

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6504

HC

Unique Paper Code : 32341301

Name of the Paper : Data Structures

Name of the Course : B.Sc. (H) Computer Sc.

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** questions out of the remaining Q.2-Q.7.
3. Parts of a question must be answered together.

1. (a) Write enqueue and dequeue functions for a queue to be implemented through a circular singly linked list. (5)

(b) Given the following code. Write its recursive function.

P.T.O.

```
Void f(int n)
{
  For (i=1;i<=n;i++)
  {
    If(i%2==0)
    Cout<<i*i*i;
  }
}
```

- (c) Evaluate the following postfix expression using a stack:

4 10 5 + * 15 3 / -

Show the contents of the stack after every step.

(5)

- (d) Sort the following set of elements using selection sort.
Show the content of array after every pass.

34, 56, 12, 8, 92, 9, 44, 23.

- (e) A hash table of length 10 uses open addressing with hash function $h(k)=k \bmod 10$, and linear probing. After inserting 6 values into an empty hash table, the table is as shown below. (2+3=5)

0	
1	11
2	32
3	63
4	71
5	85
6	52
7	
8	
9	

Which one of the following choices gives a possible order in which the key values could have been inserted in the table? Justify your answer.

- (i) 85, 11, 63, 71, 32, 52
 - (ii) 63, 11, 32, 71, 52, 85
 - (iii) 85, 63, 11, 32, 71, 52
 - (iv) 11, 85, 52, 32, 63, 71
- (f) Some search operations are to be performed on a sorted data stored in an array. However, it is known that the keys to be searched are all present in the initial few positions. Which search technique would you use? Justify your answer. (2+3=5)

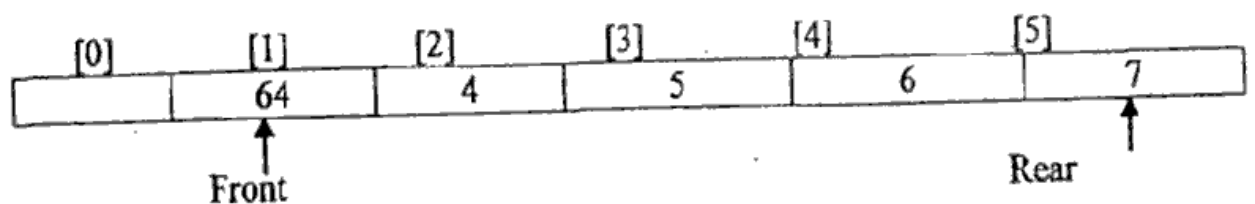
P.T.O.

- (g) Construct a binary tree whose following traversals are given : (5)

Inorder: x y z a p q r

Preorder: a y x z q p r

2. (a) Write a recursive function to display a single linked list of integers in reverse order. (4)
- (b) Write a member function to delete the element at i^{th} position in a doubly linked list. The position i is passed as a parameter to this function. (6)
3. (a) Write a function to reverse the order of elements in stack using two additional stacks. (4)
- (b) Compare and contrast the behavior of bubble and insertion sort on the following set of values. (4)
- 1, 2, 3, 4, 5, 6.
4. (a) Given a queue implemented using array of size 6. Show the queue and the front & rear values after performing each of the following operations. (4)



enqueue(14), enqueue(56), dequeue(), dequeue(). (4)

- (b) What is hashing? Explain any two hashing functions. Explain linear probing method of collision resolution with an example. (2+2+2=6)

5. (a) What are Self organizing lists? Compare the following two methods used to self organize lists.

(i) Move to Front

(ii) Transpose (2+3=5)

- (b) Give the formula and calculate the address of the element $A[3][2]$ of the 2D array defined as $A[5][5]$, if the elements are stored in

(i) Row major order.

(ii) Column major order.

The beginning address of array is 400. Every element requires 4 bytes of storage. (4)

6. (a) Create a binary search tree using the following values. 12, 45, 13, 67, 10, 34.

Using the above tree perform the following operations

(i) Delete 12 using delete by merging.

(ii) Delete 45 using delete by copying. (6)

P.T.O.

(b) Write a function to calculate the number of leaves in a binary tree. (4)

7. (a) Insert the following values in B tree of order 5.

45, 12, 34, 78, 90, 22, 88, 96, 40, 82, 55, 100. (6)

(b) Define a class to implement a Lower Triangular matrix as a 1D array. Write a member function to store and retrieve its elements. (4)

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