ıe question paper comprises of two sections.
ction I and II must be attempted in separate answer sheets.
ake suitable assumptions and draw neat figures wherever required.

SECTION – I

1 Do as directed.

1) Define following terms. **[01]**

(a) Data Structure (b) Algorithm

2) If the sequence of operations – push(a), push(z), pop, push(a), push(z), pop, pop, pop, push(z), pop are performed on a stack, the sequence of popped out values are _____. **[01]**

3) How many minimum moves are required to move 8 disks from source to destination in TOH (Tower of Hanoi) problem? **[01]**

4) How many link parts are contained in the nodes of the circular doubly linked list of integers with five nodes? **[01]**

5) How linked list is a linear data structure? **[01]**

6) If following operations will be performed on empty circular double ended queue, what will be double ended queue content from front? **[02]**

InsertFront('C'); InsertFront('S'); InsertRear('P'); DeleteFront(); InsertRear('I'); InsertRear('T'); DeleteRear(); InsertRear('Q');

7) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using with the hash function h(k) = k mod 10. Use linear probing for collision. Construct the resultant hash table. **[03]**

Q -2(a) Consider an array of float elements A[-100:52, 60:89]. Find the total number of elements in the given array. Find the address of A [0, 71] element, if it is stored in row major order. Consider 4 byte for float data type and base address is 3001. **[03]**

(b) i. Convert the following infix expression into postfix expression and evaluate resultant postfix expression using best suitable data structure. [05]

$9 - ((3 * 4) + 8) / 4$

ii. List out different techniques to implement Priority Queue. Which technique is more efficient for the implementation of Priority Queue? Why? [02]

OR

(b) i. Trace recursive TOH (Tower of Hanoi) problem for n=3 disks using Stack. [05]

ii. Write recursive function/pseudocode to print all nodes of the Singly Linked List in reverse order. [02]

Q - 3 Answer following questions. (Any Three) [15]

1) Consider a Singly Linked List of integer elements is available. Write an algorithm/pseudocode to delete all the elements whose data matches with key X.
2) Discuss the overflow and underflow conditions of Simple Queue with suitable example. What is the drawback of Simple Queue? How can we overcome it?
3) Draw proper structure of Doubly Linked List with five nodes. Write algorithm/pseudocode to exchange first and last node of the Doubly Linked List.
4) Consider the following operations on Circular Queue of size 6. Consider the initial values of rear and front as -1.
   (i) Insert 3,6,7 (ii) Delete (iii) Insert 9 (iv) Delete (v) Insert 1 (vi) Insert 5,8 (vii) Delete.
   Show each operations with the values of rear and front. What are the values of rear and front variables at the end?

SECTION – II

Q - 4 Attempt Following.

1) To arrange n elements using selection sort, number of comparisons required _____. [01]
2) A _____ is a binary tree in which every level, except possibly the last, is completely filled, and all the nodes are as far left as possible. [01]
3) Which data structure is used to implement Breath First Search for the Graph? [01]
4) When linear search is highly inefficient compared to binary search? [02]
5) True/False. Binary Search Tree always have same tree structure for particular set of data, irrespective of its permutation. Justify your answer.

6) Consider the given recursive code of Binary Search, where A: integer array of ascending elements, low: starting index, high: ending index, x: key element to search. Fill up the blank parts with correct logic. [02]

```
int binary_search(int A[], int low, int high, int x)
{
        if(high >= low)
         {
              int mid = (low + high)/2;
              if( _____ )
                  return mid;
              else if( _____ )
                  return binary_search(A, low, mid-1, x)
              else
                  return binary_search( _____ )
         }
        return -1;
}
```

7) Match the following according to task in **A** with appropriate data structure in **B**. [02]

A	B
1. Resource Sharing	a. Hash Table
2. Directory structure	b. Graph
3. Efficient Searching	c. Tree
4. Social Networking	d. Queue

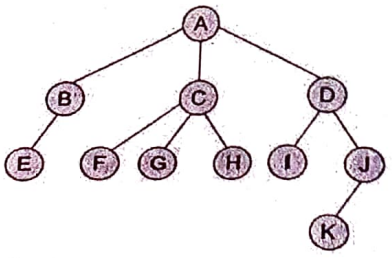
Q -5(a) Construct Binary Search Tree with the given post order traversal. [06]

10, 9, 23, 22, 27, 25, 15, 50, 95, 60.

What is the pre order traversal after deleting 25 from the Binary Search Tree?

(b) Answer following questions (Any Two) [04]

1) Covert given general tree to binary tree.



2) Is it possible to construct unique binary tree with preorder and post order traversals? Justify your answer with suitable example.

3) Explain any one memory representation techniques for directed graph with suitable example. [15]

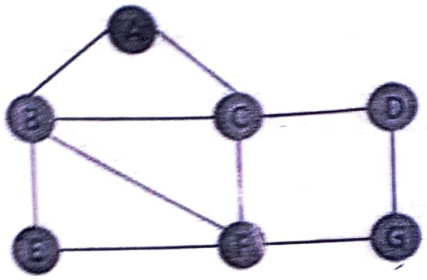
Q - 6 **Answer following questions (Any Three).**

1) Show all the passes of Insertion sort in ascending order for the below input sequeance.

39, 9, 45, 63, 18, 81, 108, 54, 72, 36

2) If below graph's vertices to be colored using five available colors (Red, Green, Yellow, Blue, Pink). Coloring must be done in way that no any two adjacent vertices should have same color. Find the minimum number of colors require to color the below graph.

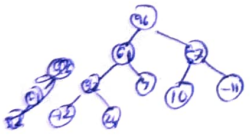
NOTE: Given below graph is uncolored graph.



If BFS (Breadth First Search) is applied to above graph. What are the minimum number of colors requiring to color resultant BFS tree (output graph after applying BFS into the given graph)?

3) Create Max Heap tree for following data.

4, –12, 16, 32, 24, 57, –11, 69, 96



4) Construct an AVL Tree for the following data. Show the tree after each insertion with balance factor and rotation.

7, 1, 6, 2, 5, 4, 3

Apply Delete 1 and show resultant AVL tree.

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