Design and Analysis of Algorithms

Lecture-9

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AKTU Examination Questions

1. Solve the recurrence $T(n) = 2T(n/2) + n^2 + 2n + 1$

2. Solve the recurrence using recursion tree method:

$T(n) = T(n/2) + T(n/4) + T(n/8) + n$

3. Use a recursion tree to give an asymptotically tight solution to the recurrence $T(n) = T(\alpha n) + T((1 - \alpha)n) + cn$, where α is a constant in the range $0 < \alpha < 1$ and $c > 0$ is also a constant.

4. The recurrence $T(n) = 7T(n/3) + n^2$ describes the running time of an algorithm A. Another competing algorithm B has a running time of $S(n) = a\,S(n/9) + n^2$. What is the smallest value of 'a' such that A is asymptotically faster than B?

5. Solve the recurrence relation by substitution method

$T(n) = 2T(n/2) + n$

AKTU Examination Questions

6. Show that the solution to $T(n) = 2T(\lfloor n/2 \rfloor + 17) + n$ is $O(n \lg n)$.

7. Solve the recurrence: $T(n) = 50\, T(n/49) + \log n!$

8. Solve the following recurrence using Master method:

$T(n) = 4T(n/3) + n^2$

9. Find the time complexity of the recurrence relation

$T(n) = n + T(n/10) + T(7n/10)$

10. Solve the following By Recursion Tree Method

$T(n) = n + T(n/5) + T(4n/5)$

11. The recurrence $T(n) = 7T(n/2) + n^2$ describe the running time of an algorithm A. A competing algorithm A has a running time of $T'(n) = aT'(n/4) + n^2$. What is the largest integer value for a A' is asymptotically faster than A?