

B.Sc.(Honours) Examination 2018
Semester-II
Computer Science
Course : BCSC-21 (Old)
(Data Structures)

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

Answer Question No.1 and **any four** from the rest

1. a) Mention four properties of an algorithm.
 - b) Prove that is $\frac{n^2 + 5}{2n^2 - 7}$ is $O(1)$.
 - c) Consider a chord (u, v) in a BFS tree T of an undirected graph. Prove that $|d(u) - d(v)| \leq 1$, where $d(u), d(v)$ are the distances of u and v from the root in T .
 - d) Define a binary search tree. 2×4=8
 2. a) Define the ADT queue.
 - b) Present C functions for testing
.empty queue,
.full queue,
in a circular queue
 - c) Present a C function to insert an item in a circular queue. 1+(2+2)+3=8
 3. a) Present a recursive function to compute the post-order traversal of a binary tree.
 - b) Present a C function, to insert a node in a binary tree. 3+5=8
 4. a) What is the worst case time complexity of inserting an element in a binary search tree of n nodes?
 - b) Define AVL tree.
 - c) Prove that the height of an AVL tree of n elements is $O(\log n)$. 1+2+5=8
 5. a) Present a function to insert an element in a binary search tree.
 - b) Present a C function to evaluate a post-fix expression. 4+4=8
 6. a) Define a graph.
 - b) Explain its adjacency list representation.
 - c) Present a C function to traverse a graph (may be disconnected) using breadth first search technique. 1+2+5=8
-