

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2010

Second Semester

CSE102: DATA STRUCTURES

(Common to Computer Science & Engineering and Information Technology)

Time: Three Hours**Maximum Marks: 100****Answer ALL Questions:-
PART A (10 x 1 = 10 Marks)**

1. Algorithm analysis is based on
 - a) Time complexity
 - b) Space complexity
 - c) Time and Space complexity
 - d) None of the above
2. The problem solving strategy which divides the problem into two or more sub problems is called _____.
 - a) Divide and conquer
 - b) Dynamic programming
 - c) Backtracking
 - d) Branch and bound
3. The dummy header in the linked list contains _____.
 - a) Pointer to first node
 - b) Pointer to middle node
 - c) Pointer to last node
 - d) None of the above
4. A linked list with no NULL link is called _____.
 - a) Singly linked list
 - b) Circular linked list
 - c) Doubly linked list
 - d) None of the above.
5. The principle followed by queue is
 - a) FIFO
 - b) LIFO
 - c) FILO
 - d) None
6. notation is also known as reverse polish notation.
 - a) Infix
 - b) Prefix
 - c) Postfix
 - d) none of the above
7. Maximum number of nodes in a binary tree of height h is
 - a) $2^{h+1} - 1$
 - b) $2^{h+1} + 1$
 - c) 2^{h+1}
 - d) 2^{h-1}
8. A binary tree is a tree in which
 - a) a node has more than two children
 - b) a node has exactly two children
 - c) a node has less than two children
 - d) no node can have more than two children
9. Sorting is divided into two types
 - a) Internal, External
 - b) Interior, Exterior
 - c) Internal, Interior
 - d) Interior, External
10. The complexity of merge sort algorithm is
 - a) $O(n)$
 - b) $O(\log n)$
 - c) $O(n^2)$
 - d.) $O(n \log n)$

PART B (10 x 2 = 20 Marks)

11. What is an algorithm? List out its characteristics.
12. What is meant by program verification?
13. Define List ADT. Give an example.
14. Distinguish between singly linked list and doubly linked list.
15. What is a stack? List out the operations performed on stacks.
16. Convert the following infix expression into postfix and prefix form:

$$(((A + B) / C) * (D / E))$$
17. What is a priority queue?
18. What is an AVL tree?

19. State the advantages of binary search algorithm. What is the running time of binary search algorithm?
20. What is meant by internal sorting?

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain the various steps involved in problem solving. (7)
(ii) When will you say an algorithm is efficient? Give order notations for time complexity. (7)

(OR)

- b) (i) Explain about Top-down design techniques in detail. (8)
(ii) Write an algorithm to find the factorial of a given number. (6)

22. a) (i) What is a doubly linked list? State the advantages of using doubly linked list.
Write a procedure to insert and delete an element from the doubly linked list.

(OR)

- b) (i) With an example explain the algorithm to add two polynomials. (7)
(ii) Write a procedure to insert a node into the singly linked circular list. (7)

23. a) What is a Queue? Explain the algorithms that can be applied on a queue

(OR)

- b) (i) With an example explain the infix expression to postfix conversion. (8)
(ii) Write a short note on Double Ended Queue. (6)

24. a) (i) Construct the binary search tree for the following array (6)
(14, 10, 23, 50, 77, 41, 20, 25, 11, 55)

- (ii) Write an algorithm to insert an element into an AVL tree. (8)

(OR)

- b. What is tree traversal? Explain the various tree traversals that can be performed on a binary tree.

25. a) Write an algorithm to sort a set of 'N' numbers using insertion sort. Trace the algorithm for the following set of numbers. 120, 5, 8, 4, 23, 13.

(OR)

- b) (i) Explain the Bubble sort algorithm with an example. (7)
(ii) Write and explain the binary search algorithm. (7)
