CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

FACULTY OF TECHNOLOGY & ENGINEERING

SMT. KUNDANBEN DINSHA PATEL DEPARTMENT OF INFORMATION TECHNOLOGY

Subject Name: Design and Analysis of Algorithm **Semester: B.Tech V**
Subject Code: IT351 **Academic year: June -Dec 2022**

Practical List

Analysis of Program should contain following sub heading(s).

1. **Impact of Input Size on the Performance of Program**. Make Table and Draw graph of Input Size Vs Running Time/Total No of Instructions. Take at least Five Input of Different Size.
2. I**mpact of Input Quality on the Performance of Program**. Make Table and Draw graph of Best Case, Worst Case and Average Case Input Quality Vs Running Time/ Total No. of Instructions.
3. **Rate of Growth of Program.** Make Table and Draw Graph of Input Size Vs Instruction(s) Running Maximum No of Time in the Program.
4. **Conclusion** from the above graph or Data Table.

Sr No.	Practical Aim		Hrs	COs
1	**Implement and analyze algorithms given below.**		**02**	**1,3**
	1.1	Factorial of a given number (Iterative and Recursive)		
	1.2	Fibonacci Series(Iterative and Recursive)		
	1.3	Linear Search and Binary Search		
2	**Implement and analyze algorithms given below.**		**02**	**1,3**
	2.1	Bubble Sort		
	2.2	Selection Sort		
	2.3	Insertion Sort		
3	**Implement and analyze algorithms given below.(Divide and Conquer Strategy)**		**02**	**1,2,3**
	3.1	Merge Sort		
	3.2	Quick Sort.		
4	**Implement and analyze below given problem.(Greedy Approach)**		**08**	**1,2,3**
	4.1	A Burglar has just broken into the Fort! He sees himself in a room with n piles of gold dust. Because the each pile has a different purity, each		

<table>
<tr><td></td><td></td><td>pile also has a different value (v[i]) and a different weight (w[i]). A Burglar has a bag that can only hold W kilograms.
Given n=5, v={4,2,2,1,10}, c={12,1,2,1,4} and W=15,calculate which piles Burglar should completely put into his bag and which he should put only fraction into his bag.
Design and implement an algorithm to get maximum piles of gold using given bag with W capacity, Burglar is also allowed to take fractional of pile.</td><td></td><td></td></tr>
<tr><td></td><td>4.2</td><td>Suppose you want to schedule N activities in a Seminar Hall. Start time and Finish time of activities are given by pair of (si,fi) for ith activity. Implement the program to maximize the utilization of Seminar Hall. (Maximum activities should be selected.)</td><td></td><td></td></tr>
<tr><td></td><td>4.3</td><td>Find Minimum Cost spanning tree of a given undirected graph using Kruskal and Prim’s algorithm. Also observe effect on experiment result of choosing those algorithms.</td><td></td><td></td></tr>
<tr><td></td><td>4.4</td><td>Hacker Rank Challenge
https://www.hackerrank.com/domains/algorithms?filters%5Bsubdomains%5D%5B%5D=greedy</td><td></td><td></td></tr>
<tr><td>5</td><td colspan="2">Implement and analyze given problems (Dynamic Programming)</td><td>08</td><td>1,2,3</td></tr>
<tr><td></td><td>5.1</td><td>Given two integer arrays val[0..n-1] and wt[0..n-1] which represent values and weights associated with n items respectively. Also given an integer W which represents knapsack capacity, find out the maximum value subset of val[] such that sum of the weights of this subset is smaller than or equal to W. You cannot break an item, either pick the complete item, or don’t pick it (0-1 property).</td><td></td><td></td></tr>
<tr><td></td><td>5.2</td><td>Implement a program to print the longest common subsequence for the two strings.
<table>
<tr><th>Test Case</th><th>String1</th><th>String2</th></tr>
<tr><td>1</td><td>ABCDAB</td><td>BDCABA</td></tr>
<tr><td>2</td><td>EXPONENTIAL</td><td>POLYNOMIAL</td></tr>
<tr><td>3</td><td>LOGARITHM</td><td>ALGORITHM</td></tr>
</table></td><td></td><td></td></tr>
<tr><td></td><td>5.3</td><td>Given a chain < A1, A2,…,An> of n matrices, where for i=1,2,…,n matrix Ai with dimensions. Implement the program to fully parenthesize the product A1,A2,…,An in a way that minimizes the number of scalar multiplications.
Also calculate the number of scalar multiplications for all possible combinations of matrices.</td><td></td><td></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><th>Test Case</th><th>n</th><th>Matrices with dimensions</th></tr>
<tr><td>1</td><td>3</td><td>A1: 3*5, A2: 5*6, A3: 6*4</td></tr>
<tr><td>2</td><td>6</td><td>A1: 30*35, A2: 35*15, A3: 15*5, A4: 5*10, A5: 10*20, A6: 20*25</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td></td><td>5.4</td><td>Hacker Rank Challenge

https://www.hackerrank.com/domains/algorithms?filters%5Bsubdomains%5D%5B%5D=dynamic-programming</td><td></td><td></td></tr>
<tr><td>6</td><td colspan="2">Implement and analyze the problem. (Backtracking)</td><td>02</td><td>1,2,3</td></tr>
<tr><td></td><td>6.1</td><td>For a given N x N chessboard. Implement a program to find a way to place ‘N’ queens such that no queen can attack any other queen on the chessboard. A queen can be attacked when it lies in the same row, column, or the same diagonal as any of the other queens. Implement the problem to print all the possible configuration for N Queen Problem.</td><td></td><td></td></tr>
<tr><td>7</td><td colspan="2">String Matching Problem.</td><td>02</td><td>1,2,3</td></tr>
<tr><td></td><td>7.1</td><td>Suppose you are given a source string S[0 ..n − 1] of length n, consisting of symbols a and b. Suppose further that you are given a pattern string P[0 ..m − 1] of length m < n, consisting of symbols a, b, and *, representing a pattern to be found in string S. The symbol * is a “wild card” symbol, which matches a single symbol, either a or b. The other symbols must match exactly. The problem is to output a sorted list M of valid “match positions”, which are positions j in S such that pattern P matches the substring S[j..j + |P|− 1]. For example, if S = ababbab and P = ab*, then the output M should be [0, 2].
Implement Naive and Rabin karp algorithm to solve the problem.</td><td></td><td></td></tr>
<tr><td>8</td><td colspan="2">Codechef Problems Discussion</td><td>04</td><td>1,2,3</td></tr>
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