

**Q.6 Please calculate T(N) for the following three approaches of matrices multiplication**

- **Naïve Method**
- **Divide and Conquer**
- **Strassen's Method**

Matrix 1								Matrix 2							
4	5	7	6	2	3	8	1	6	1	5	4	7	2	3	8
1	2	6	7	5	4	8	3	4	2	7	8	1	5	3	6
4	2	6	1	5	3	8	7	3	1	7	5	2	6	8	4
5	4	8	2	3	1	7	6	3	8	7	1	5	6	4	2
1	2	3	5	7	6	8	4	4	1	6	8	7	5	3	2
2	8	5	1	4	6	3	7	3	1	8	4	2	6	5	7
8	2	6	3	4	5	1	7	8	1	4	5	3	6	7	2
2	6	7	8	1	3	5	4	4	1	8	5	6	3	2	7

### 1. Naïve Method

$T(n) = \text{Subproblem} * T(\text{n/subproblem Size}) + O(n)$

For Naïve Method we have we have  $8*8$  matrix.

So, Multiplication =  $8^3 = 512$  and Addition =  $8^2 = 64$ .

Addition of 2 matrix will take  $O(n^2)$  time

So,  $T(n) = 512 * T(n/8) + O(n^2)$

### 2. Divide and Conquer

For Divide and Conquer Method, We have Total Multiplication =  $8^3 = 512$  and Addition =  $8^2 = 64$ .

Addition of 2 matrix will take  $O(n^2)$  time

So,  $T(n) = 512 * T(n/8) + O(n^2)$

### 3. Strassen's Method

For Strassen's Method, if we can multiply 2 by 2 matrices using only 7 multiplications instead of the usual 8, we can use that into multiplying 8 by 8 matrices using 7 multiplications of 2 by 2

matrices each of which requires 7 multiplications of numbers. So, the total number of multiplications require for 8 by 8 matrix using Strassen's method is 343.

$$\text{So, } T(n) = 343 * T(n/8) + O(n^2)$$