Reg No.									

MANIPAL INSTITUTE OF TECHNOLOGY
(Constituent Institute of Manipal University)
MANIPAL-576104

V SEMESTER B.E. (CSE) DEGREE EXAMINATION-2010
SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS (CSE 301)

TIME : 3 HOURS   **MAX.MARKS : 50**

Note: (i) Answer **ANY FIVE** full questions.

1.(a) Explain the terms "stable algorithm" and "in place algorithm" with regard to sorting. Give an example for each.   (4 Marks)
(b) List and explain the aspects of algorithms to be considered in choosing an algorithm from among multiple algorithms, in which all the algorithms solve the same problem.
                                                                          (2 Marks)
(c) Arrange the following functions in the increasing order of growth
   i. $\log(n!)$ ii. $n \log n$
  iii. $\sqrt{\log n}$ iv. $(\log n)!$ (2 Marks)
(d) Write the recursive solution for Towers of Hanoi problem and provide the time complexity.   (2 Marks)

2.(a) Write bubble-sort algorithm. Derive time-complexity of the algorithm.   (4 Marks)
(b) Write a general divide and conquer recurrence relation explaining all the notations. Write Master theorem of solving a divide and conquer recurrence relation.   (4 Marks)
(c) Write the steps in partitioning(not sorting) the following data using Quick sort algorithm. Assume pivot element as the first element in the set.   (2 Marks)
                 7   4   3   9   5   6   10   12

3.(a). Design a decrease-by-one algorithm for generating the power set of a set of *n* elements. The power set of a set S is the set of all the subsets of S, including the empty set and S itself. Derive the time complexity of the algorithm.   (4 Marks)
(b) List any four differences between Depth-First Search and Breadth-First Search.
                                                                          (4 Marks)
(c). Explain any one method of topological sorting with an example.   (2 Marks)

4.(a) Write and explain JohnsonTrotter algorithm for generating permutations.(4 Marks)
(b). Mention the characteristics of 2-3 trees. Construct step-wise 2-3 tree for the following data.   (4 Marks)
             8   4   7   2   1   3   6

(c) Write the bottom-up heap construction algorithm. (2 Marks)

5.(a). What is Problem Reduction ? Give an example. (2 Marks)

(b). For the below pair of text and pattern write the shift table for string matching using Horspool's algorithm. Show clearly each trial while searching for all occurrences of the pattern in the text using Horspool's algorithm. Mention shift distance after each trial.

(4 Marks)

Text – S C H E M E S   O F   S A L A R I E D   S A L E S   P E R S O N S

Pattern – S A L E S

(c). Write an algorithm for computing binomial co-efficient using dynamic programming. Derive an equation for time complexity of the algorithm. (4 Marks)

6.(a) Explain Huffman trees with an algorithm for its construction. (4 Marks)

(b). Discuss the solution for N-Queens problem using backtracking by writing all the state space when N=4. (4 Marks)

(c) Write a note on NP and NP-Complete problems. (2 Marks)

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