

1	<p>Explain with appropriate detail with example.</p> <ul style="list-style-type: none"> a) Heap Sort b) NP Vs. NP-Complete Problems c) Use of sentinel values in code tuning technique d) Pruning Strategy with example e) Strassen's Matrix Multiplication strategy f) In some cases recursion gives more complex algorithms in terms of time complexity then the iterative algorithms? Explain with example.
2	<p>The Longest Ascending subsequence problem is defined as follows: Given an array $A[1:n]$ of natural numbers , Find the length of the longest ascending subsequence of array A. A subsequence is a list $A[i_1], A[i_2], A[i_3], \dots, A[i_m]$ for some $1 \leq i_1 < i_2 < i_3 < \dots < i_m \leq n$. The value m is called the length of the subsequence. Write an appropriate algorithm.</p> <p>A</p> <p>B Suppose an arithmetic expression is given as an Directed acyclic Graph with common subexpressions removed. For example $2+3*4+5/(3*4)$ would be given as shown. Devise an algorithm for evaluating such an expression in time $O(n)$.</p> <div style="text-align: center; margin: 20px 0;"> $\begin{array}{c} + \\ / \quad \backslash \\ + \quad / \\ / \quad \backslash \quad / \quad \backslash \\ 2 \quad * \quad 5 \\ / \quad \backslash \\ 3 \quad 4 \end{array}$ </div> <p>C One Processor Scheduling Problem is defined as follows. We are given a set of n jobs. Each job I has a start time t_i and a deadline d_i. A feasible solution is a permutation of the jobs such that when the jobs are performed in that order, then every job is finished before the deadline. Write a greedy algorithm for this which processes the jobs in the order of deadline (the early deadlines processed before the late ones).</p>
3	<p>Arbitrage is the use of discrepancies in the currency exchange rates to make profit. Suppose 1 US \$ buys 0.74 pounds, 1 pound buys 2 Australian dollars & 1 Australian dollar buys 0.70 US \$. Then 1 US \$ buy $0.75 * 2 * 0.7 = 1.05$ US \$ having a profit of 5 %. We are given n currencies c_1, c_2, \dots, c_n</p>

	<p>& nXn table R of exchange rates, such that one unit of currency C_i buys $R[i,j]$ units of currency C_j .</p> <p>Give an efficient algorithm to determine the maximum profit for a sequence $[i_1,i_2].R[i_2,i_3].\dots.R[i_{k-1},i_k].R[i_k,i_1]$</p> <p>B Design a backtracking algorithm that inputs a natural number C, an outputs all of the ways that a group of ascending positive numbers can be summed to give C. For example if $C=6$, the ouput should be</p> <p>1+2+3 1+5 2+4 6</p>
4	<p>A Huffman Algorithm compresses the files using the frequency of occurrence of various characters in the file. Explain in detail the Huffman Compression and how it uses prefix free code.</p> <p>B Modify the Binary Search Algorithm so that it splits the input not into two sets of almost equal sizes but into two sets of sizes approximately one third and two thirds.</p> <p>C Explain the following</p> <ol style="list-style-type: none"> 1. Internal and external sort with example 2. Approximation Algorithms 3. Using Oracle for finding lower bounds