Answer Key

Name: **Roll No:**

Department of Computer Science and Engineering

CS2005 Data Structures and Algorithms

Quiz 2

Time: 20 minutes **Maximum Marks: 10**

1. Consider the following tree:

The internal (non leaf) nodes can have 1,2, 3 or 4 children. The root is at level 0 and the descendants' levels are numbered 1,2.....etc successively .

(i) If there are l levels in the tree (0 to l-1) then the lowest and highest possible number of nodes is _____l_____ and _____$\frac{4^l-1}{3}$_____ respectively 2 marks

(ii) In a given complete tree, the total number of nodes is n. Then the last level in the tree is has level _____$\lfloor \log_4 n \rfloor$_____ 1 Mark

2. A complete graph G=(V,E) with |V|=n has |E| = _____$n(n-1)/2$_____ 1 Mark

3. Which of the following statements regarding a BST is/are not true. 1 Mark

a) Inorder traversal of a BST returns the keys in the ascending order. true

b) Finding the maximum element of a BST with n keys takes O(logn) time. false

c) Finding the the minimum element of a BST with height h takes O(h) time. true

d) Finding the inorder successor of a BST with height h takes O(h) time. true

@ 1 Mark only if TFTT is correct.

4. Write True/False for the following statements. 1 Mark

a) An undirected graph is acyclic if and only if its DFS has no back edges. True

b) A cross edge is an edge between two vertices in different DFS trees or it can be an edge between the vertices of the same DFS tree as long as one is not an ancestor of the other. True

5. The running time of BFS in a graph G =(V,E) represented using adjacency list is 1 Mark

a) O(|V|+|E|) b) $O(|V|^2)$ c) O(|V||E|) d) $O(|E|^2)$

6. Which of the following statements regarding a minimum spanning tree is not correct. 1 Mark

a) The minimum spanning tree of a graph all of whose edges have unique weights is unique.

b) A minimum spanning tree of a graph need not be unique.

c) A spanning tree of a graph is unique.

d) Kruskal's algorithm finds a spanning tree of a graph

a b d - true
c - false

c - false 1 mark
any thing else also ⇒ 0

7. Which of the following statements regarding the inorder successor in a BST is true. 1 Mark

a) Inorder successor is always a leaf node. false

b) Inorder successor is always a leaf node or a node with empty right child. false

c) Inorder successor is always a leaf node or a node with empty left child. false

d) Inorder successor may be an ancestor of the node. true

d - true 1 mark
all else - 0

8. Consider an undirected graph G=(V,E). If |V|=n and |E| =m , then the sum of the degrees of all vertices in G =_____2|E|_____ 1 Mark

KEY

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