



ASSIGNMENT

Code: IT501
Contacts: 3L+1T
Credits: 4

Sub Code & Name: IT501– Design & Analysis of Algorithm
Branch: Information Technology Semester : 5th

Name of Faculty Subject: Prof. Dr. Tilendra Shishir Sinha

1. Discuss various types of algorithms and their need.
2. What do you mean by Substitution method? Discuss it with an example
3. Solve the below recurrence relation

$$a_n = 5 \quad \text{When} \quad n=0$$

$$a_n = 7 \quad \text{When} \quad n=1$$

$$a_n - 2a_{n+1} + a_{n-2} = 0$$

4. For $T(n) = 2T(n/2) + n^3$. Solve the recurrence relation
5. Solve the Recurrence Relation $T(n) = 4T(n/2) + n$.
6. Solve the Recurrence Relation $T(n) = T(2n/3) + 1$.
7. Solve the Recurrence Relation $T(n) = 9T(n/3) + n$
8. Let 6 number of matrices are given $A_1 = 30 \times 35$, $A_2 = 35 \times 15$, $A_3 = 15 \times 5$, $A_4 = 5 \times 10$, $A_5 = 10 \times 20$, $A_6 = 20 \times 25$. By using matrix chain multiplication algorithm find out the minimum number of multiplication requirement and the how the parenthesis are placed?
9. Let $R(i, j)$ be the number of times that table entry $m[i, j]$ is referenced while computing other table entries in a call of MATRIX-CHAIN-ORDER. Show that the total number of references for the entire table is

$$\sum_{i=1}^n \sum_{j=i}^n R(i, j) = \frac{n^3 - n}{3} ,$$

10. Which is a more efficient way to determine the optimal number of multiplications in a matrix chain multiplication problem: enumerating all the ways of parenthesizing the product and computing the number of multiplications for each, or running RECURSIVE-MATRIXCHAIN? Justify your answer.
11. Two sets are given $X = \langle A, B, C, B, D, A, B \rangle$ and $Y = \langle B, D, C, A, B, A \rangle$, By using LCS algorithm find the longest common subsequence Z form the two given sets.
12. Discuss Prim's Algorithm along with an example
13. Discuss Kruskal's Algorithm along with an example



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14. Six number of characters are given with their frequency. Create a Huffman Tree by using Huffman code Algorithm.

Character	a	B	c	d	E	f
Frequency	45	13	12	16	9	5

15. How a dynamic problem will be solved? Discuss with some steps
16. Let four matrices are given $A=5 \times 4$, $B=4 \times 6$, $C=6 \times 2$, $D=2 \times 7$, by using optimal matrix chain multiplication find out minimum number of multiplication operation and how the parenthesis are placed in the four matrices.
17. By using Quick sort method sort the given elements. $A=\{2,8,7,1,3,5,6,4\}$
18. Show that the running time of QUICKSORT is $\Theta(n^2)$ when the array A contains distinct elements and is sorted in decreasing order.
19. Some elements are given by using merge sort, sort these elements.
 $A=\{2,4,5,7,1,2,3,6\}$
20. Discuss DFS and BFS algorithm with the help of an example
21. How Bellman-Ford Algorithm is applicable in Single Source Shortest path?
22. Differentiate Bellman-ford and Dijkstra Algorithm
23. Discuss KMP algorithm with the help of two examples
24. Discuss application of Boyer-Moore Algorithm in String Matching Process.
25. Calculate prefix table for the pattern $P = abacaba$.