the same					
Column in the spane makin an the same	The n	m-zemo	salue q	is at o	th now, 4th
Similar pattern.					
	3 ,		1.1.	0010 1000	es also filled
	Similar	r pattern		and the	es also filled
	Similar	r paltern		0010 100	es also filled
	Similar	r pallem			es also filled
	Similar	r pallem			es also filled
	Similar	r pallern			es also filled
	Similar	r pallem			es also filled
	Similar	r pallem			es also filled
	Similar	rpaltem			es also filled
	Similar	rpaltem			es also filled
	Similar	rpaltern			es also filled
	Similar	r pallem			es also filled
	Similar	rpaltem			es also filled
	Similar	rpaltem			es also filled

1 1 1 10 0	lgorithm to perform fast transpose on sporse
1. Wate a	MONIMI ID BENDUM FOR ISSUSSE CHI SHOUSE
mamn	
11. 11.	
Algorithm	0
step 1:	
Step 2°	
	total-array & enden-erray
Step 3	: Size of total array is the the
	Original makin.
Step 4	: Ate every index of total, put the
	number of times respective inden appears in
	Second column of sporce making
Step 5!	Size of enden array. Size of bolden +
steps:	enden [0] = 1 & inden [i] = inden [i-1]
	ttotal[i-1]
Step 7:	Traylesse the spane makin Bon second
	mw & consider column elements.
Step 8:	Lo cation = inden [col-No]
Stop 9:	location the enden of transpose matrix
	= swaffed son from original massa.
Step 10:	Increase indented No J by 1.
' grop 11 !	Repeate Step 7 to 10 for remaining
	pipiets of original matrix.
Van Te	