

Q5. Attempt any *two* questions from the following : 10x2=20

- (a) What is the difference between an undirected graph and directed graph? Describe the different ways to implement graphs in computer memory.
- (b) Define spanning tree of a graph. What is minimum spanning tree? Discuss any one method for finding the minimum spanning tree of a graph.
- (c) Write short notes on the following :
- i) Sparse matrices
 - ii) Indexing of files

Printed Pages : 6



NMCA213

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

PAPER ID : 214220

Roll No.

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MCA

(SEM. II) THEORY EXAM. 2014-15
DATA STRUCTURES USING 'C'

Time : 3 Hours]

[Total Marks : 100

Note : Attempt the questions as indicated.

Q1. Attempt any *four* questions from the following : 5x4=20

- (a) Consider the following C code segment :

```
int IsPrime(m)
```

```
{
```

```
    int i, m;
```

```
    for (i = 2; i <= sqrt (m); i++)
```

```

        is (m % i == 0)

        {printf("Not Prime\n");

        return 0;}

    return 1;

}

```

Let $T(m)$ denote the number of times the *for* loop is executed by the program on input m . Find the complexity of the code.

- (b) Suppose multidimensional arrays A and B are declared using

$A (-2:2, 2:22)$ and $B (1:8, -5:5, -10:5)$

Consider the element $B(3, 3, 3)$ in B . Find the effective indices E_1, E_2, E_3 and the address of the element, assuming $\text{Base}(B) = 400$ and there are $w = 4$ words per memory location.

- (c) What is Hash function? Name three techniques often built into Hash functions. Name four advantages of a chained Hash table over open addressing.

Q5. Attempt any *two* questions from the following : $10 \times 2 = 20$

- (a) How many comparison of keys are required to verify that a list of n entries is in order? When are simple sorting algorithms better than sophisticated ones? Explain.

- (b) What is a heap? How does heapsort work? Sort the following seven numbers into increasing order using heapsort.

12, 19, 33, 26, 29, 35, 22

- (c) Define a B tree. Construct a B tree of order 3 by inserting following keys in the order shown into an empty B tree.

M Q A N P W X T G E J

- (c) What do you mean by circular queue? How is it different from a simple queue? Show how an element is deleted from a circular queue.
- (d) Write a C function to delete the k^{th} element from a linked list, where k is an integer.
- (e) Why is it more difficult to move backward than forward in a linked list?
- (f) What do you mean by doubly-linked list? Explain with an example.

Q3. Attempt any *two* questions from the following : 10x2=20

- (a) Define the terms binary tree, complete binary tree and threaded binary tree. Also give an example of each.
- (b) Name the three conditions under which sequential search of a list is preferable to binary search. Why was binary search implemented only for contiguous lists, not for linked lists?

- (d) Write a function in C to find the largest element in an array.
- (e) Translate the following infix expression into its equivalent postfix expression by showing all steps

$$(A - B) / ((D + E) * F)$$

- (f) Define recursion. What is the complexity of the following recursive function? Int DoSomething (int n) {

If (n <= 2)

return 1;

else

return (DoSomething (floor (sqrt (n))) +n);

}

Q2. Attempt any *four* questions from the following : 5x4=20

- (a) Describe the three types of structures used for storing strings.
- (b) Is it possible to implement a queue with the help of two stacks? Explain.

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