

GOVT. COLLEGE OF ENGINEERING, AMRAVATI

Department of Computer Science and Engineering

CLASS TEST-I (Summer 2018) B. Tech. Third Year

Course: Design and Analysis of Algorithms Code: ITU601 Time: 1 hrs. Marks: 15 Date: 22/01/2018

- Q1.** Prove that the running time complexity of insertion Sort Algorithm is quadratic function of n . (5 marks)
- Q2.** Write algorithm for Merge sort and derive its running time complexity with its standard function of n . (4 marks)
- Q3.** What is Asymptotic Notation; explain all with its graphs. (6 marks) **OR**
- Q4.** Solve with proof. (6 marks)
- A. Suppose we are comparing implementations of insertion sort and merge sort on the same machine. For inputs of size n , insertion sort runs in $8n^2$ steps, while merge sort runs in $64n \lg n$ steps. For which values of n does insertion sort beat merge sort?
- B. What is the smallest value of n such that an algorithm whose running time is $100 n^2$ runs faster than an algorithm whose running time is $2n$ on the same machine?

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Q1. Explain recursive calls with suitable example. [5 M]

Q2. "Insertion sorting makes on the average about half as many comparisons as in the worst case" -Discuss. [5 M]

Q3. Explain algorithm for Towers of Hanoi problem. Also prove that for m rings, it requires $\Theta(2^m)$ movements. [5 M]

OR

Q3. Solve the following recurrence. [5 M]

$$t_n = \begin{cases} n & \text{if } n=0,1 \text{ or } 2 \\ 5t_{n-1} - 8t_{n-2} + 4t_{n-3} & \text{otherwise} \end{cases}$$

Homogeneous

Government College of Engineering, Amravati
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Class Test-I (S-19)

Sub: ITU 601 DAA

Marks: 15

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Solve Any Three

Q.1 Solve the following recurrence:

$$t_n - 2t_{n-1} = (n+5)3^n \quad n \geq 1$$

Q.2 Which of the following statements are true? Prove your answers.

i. $n^2 \in O(n^3)$ ii. $n^2 \in \Omega(n^3)$ iii. $2^n \in \Theta(2^{n+1})$

Q.3 What is sequencing in the analysis of control structure? Provide detail algorithmic analysis of "for loops".

Q.4 Explain efficiency of algorithms in detail.