National Institute of Technology Tiruchirappalli
BRANCH: *Computer Science and Engineering*
B. Tech. IV Semester**, Cycle Test I Examination**
SUB. CODE & TITLE: *CSPC42* **&** *Introduction to Algorithms*
DATE: 01.03.2021, **TIME**: 60 MIN, **Max. Marks:** 25**, No. of Pages:**01

Instructions: *Answer all the questions.*

1. Write the time complexity for the given code (2)

```
for (i=1; i<= n*n; ++i){
  for (j=1; j*j<=n; ++j){
        \\operations with  in this loop is time complexity O(1)
}}
```

2. Arrange the given functions in the order of slowest to fastest growing order. (2)
n^3, $n \log_2 n$, 2^n, $n!$, $n^2 \log_2 n$, 1, n^n , $\log_2 n$, 3^n

3. Find the recurrence relation for the given code and solve the recurrence equation. (3)

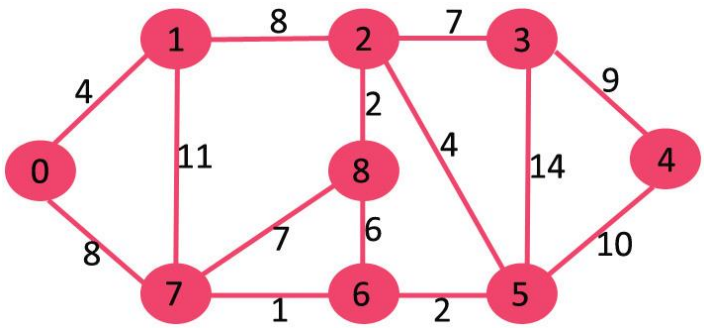
```
Algorithm A(n)
{
if(n= = 2) return 1
else
    return (A(n^0.5)+A(n^0.5))
}
```

4. Trace the Quick Sort algorithm for sorting the values {2, 8, 7, 1, 3, and 5} and analyse the time complexity. (4)

5. Let number of jobs=5, profits [10, 3, 33, 11, 40] and deadlines [3, 1, 1, 2, 2] respectively. State the design paradigm for job sequencing and find the optimal solution for the given problem. (4)

6. Given a tank with capacity C litters which is completely filled in starting. Everyday tank is filled with l litters of water and in the case of overflow extra water is thrown out. Now on i^{th} day i litters of water is taken out for drinking. We need to find out the day at which tank will become empty the first time. Write an algorithm to solve the problem with time complexity O (log C). (5)

7. What is Minimum spanning tree? Write Kruskal's algorithm for finding MST and trace the algorithm for the given graph. (5)



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