

Code: DC54

Subject: DATA STRUCTURE

DiplETE - CS

Time: 3 Hours

JUNE 2013

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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. Arrays are best data structures

- (A) for relatively permanent collections of data
 (B) for the size of the structure and the data in the structure are constantly changing
 (C) for both of above situation
 (D) for none of above situation

b. The complexity of merge sort algorithm is

- (A) $O(n)$ (B) $O(\log n)$
 (C) $O(n^2)$ (D) $O(n \log n)$

c. The depth of a complete binary tree is given by

- (A) $D_n = n \log_2 n$ (B) $D_n = n \log_2 n + 1$
 (C) $D_n = \log_2 n$ (D) $D_n = \log_2 n + 1$

d. Which of the following sorting algorithm is of divide-and-conquer type?

- (A) Bubble sort (B) Insertion sort
 (C) Quick sort (D) All of these

e. Identify the data structure which allows deletions at both ends of the list but insertion at only one end

- (A) Input-restricted deque (B) Output-restricted deque
 (C) Priority queues (D) None of these

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- f. In a Heap tree
- (A) Values in a node is greater than every value in left sub tree and smaller than right sub tree
 - (B) Values in a node is greater than every value in children of it
 - (C) Both of above conditions applies
 - (D) None of above conditions applies
- g. Which of the following is two way list?
- (A) grounded header list
 - (B) circular header list
 - (C) linked list with header and trailer nodes
 - (D) none of these
- h. Which of the following statement is false?
- (A) Arrays are dense lists and static data structure
 - (B) data elements in linked list need not be stored in adjacent space in memory
 - (C) pointers store the next data element of a list
 - (D) linked lists are collection of the nodes that contain information part and next pointer
- i. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal
- (A) ABFCDE
 - (B) ADBFEC
 - (C) ABDECF
 - (D) ABDCEF
- j. A connected graph T without any cycles is called
- (A) a tree graph
 - (B) free tree
 - (C) a tree
 - (D) all of these

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

- Q.2** a. Define storage class and its functions. Explain in detail scope, storage allocation and purpose of each storage class. (8)
- b. Differentiate between Static and Dynamic memory allocation. (8)
- Q.3** a. Define and explain Self Referential Structures in detail. Give suitable example. (8)
- b. Explain with an example how a Union is different from a Structure? (4)
- c. List various file opening modes available in 'C'. (4)

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- Q.4** a. Write an algorithm to search an element using Binary search method. (8)
b. Write a 'C' routine to sort a list of numbers using Quick Sort. (8)
- Q.5** a. Write a 'C' routine that describes various operations on stack. (8)
b. What is the advantage of circular queue over linear queue? Write C routines for inserting and deleting an element from the linear queue. (8)
- Q.6** a. Explain the singly linked list? Write a C program for different operations that can be performed on singly linked list. (12)
b. What is the main advantage and disadvantage of using Linked List over an array? (4)
- Q.7** a. Define and explain doubly linked list. Write a 'C' routine to insert a node after the specified node in a doubly linked list. (8)
b. Define and explain Binary Search Tree (BST). Write 'C' function for counting the number of nodes in a BST. (8)
- Q.8** a. Define and explain Graph Traversal. Describe in detail various Graph Traversal Strategies with the help of example. (10)
b. Discuss the difference between Depth first traversal and Breadth first traversal. (6)
- Q.9** Write short notes on:
(i) Merging of two circular lists
(ii) Binary tree and its representation in memory. (8+8)