SUBJECT CODE: CA/MC/AD24

B. C. A. DEGREE EXAMINATION, APRIL 2007
SECOND SEMESTER

COURSE	:	MAJOR CORE
PAPER	:	ALGORITHMS AND DATA STRUCTURES
TIME	:	3 HOURS MAX. MARKS: 100

SECTION - A

I   **CHOOSE THE CORRECT ANSWER**   (20 x 1 = 20)

1. _____ is the standard notation to represent functions which bound the computing time of the algorithm
   a) Mega notation   b) Big Oh notation   c) Theta notation
   d) None of the above
2. Arrays, Lists are _____ type of data structure
   a) primitive   b) basic   c) non-primitive   d) temporary
3. Minimum number of outputs for an algorithm is
   a) TWO   b) ONE   c) ZERO   d) more than ONE
4. A procedure or function calling itself is called
   a) iteration   b) selection   c) sequential   d) recursion
5. Towers of Hanoi is an application of _____ data structure
   a) stack   b) queue   c) array   d) list
6. If the operator is placed after the operands it is called as _____ notation
   a) Infix   b) Postfix   c) Prefix   d) none
7. An example for non-linear data structure
   a) stack   b) queue   c) list   d) tree
8. The number of sub trees of a node in a given tree is
   a) child   b) degree   c) leaf   d) sibling
9. What is the running time of insertion sort if all keys are equal
   a) $O(1)$ b) $O(\log n)$ c) $O(n)$ d) $O(n^2)$
10. The two way list has info in the form
    a) left pointer, right pointer, data   b) right pointer, left pointer, data
    c) data, left pointer, right pointer   d) left pointer, data, right pointer

II.   FILL IN THE BLANKS

11. _____ operation adds items to stack.
12. _____ allows insertions and deletions on both the ends.
13. The prefix notation for A-B/(C*D^E) is _____
14. The average case analysis of binary search is of the order_____
15. The Quick sort is otherwise called as _____

III   STATE WHETHER TRUE / FALSE

16. The data should be ordered before the linear search operation.
17. pop operation returns the ith element from the top of the stack.
18. An element in a list is called a node.
19. The worst case run time of quick sort is $O(n^2)$
20. Eight queens problem is an example of divide and conquer method of problem solving.

SECTION – B   **(8 x 5 = 40)**

ANSWER ANY EIGHT OF THE FOLLOWING

21. Explain the concept of top-down design approach
22. How do we analyze an algorithm?
23. a. Distinguish between arrays and linked lists   (2)
     b. Write down any 3 applications of linked lists   (3)
24. Write the procedure for deletion in a queue..
25. Write the algorithm to sort a set of numbers using selection sort.
26. Write note on header circular lists.
27. Discuss the various binary tree representations.
28. Trace the merge sort algorithm for the following set of numbers
86,77,47,93,31,42,13,20,94,4,51,12
29. Discuss the towers of Hanoi problem.
30. Explain the binary search algorithm.

SECTION – C   **(4 x 10= 40)**

ANSWER ANY FOUR OF THE FOLLOWING

31. Write the procedure for Insertion sort algorithm and sort the following numbers using the same algorithm. (5 + 5)
25, 15, 30, 9, 99, 20, 26
32. Explain the procedure to insert and delete items in a two way list. (5 + 5)
33. Discuss how insertion and deletion are performed on linked queues. (5 + 5)
34. a. Write the procedure to insert elements in to a binary search tree. (5)
     b. Trace the binary search tree algorithm for the following inputs
         60, 25, 75, 15, 50, 66,3 3, 44   (5)
35. Discuss the various tree traversal methods with an example.
36. Define and describe the Knapsack problem.

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