# END TERMS EXAMINATION

## THIRD SEMESTER (MCA),DECEMBER-2010

**Paper Code: MCA-205** **Subject: Design and Analysis of Algorithm**
**Paper ID: 44205**

**TIME:3 Hours** **Maximum Marks:60**

**Q1 is compulsory. Attempt any four questions from the rest.**

## **Q1** Explain briefly:

(a) Define the asymptotic notations used for best case, average case and worst case analysis of algorithms.
(b) Give an array of eight elements which is the worst case of Insertion sort.
(c) Among best first search' and 'depth first search', which technique is used in inorder traversal of a binary tree and how?
(d) What is the average case complexity of binary search algorithm?
(e) Define strongly connected graph and give an example of a graph that is strongly connected.
(f) Mention two specific features of Dijkstra's algorithm that makes it a greedy algorithm.
(g) Write an algorithm to find median and mode from a list of 'n' elements.
(h) Find order of complexity of function $f(n)=2^{*} f(n-1)+5$ with initial condition of $f(1)=1$.

(i) Distinguish between polynomial time algorithm and polynomial time verifiable algorithm.

(j) Why a variable length code is always better than a fixed length code? Is Huffman code a fixed length code?

**Q2** (a) Define the 'divide and conquer' concept and prove that time complexity of merge sort is of order n log(n).

(b) Explain the Strassen's algorithm for matrix multiplication on three matrices: A, B and C of size (2*3), (3*4) and (4*2).

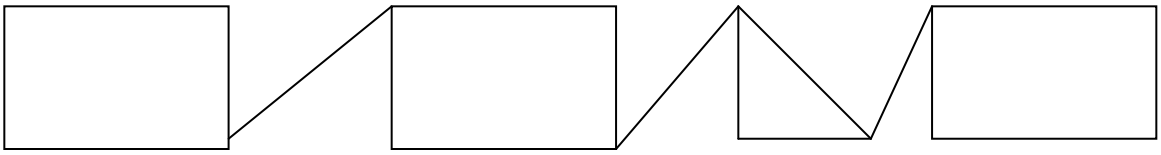
Find the size of final matrix and number of multiplications (not any addition) performed.

**Q3** (a) Describe the algorithm of finding longest common subsequence in two strings(pattern).

(b) Define NP Complete problem specifying condition for a problem to be NP Complete. Given an example of a problem that NP-complete but not of polynomial time.

**Q4** (a) Write a recursive algorithm to reverse a sorted array in reverse order.

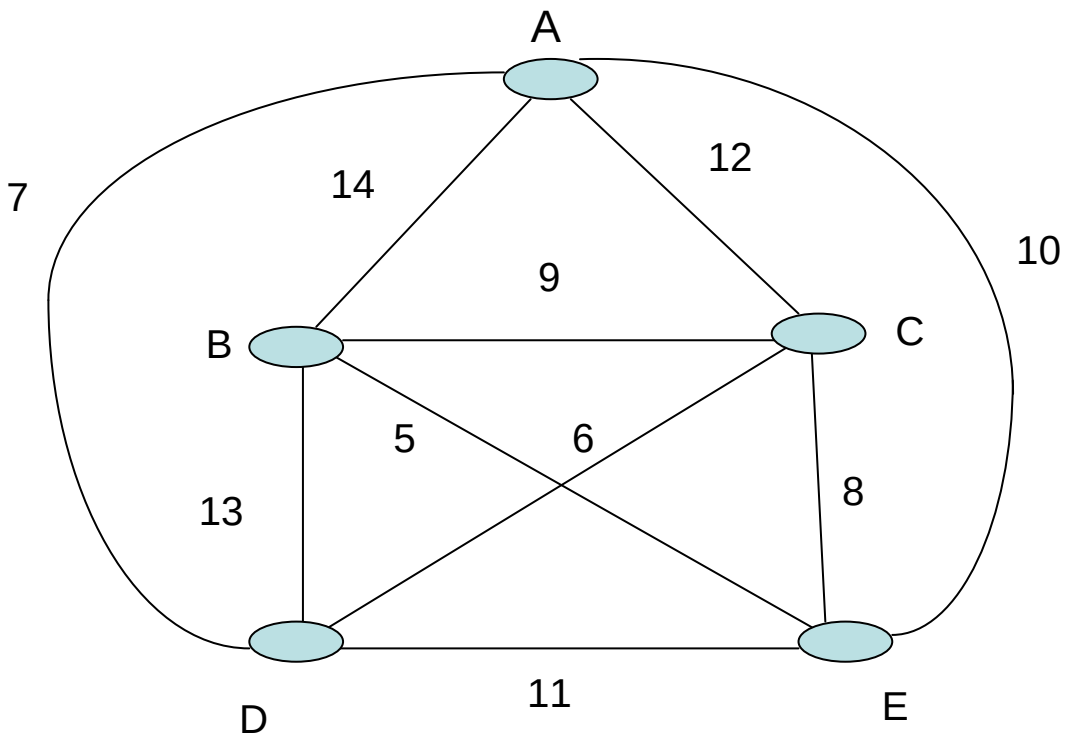
(b) Find all the articulation points and the corresponding connected components from the following graph.



**Q5** (a) Prove that Primes algorithm always find a minimum spanning tree from a given connected graph.

(b) Write any algorithm of your choice to compare two given strings. S1 and s2 that returns all the possible values as the case may be i.e. equality, s1>s2 or s1<s2.

**Q.6** For the following graph give a data structure and use it find all pair Shortest path using Floyd Warshall's algorithm.Write the pseudo code of the algorithm.




**Q.7** Write short notes on any **two** of the following:

**(a)** Bellman Fort Algorithm

**(b)** Finite automata for string matching

**(c)** Optimal BST