(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 7306 Roll No.

M. C. A.

(SEM. II) EXAMINATION, 2008-09

DATA STRUCTURES USING C

Time : 3 Hours] *[Total Marks : 100*

Note : (i) This paper is in three sections. **Section A** carries **20** marks, **Section B** carries **30** marks and **Section C** carries **50** marks.

(ii) Attempt **all** questions. Marks are indicated against each question/parts.

(iii) Assume data where required.

SECTION - A 2×10=20

1 You are required to answer all the parts.

Choose the correct answer for the following :

(a) The data structure used to perform recursion is :

(i) Queue

(ii) Stack

(iii) Array

(iv) Linked list.

(b) Priority queue is implemented by

(i) Heap

(ii) Queue

(iii) Dequeue

(iv) Stack.

(c) Best case running time for quick sort is

(i) **0 (n lgn)**

(ii) **0 (lgn)**

(iii) **θ(n)**

(iv) **0 (n^2)**

(d) External sorting are done in

(i) CPU register

(ii) Primary storage

(iii) Secondary storage

(iv) Files

(e) No. of nodes in a binary tree of height ***h*** is :

(i) 2^h

(ii) 2^{h+1}

(iii) $2^{h+1} - 1$

(iv) $2^h - 1$

State True or False for the following two parts :

(f) Circular queue cannot be implemented by using array.

(g) Single linked list is always advantages to use instead of array.

Fill in the blanks for the following three parts :

(h) Huffman algorithm is used for _____.

(i) _____ is one of the traversal techniques used in graph.

(j) Prim's algorithm is used to find out _____.

SECTION - B 10×3=30

2 Attempt any three parts of the following :

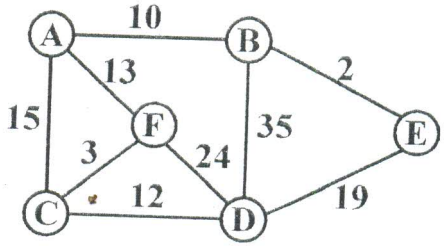
(a) Write a program in C to sort a set of n complex numbers into ascending order of their absolute values. Real and imaginary parts of all the complex numbers are integer. Absolute value of a complex number $x + iy$ is defined as $\sqrt{x^2 + y^2}$. Choose suitable data structure to represent complex numbers.

(b) Write an algorithm to convert infix expression into post fix expression. Trace your algorithm on following expression $(A+B)+C*D*E+(F-G)/H$.

(c) Write an algorithm for adding two polynomial using linked list. Develop your algorithm in to C function.

(d) Write a C function to delete an element from a Binary search tree.

(e) Write Kruskal's algorithm for finding minimal spanning tree. Run your algorithm on following graph and find out minimal spanning tree.



SECTION - C

3 Attempt any **two** parts of the following : 5×2=10

(a) Write iterative and recursive version of Binary Search algorithm. Also mention the time complexity in both cases.

(b) What is the running time for the following loop :

```
for (i=1; i<=n; i++)
for (j=i; j>=1; j++)
{
=
–
}
```

(c) What do you understand by recursion ? Write a program in C to solve Tower of Hanoi problem using recursion.

4 Attempt any **two** parts of the following : 5×2=10

(a) Write a program in C to sort given list of names.

(b) How priority queue is implemented ? Explain in detail giving example.

(c) Write a C function to delete all nodes from a single linked list containing a given value.

5 Attempt any **two** parts of the following : **5×2=10**

(a) What are threaded binary tree ? Explain its advantage over binary tree.

(b) Discuss collision resolution techniques used in hash table.

(c) Discuss the different ways of representing a binary tree in computer memory.

6 Attempt any **one** of the following : **10×1=10**

(a) Define AVL tree. Show at each step the AVL tree built from the following sequence of insertions :

10, 17, 3, 18, 21, 4, 3, 25, 30, 11, 13, 15, 19

Discuss the type of rotations used.

(b) Write quick sort algorithm. Explain your algorithm taking suitable example. Analyze its running time.

7 Attempt any **one** of the following : **10×1=10**

(a) Explain B+ tree index files and B tree index files in details.

(b) Write short notes on any two of the following :

(i) Adjacency matrix

(ii) Graph representation

(iii) Sequential and index file organization.
