

Code: DC08
Time: 3 Hours

JUNE 2011

Subject: DATA STRUCTURES
Max. Marks: 100

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. A list of data items, usually words or bytes, with the accessing restriction that elements can be added or removed at one end of the list only, is known as:
- (A) stack (B) memory
(C) linked list (D) heap
- b. A complete binary tree with the property that the value at each node is at least as large as the values at its children is known as
- (A) binary search tree (B) AVL tree
(C) complete balanced tree (D) heap
- c. Consider that n elements are to be sorted. What is the worst case time complexity of Shell sort:
- (A) $O(n)$ (B) $O(n \log_2 n)$
(C) $O(n^{1.2})$ (D) $O(n \times n)$
- d. Which data structure is needed to convert infix notations to postfix notations:
- (A) branch (B) queue
(C) tree (D) stack
- e. Which of the following is a hash function:
- (A) quadratic probing (B) chaining
(C) open addressing (D) folding
- f. The prefix expression for the expression $a*(b + c)/e-f$ is :
- (A) $/*a+bc-ef$ (B) $/*+abcef$
(C) $/*a+bcef$ (D) none of these

- g. In linked list representation, a node contains at least
- (A) node address field, data field
 - (B) node number, data field
 - (C) next address field, information field
 - (D) none of these
- h. Adjacency matrix for a digraph is:
- (A) unimatrix
 - (B) symmetric
 - (C) asymmetric matrix
 - (D) multisymmetric
- i. “n” elements of a queue are to be reversed using another queue . The number of “ADD” and “REMOVE” operations required to do so is:
- (A) $2*n$
 - (B) $4*n$
 - (C) n
 - (D) no possibility
- j. Sparse matrices have
- (A) many zeroes entries
 - (B) many non numeric entries
 - (C) higher dimension
 - (D) none of these

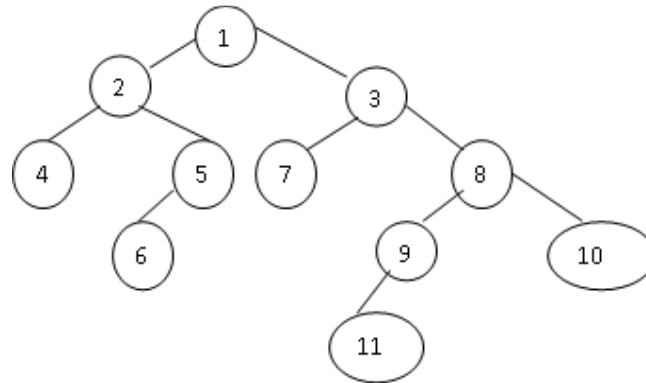
Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Write note on the ‘Time complexity’ of the algorithm. Find out the time complexity of following algorithm ‘sum’. (8)
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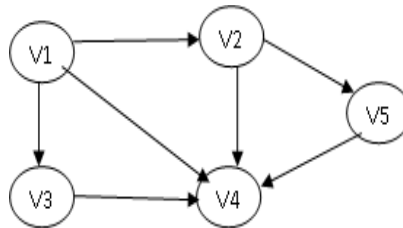
algorithm sum(a, n)
{
 initially sum=0
 for i = 0 to n
 sum=sum+a[i]
 return sum;
}

```
- b. Define Abstract Data Types. By taking any suitable example, make a list of primary operations that may be defined on ADT. (8)
- Q.3** a. What are the different ways of representing a polynomial using arrays? Write an algorithm to add two polynomials using arrays. (8)
- b. What is a Linked List? How is it different from array? Write the different types of linked lists. (8)
- Q.4** a. Implement a Singly Linked List in Stack (LIFO) manner. (8)
- b. Write an algorithm to interchange the elements at the odd and even positions of an array with n elements. (8)

- Q.5** a. Discuss Circular linked list with the help of a suitable block diagram. (8)
- b. Write an algorithm to convert an infix expression to a post fix expression. Execute your algorithm on the following expression:  $(A - B) * (D/E)$ . Show the position of the stack at all the intermediate stages. (8)
- Q.6** a. Write down the algorithm for Binary search. Discuss the complexity of it. (8)
- b. Consider the list of six elements as 66,44,2,22,18,16. Apply Selection Sort algorithm to sort this list and show the result of each pass. (8)
- Q.7** a. Define Merging. Write a recursive algorithm to implement Merge sort. (8)
- b. Define Hashing. Write Mid-Square method to implement Hashing. (8)
- Q.8** a. Explain the Linked representation of Binary Trees by taking any example. (8)
- b. Find out the Pre-order, In-order and Post-order traversal of the following Tree: (8)



- Q.9** a. For the following graph, find out the In-degree and Out-degree of all vertices. (8)



- b. Write Breadth First Search Traversal algorithm for Graph. (8)