DiplETE – CS (NEW SCHEME) - Code: DC54

JUNE 2010

Code: DC54   **Subject: DATA STRUCTURES**
Time: 3 Hours   **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.**
- **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. When the working storage variables get allocated_____.

   (A) at compile time   **(B)** at the starting of the runtime
   (C) at the end of the runtime   **(D)** None of these

b. The recursive functions are evaluated using_____.

   (A) stacks   **(B)** queues
   (C) priority queues   **(D)** binary tree

c. Which of the following types of expressions do not require precedence rules for evaluation?

   (A) Fully parenthesised infix expression.
   (B) Postfix expression.
   (C) Partially parenthesised infix expression.
   (D) None of the above.

d. Which of the following opens a file?

   (A) fopen   **(B)** fscanf
   (C) open   **(D)** None

e. The number of comparision in bubble sort is_____.

   (A) $O(n)^2$ **(B)** $O(n^2)$
   (C) Both **(A)** & **(B)**   **(D)** none of the above

f. The sorting technique where array to be sorted is partitioned again and again in such a way that all elements less than or equal to partitioning element appear before it and those which are greater appear after it, is called_____.

   (A) merge sort   **(B)** quick sort
   (C) selection sort   **(D)** none of these

g. If the characters 'D', 'C', 'B', 'A' are placed in a queue (in that order), and then removed one at a time, in what order will they be removed?

(A) ABCD   (B) DCAB
(C) ABDC   (D) DCBA

h. A Linked list can grow and shrink in size dynamically at_____.

(A) beginning   (B) runtime
(C) ending   (D) None of the Above

i. In a comple binary tree, if the parent is at nth position, then the children will be at_____.

(A) n+1,n+2   (B) 2n,2n–1

(C) 2n,2n+1   (D) 2n+1, 2n–1

j. A directed graph T without any cycles is called_____.

(A) a tree graph   (B) a directed acyclic graph
(C) connected graph   (D) All of above

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

Q.2   a.   Explain different storage classes with an example for each and also explain scope and life time of the variable.
(8)

b.   What is stack overhead in recursion? Explain with example how to calculate stack overheads in recursion.
(8)

Q.3   a. Define: (i) Nested structures (ii) Array of structure. Write a program by making use of the above concept to store student information and display the same.   **(10)**

b.   Develop a C program to write data of students such as name, roll number, marks in to a file. Further read the data from the file and display it on the screen.   **(6)**

Q.4   a. What is an array? How it is represented in memory? Explain.   **(5)**

b. Write an algorithm/program to find transpose of given matrix.   **(5)**

c. Derive the average, worst case time complexity of quick sort.   **(6)**

Q.5   a. Describe the various operations of Stack. List its applications.   **(6)**

b. Write a C program to implement a stack of characters.   **(10)**

Q.6   a. Write C function to: **(8)**

(i) Insert a node in to a singly linked list by using recursive program.
(ii) Delete a specified node in a singly linked list.

b. Write C functions for sorting and reversing a linked list.   **(8)**

Q.7   a. Implement concatenation of two circular singly linked lists List 1 and List 2.   **(8)**

      b.   What are the limitations of linear queue over the circular queue?   **(8)**

Q.8   a.   What is a tree? How it is different from binary tree? Give the structure of a node of a binary tree. **(6)**

      b.   Write C function for deleting a node from binary search tree considering all possibilities. **(10)**

Q.9   a.   What is a graph? Give a diagramatic representation of an adjacency list representation of a graph. **(8)**

      b.   What is minimum spanning tree? Find the minimum spanning tree for the graph.   **(8)**