

B.Sc. (Honours) Examination, 2019

Semester-II

Computer Science

Course BCSC-21 (Old

(Data Structure)

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

Answer Question No.1 any four from the rest.

1. a) Define O (big O) notation for a function.
b) Prove that n^2+1 is $O(n^2)$.
c) Consider a DFS tree T in a graph G . Let (u, v) be a chord with respect to the DFS Tree T . Prove that $|d(u) - d(v)| \geq 2$, where $d(u)$ is the distance of u from root to u in T .
d) Define a binary tree. Give an examples. 2×4=8
 2. Write C functions to implement push and pop operations in a stack given as linked pointer. 4+4=8
 3. a) Define a tree, rooted tree, rooted ordered tree, and binary tree.
b) Write a C function for pre order traversal of a binary tree. 4+4=8
 4. a) In-order and pre-order traversals of a binary tree are 4 2 6 1 7 3 5 and 3 2 4 1 6 7 5, respectively. Construct the tree.
b) Define a binary search tree.
c) In-order traversal of a binary search tree sorts the elements. – Justify. 4+2+2=8
 5. a) Explain the need of height balanced binary search tree.
b) Define an AVL tree.
c) Prove that the height of an AVL tree of n nodes is $O(\log n)$. 2+2+4=8
 6. a) Define a threaded binary search tree.
b) Explain the usefulness of a threaded binary tree.
c) Write a C function for in-order traversal of a threaded binary search tree. 2+2+4=8
 7. a) Define a directed graph.
b) How it can be represented using adjacency matrix representation?
c) Write the algorithm for depth first search traversal of a graph. 2+2+4=8
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