

Code: DC54 Subject: DATA STRUCTURES

DiplETE – CS (NEW SCHEME)

Time: 3 Hours

JUNE 2012

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. Scope of a variable is

- (A) The region over which the variable declaration has effect
- (B) The region where function has effect
- (C) The return type of a variable
- (D) None of the above

b. Two programs are given to find factorial of a number, one with recursion and one without recursion. Which program will not run for a very big number as input because of stack overflow?

- (A) First one only
- (B) Second one only
- (C) Both
- (D) None of the above

c. A direct access file is

- (A) A file in which records are arranged in a way they are inserted
- (B) A file in which records are arranged in particular order
- (C) Files which are stored on a direct access storage medium
- (D) None of the above

d. The complexity of merge sort algorithm is

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

e. A stack is defined formally as a list in which all insertion and deletion are made at _____

- (A) same time
- (B) same end
- (C) different end
- (D) both (A) and (B)

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- f. Which of the following sorting algorithm is of divide-and-conquer type?
- (A) Bubble sort (B) Insertion sort
(C) Quick sort (D) All of above
- g. In a linked list, the pointer of last node contains a special value called the _____ pointer.
- (A) NULL (B) Zero
(C) Link (D) Nextpointer
- h. The node in a _____ linked list has a pointer to both its successor and predecessor.
- (A) Circularly (B) Doubly
(C) Linear (D) Sequential
- i. The inorder traversal yields a sorted listing of elements in _____
- (A) Binary trees (B) Binary search trees
(C) Heaps (D) None of above
- j. In a graph if $e=[u, v]$, then u and v are called
- (A) endpoints of e (B) adjacent nodes
(C) neighbours (D) all of above

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

- Q.2** a. What is scope and storage allocation of static, local and register variables? Explain with an example. **(6)**
- b. What is static and dynamic memory allocation? Explain dynamic memory allocation functions with examples. **(10)**
- Q.3** a. Define a structure to represent complex numbers. Write a program to multiply two complex numbers using your representation. **(8)**
- b. Differentiate between Structures and Unions with example. **(4)**
- c. List out the important file handling functions available in 'C' and write their prototype. **(4)**
- Q.4** a. Write a complete program in C to find the transpose of a matrix. **(8)**

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- b. Write an algorithm to sort a list of numbers using Merge sort. (8)
- Q.5** a. Describe the various operations on stack. List its applications. (8)
- b. What is the advantage of circular queue over linear queue? Write C routines for inserting and deleting an element from the circular queue. (8)
- Q.6** a. What is a singly linked list? Mention any two advantages of singly linked list. (4)
- b. Show how a polynomial can be represented using linked list. Write an algorithm to add two polynomials. (12)
- Q.7** a. Write a C program to perform the following operations on doubly linked list
(i) Insert a node
(ii) Delete a node (10)
- b. Write C functions for the following tree traversals:
(i) Inorder
(ii) Preorder
(iii) Postorder (6)
- Q.8** a. Write a "C" function to compute the in-degree and out-degree of a vertex of a directed graph when the graph is represented by an adjacency list. (10)
- b. What is Minimum Cost Spanning Tree? Explain with example. (6)
- Q.9** Write short notes on:
- (i) Circular lists
(ii) Binary tree representations (8+8)