DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
BLOCK EXAMINATION
SUBJECT: (IT 509) Design And Analysis of Algorithm

Examination	**: B.TECH Semester - V**	**Seat No.**	**:**
Date	**: 22/10/2016**	**Day**	**: Saturday**
Time	**: 11:00 To 12:15**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume any necessary data but giving proper justifications.
4. Be precise, clear and to the point in answering the questions. Unnecessary elaborations will not fetch more marks.

Q.1 Do as directed. **[12]**

(a) What is the key difference between Divide and Conquer and Dynamic Programming paradigm? **[1]**

(b) Discuss difference between DFS and BFS techniques. **[2]**

(c) Discuss difference between P and NP problems. **[2]**

(d) Is it possible to solve single-source longest path problem using dijkstra's algorithm by changing minimum to maximum? Yes or No with proper justification and counterexample. **[2]**

(e) Consider an input that is an array of N numbers. The problem is to check whether this array is distinct or not i.e. if no two numbers are the same, the answer is YES, otherwise the answer is NO. Show that this problem can be solved in Θ (N lgN) time. **[4]**

(f) If A $\leq_p$ B and B belongs to NP-Complete, then A belongs to which class? [P/NP/NP-Complete/NP-Hard] **[1]**

Q.2 Attempt ***Any TWO*** of the following questions. **[12]**

(a) Consider the variation of the binary search algorithm that splits the input into three sets of equal sizes (almost) let's call it ternary search. Write down the algorithm for ternary search and analyze its complexity. Is binary search is preferable over ternary search? Yes/No with proper justification. **[6]**

(b) Comparison based sorting algorithms take Ω(nlogn) time, prove it using decision tree model with proper justification. [With theorem you have to prove lemma also] **[6]**

(c) Suppose we want to solve the Maximum Spanning Tree problem. Depict the kruskal's algorithm for finding Maximum Spanning Tree of a given graph, analyze its time complexity with appropriate reasoning. **[6]**

Q.3 (a) Discuss backtracking solution for N-Queen problem and write the algorithm for the same. **[6]**

(b) Describe the fractional knapsack problem setup with different greedy strategy, write the algorithm for optimal greedy strategy and analyze its time complexity. **[6]**

OR

Q.3 (a) Discuss the principle operations involve in designing Non Deterministic algorithms. Design Non Deterministic Searching and Sorting algorithm and compare its complexity with deterministic algorithms to do the same. **[6]**

(b) Analyze the time complexity of Quicksort algorithm's Best case, Average case, and Worst case in detail. It is possible to eliminate worst case always if we use random element as pivot in Quicksort? Yes/No with proper justification. **[6]**