

Printed Pages : 7

ECS-302

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

PAPER ID : 0110

Roll No.

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B. Tech.

Third Semester Theory Examination, 2011-12

Data Structure Using C

Time : 3 Hours]

[Total Marks : 100

Note : This question paper contains three Sections. Attempt all the Sections as per instructions.

Section-A

This question contains ten parts. Attempt *all* parts of this question. $2 \times 10 = 20$

1. (a) What are the parameters to judge the efficiency of an algorithm ?
- (b) Write the merits and demerits of static and dynamic memory allocation technique.
- (c) What is stack ? Give the declaration of all the functions used in the implementation of a stack.
- (d) Define priority queue. How is it implemented ?

- (e) What are the ways in which a tree is represented in computer memory ?
- (f) Discuss the concept of "successor" in Binary Search Tree.
- (g) What is a Minimal Spanning Tree ? Discuss its usage.
- (h) How the connected component of a graph is found ? Show by taking suitable example.
- (i) Write an algorithm for bubble sort.
- (j) Define garbage collection and compaction.

Section-B

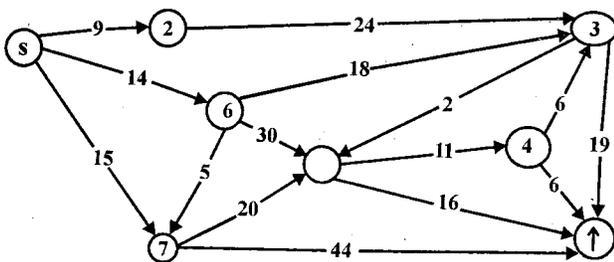
This question contains five parts. Attempt *all* parts.

All parts carry equal marks.

6×5=30

2. (a) Write a program in C to input a list of names, perform sorting on the list and display it. Also display the name with maximum number of characters. Do not use any standard library functions for string manipulations.

- (b) Write a program in C for implementation of a queue. Your program should at least contain ADD, CREATE, DELETE, FULL and EMPTY functions.
- (c) What is a tree data structure ? What are the different types of tree ? Write algorithms for tree traversal and show all forms of traversal by taking suitable example.
- (d) Write Dijkstra algorithm. What is the purpose of this algorithm ? Trace your algorithm on the following graph taking "s" as source node and "t" as destination node.



(3)

(e) Write an algorithm for quick sort. Trace your algorithm on the following data to sort the list :

2, 15, 4, 21, 56, 7, 85, 51, 8, 1, 59, 42, 10, 9.

How the choice of the pivot element effect the efficiency of the algorithm ?

Section-C

Attempt any *two* parts from each question. All questions are compulsory. $10 \times 5 = 50$

3. (a) Find out the running time of the following code

fragment :

```
for (i=1; i<=k; i++)
```

```
for (j=k; j>=i; j--)
```

```
{
```

```
  stmts;
```

```
  .....
```

```
  .....
```

```
  stmts;
```

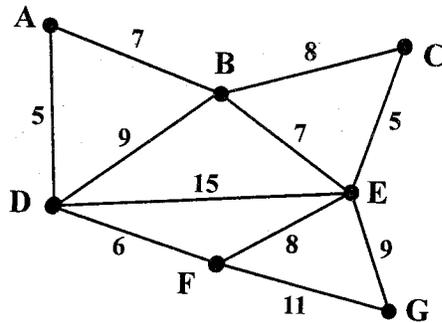
```
}
```

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(4)

- (b) What is a sparse matrix ? How sparse matrices can be represented efficiently in memory ?
- (c) If an array is defined as `int a[10][20]` in C, devise a formula to calculate the address of an any variable say `a[i][j]`, for any valid value of `i` and `j`.
4. (a) Write a procedure for converting a Dequeue into a Queue. What is the advantage of using a Dequeue ?
- (b) Write an algorithm for the evaluation of a postfix expression.
- (c) What do you understand by tail recursion ? Give example. Discuss its significance.
5. (a) What is a Threaded Binary Tree ? Explain the advantages of using a threaded binary tree.
- (b) Discuss Huffman algorithm and its significance.
- (c) A binary tree has 9 nodes. Its inorder and preorder traversal's node sequences are :
- Inorder : EACKFHDBG
Preorder : FAEKCDHGB
- Draw the tree.

6. (a) Find Minimal Spanning Tree for the following graph using Kruskal's algorithm.



- (b) Explain depth first search technique for graph traversal using suitable example.
- (c) Discuss the methods of storing a graph in computer.
7. (a) Write a program in C for binary search. Analyze its running time.
- (b) Discuss the different cases of insertion into a B tree.
- (c) How using hash table is beneficial for us ? Explain collision resolution strategies used in hash table.

Or

Doubly linked list takes more space than singly linked list for storing one extra address. In what condition could a doubly linked list be more beneficial than singly linked list?

(7)

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