EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

SECOND EXAMINATION IN SCIENCE -2009/2010 (2011)

FIRST SEMESTER (June /July, 2011)

CS201 – DATA STRUCTURES & DESIGN OF ALGORITHMS

Answer all Questions **Time: 2 Hours**

Q1)

a) Define in your own words what an algorithm is.

b) List down five distinct areas of algorithm.

c) What are the differences between Stack and Queue data structures?

d) Write algorithms for every stack operations which

i. Create a Stack.

ii. Check empty Stack.

iii. Return top element of the stack.

iv. Insert an element in to a stack.

v. Remove an element from a stack.

e) A word or phrase is called a palindrome if it can read the same back and forth. "Level", "redder", "amma", "madam" and "Dammit I'm mad" are examples of these kinds. Write an algorithm, explaining briefly how you would use stack data structure, to check if a given word is palindrome or not.

Q2)

a) What is meant by Bubble sort?

b) Write down the algorithm of Bubble sort.

c) Sort the following numbers into ascending order using Bubble sort.

82	**36**	**11**	**33**	**1**

(You should write each step)

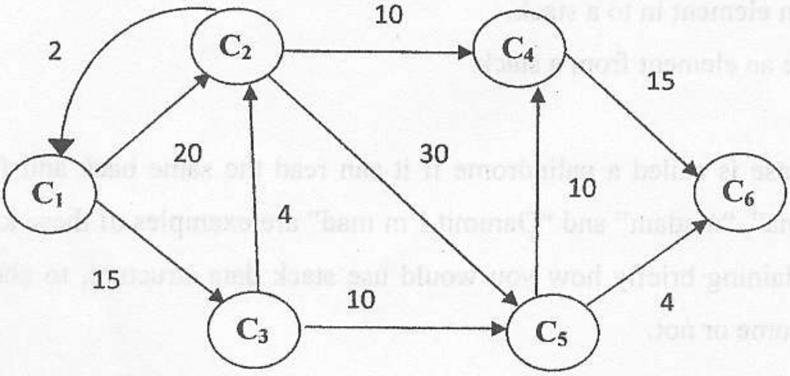
d) Compare the Quick sort and Merge sort with suitable example.

e) Let G (V, E) be a directed graph representing cities of a state, where V is a set of citie
C_2, C_3............C_n, and E be a set of links e_{ij} directly connecting the cities C_j ar

(d_{ji} may be different from d_{ij} even if the link e_{ji} exist).

i. Write an algorithm to find the shortest paths from the city C_1 to all cities.

ii. Apply your algorithm to the following instance and find the shortest and distances.



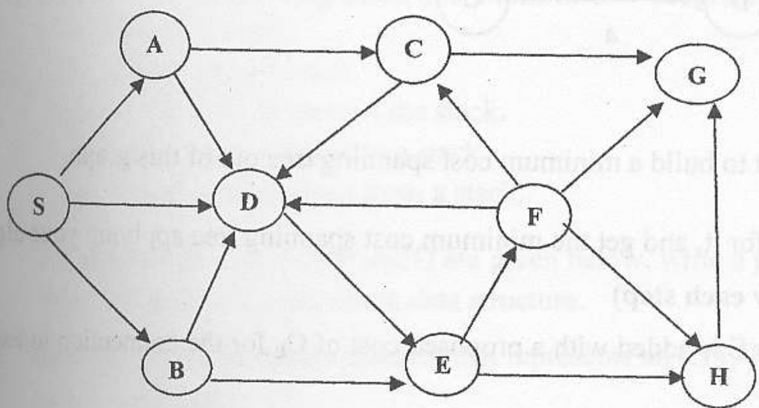
Q3).

a) Explain the Binary Search using a suitable example.

b) What are the differences between Breadth First Search (BFS) and Depth First Search (DFS)?

c) Write the Breadth First Search algorithm (BFS).

d) By using BFS traversal algorithm, write down the traversal order of the graph from the node S. **(Draw the graph for each step).**



Q4)

a) Let T be a binary tree of 11 nodes that are labeled A to K in some order. If the in-order traversal and pre-order traversal visit the nodes in the order

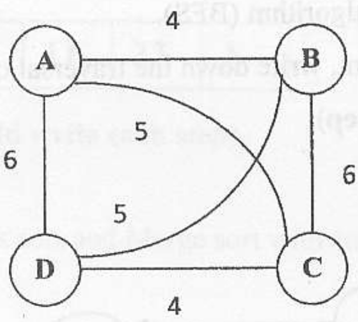
E, I, A, F, B, K, C, G, D, J, H and

K, I, E, F, A, B, J, G, C, D, H respectively

i) Construct the binary tree.

ii) In what order will the post-order traversal visit the nodes?

b) Consider the following graph illustrating 4 cities A, B, C and D with proposed conne
and their costs.



Suppose that you want to build a minimum cost spanning tree out of this graph.

i) Give an algorithm for it, and get the minimum cost spanning tree applying your algori

(You should draw each step)

ii) Suppose a new city E is added with a proposed cost of C_E for the connection to each

4 cities,

Show how it would change the new minimum cost spanning tree(to include E)

1. If $C_E<4$, and
2. If $C_E>6$.

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