

15/15

BRAC UNIVERSITY  
Department of Computer Science and Engineering

Sec: 10

Examination: Quiz  
Duration: 25 minutes

Semester: Fall 2022  
Full Marks: 15

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## CSE221: Algorithms

1.  $T(n) = 3T(3n/4) + T(n/2) + n$ ,  $T(1) = 1$  Find out the time complexity of the equation. 5

Let,  $T'(n) = T(\frac{n}{2}) + n$

$$\begin{matrix} a=1 \\ b=2 \\ k=1 \end{matrix} \left. \begin{matrix} b^k = 2 \\ a < b^k \end{matrix} \right\}$$

$$\therefore T'(n) = O(n)$$

$$T(n) = 3T\left(\frac{3n}{4}\right) + n$$

$$\begin{matrix} a=3 \\ b=\frac{4}{3} \\ k=1 \end{matrix} \left. \begin{matrix} b^k = \frac{4}{3} \\ a > b^k \end{matrix} \right\}$$

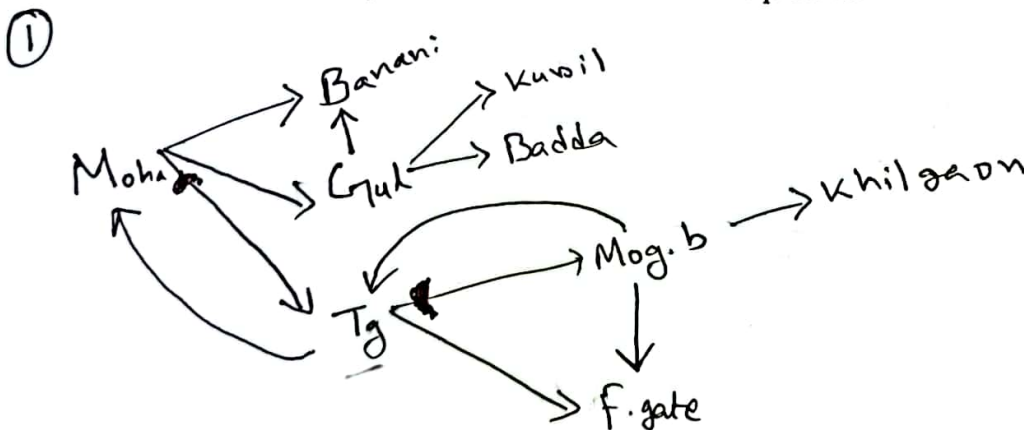
$$T(n) = O\left(n^{\log_{\frac{4}{3}} 3}\right) = O(n^{3.81})$$

(Ans.)

2. Suppose you want to visit places in Dhaka. The connecting paths of two places are one way. From Mohakhali, one can go to Banani, Gulshan and Tejgaon. From Tejgaon, one can go to Mohakhali, Mogbazar, Firmgate. From Gulshan, there are ways to go to Banani, Badda and Kuril. From Mogbazar, there are ways to go to Firmgate, Khilgaon and Tejgaon. You want to start traveling from Tejgaon

i. Create the graph of the city.

ii. Now applying a suitable graph traversal algorithm, find out the minimum distance for the places. Demonstrate the whole process. 3  
7



(11)

For minimum distance we have to do BFS

Node	Color	Parent	Distance
Tejgaon	white	null	0
Farm gate	white	Tejgaon	1
Mogbazar	white	Tejgaon	1
Khilgaon	white	Mogbazar	2
Mohakhali	white	Tejgaon	1
Banani	white	Mohakhali	2
Gulshan	white	Mohakhali	2
Kumil	white	Gulshan	3
Badda	white	Gulshan	3