

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

FACULTY OF TECHNOLOGY & ENGINEERING

DEPARTMENT OF INFORMATION TECHNOLOGY

Subject Name: Design and Analysis of Algorithm

Semester: B.Tech V

Subject Code: IT341

Academic year: June -Dec 2018

Practical List

Instructions:

- I. All Practical must be performed individually.
- II. All Practical must be signed regularly in the laboratory by concern lab Teacher.

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. **Impact 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
1	Introduction to profiling in C and Implement and analyze algorithms given below	02
	1.1 Fibonacci Series(Iterative and Recursive)	
	1.2 Factorial of a given number (Iterative and Recursive)	
2	Implement and analyze algorithms given below.(1 Lab for 2.1, 1 Lab for 2.2 & 2.3)	04
	2.1 Bubble Sort	
	2.2 Selection Sort	
	2.3 Insertion Sort	
3	Implement and analyze algorithms given below.(Divide and Conquer Strategy) (1 Lab for 3.1 & 3.2, 1 Lab for 3.3)	04
	3.1 Design and implement searching algorithm to find given word from English dictionary using minimum number of comparisons. Also find out time complexity of algorithm.	
	3.2 Merge Sort	
	3.3 Quick Sort	
4	Implement and analyze any one (Greedy Approach)	02
	4.1 Suppose there are two persons A & B. For Given amount N, If person A wants change for N Rupees, and suppose the person B having infinite number of coin for each value of C, where $C=\{c1,c2,c3,c4,c5\}$. Person A wants minimum number of coins from Person B for the amount N. Design and implement an algorithm to minimize the number of coins to make up the given amount.	

4.2 A Burglar has just broken into the Fort! He sees himself in a room with n piles of gold dust. Because each pile has a different purity, each 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 number of piles, $v=\{v_1,v_2,v_3,\dots,v_n\}$, $w=\{w_1,w_2,w_3,\dots,w_n\}$ and capacity of bag W .

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.

5 Design & Implement given problems (Greedy Approach)

04

5.1 There are eleven Professors in a Department. Each professor wants to deliver lecture in same day. Each professor has some time limits for lecture. Professor earns credit if and only if lecture is arranged on or before its time limit.

Professor	1	2	3	4	5	6	7	8	9	10	11
credit	78	90	50	60	75	10	80	55	88	74	59
Lecture Limit	5	4	5	3	2	1	4	6	4	5	6

Design and implement greedy approach to schedule maximum number of lectures in the department without and with credit.

5.2 Design LAN topology using distributed computer and communication networks, wiring connections, transportation networks among cities, and designing pipe capacities in flow networks. It is intended to network five computers at a large theme park. There is one computer in the office and one at each of the four different entrances. Cables need to be laid to link the computers. Cable laying is expensive, so a minimum length of cable is required.

6 Implement and analyze given problems (Dynamic Programming)

04

6.1 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).

6.2 Given a sequence of matrices, find the most efficient way to multiply these matrices together. The problem is not actually to perform the multiplications, but merely to decide in which order to perform the multiplications.

7 Implement and analyze given problem Any one(Dynamic Programming)

02

7.1 Find the minimum of characters to be inserted to convert it into palindrome.

7.2 Given n dice each with m faces, numbered from 1 to m , find the number of ways to get sum X . X is the summation of values on each face when all the dice are thrown.

8 String Matching

02

8.1 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.

9 Implement and analyze the problem

02

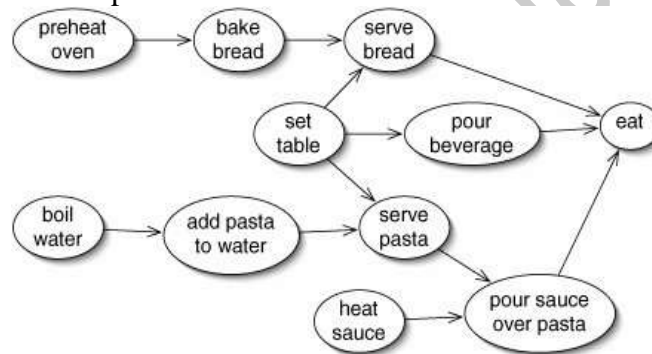
9.1 Eight Queen Problem

10 Design and analyze any two (Graph)

04

10.1 Given an undirected graph and a number m , determine if the graph can be colored with at most m colors such that no two adjacent vertices of the graph are colored with same color. Here coloring of a graph means assignment of colors to all vertices. Solve this using Backtracking.

10.2 Dinner involves a number of different tasks, shown in this directed graph. An edge indicates that one task must be performed before another. For example, the oven must be preheated before the bread can be baked. It should be noted that only a programmer would consider this a complete meal.



Implement this problem to generate all the possibilities.

10.3 Let us consider the situation of a war. In your country, there is a network of telephone lines between 9 cities (A, B, C...H, I) i.e. the 9 cities are connected by telephone line, which means that a message from one city to any other city can be transmitted through the line. Like we can transfer message from city A to city B even though they are not "directly" connected by a line. So what's the catch, everything seems fine, right?

You are the "army-general" of your country and you've to take a decision, you have to find the city which, if damaged would incur the greatest network blockage (Considering that damaging the city damages all the connected telephone lines in it).

Implement this situation and find out Which city would you try to protect the most and why?

