1	a) Even if the speed of the processors is increasing exponentially, the search for faster algorithms will continue. Comment. b) The statement "I had made the best algorithm "is not considered to be the good statement in computer science community. Why? What should be said? c) We always go for worst case complexity of an algorithm. Give three reasons with explanation. d) Macro analysis is preferable instead of micro analysis? Explain. e) What you consider by the lower bound and the upper bound of a problem? What is an oracle? f) We want to solve all the problems in polynomial time? What is the limitation of problems with solution in non polynomial time? g) What are approximation algorithms? What is ϵ-approximation? h) In the initial days of algorithm design the stress was equally on time and space of an algorithm. Now we stress more on time. Give your reasons and validate with examples. i) What you understand by parallel algorithm design technique. j) Compare arrays and link lists on any three points. k) For computer network problem which data structure you will choose and why? We have many types of tree data structures available. Does it make the choice difficult or it is better to have so many structures different situations. Give your views with proper reasoning.
2	a) A popular diversion, word find, asks the player to find a word in a square table filled with single letters. A word can read horizontally, vertically or diagonally in any direction. Write a Brute force algorithm to find the word. b) Write the Divide and conquer algorithm to find the largest and smallest element of a given array. a) A graph is said to be bi-partite if all its vertices can be partitioned into two disjoint subsets X and Y so that every edge connects a vertex in X with a vertex in Y. It is also called as two-colorable graph where every edge has its two vertices colored in different colors. Design a DFS or BFS based algorithm to see whether a Graph is bipartite or not.
3	a) Write an algorithm for Euclid's game which states that : It starts with two unequal positive numbers on the board. Two players move in turn. On each move, a player has to write on the board a positive number equal to the difference of two numbers already on the board. The player who cannot move loses the game. Your algorithm can be limited to displaying the maximum of 7 turns of each employee. b) There are four people who want to cross the bridge, they all begin on the same side. You have 17 minutes to get all of them across to other side. It is night, and they have one flashlight. A maximum of two people can cross the bridge at one time. Any party that crosses, either one or two people, must have

	the flashlight with them. Each person walks at a different speed, person 1- 1 minute to cross the bridge, person 2-2 minutes, person 3 – 5 minutes, person 4- 10 minutes. A pair must travel at the pace of slower person's speed. Write the solution in steps. c) Write an algorithm to find the smallest difference between two numbers in an array of 20 positive integers.
4	a) Optimal binary search tree is the tree that will help in performing the search of the desired nodes in the fastest possible speed. It will also take into account the probability of a particular node being searched as compared to the other. Write a dynamic programming algorithm for optimal binary search tree. b) In a 8X8 chessboard a queen can attack horizontally, vertically and diagonally to other queens on the board. Write a backtracking algorithm for 8 queen problem so that they are in non attacking position to each other.
5	a) A partial knapsack is the knapsack where we need to put the full or partial items so as to maximize the profit against an objective weight that is given. Write a greedy algorithm for partial knapsack problem. b) Write an algorithm to find all the substrings that are being repeated in a given string. For example in the string " hellohowareyouhel" substring 'hel' is repeated. Don't consider single alphabet repetitions. c) Given a traveling salesman problem in which the cities are connected to each other and distances are written on the edges. A salesman can start from any city. Write an all pair shortest path algorithm.