N.B.: 1) All questions are compulsory.
       2) Figures to the right indicate marks.
       3) Illustrations, in-depth answers and diagrams will be appreciated.
       4) Mixing of sub-questions is not allowed.

Q.1. Attempt All (Each of 5 Marks) :   **(15)**

(a) Multiple Choice Questions

1. What is Data Structure?
    a. Addresses of the variables   b. Subset of all variables
    c. The memory representation of data .   d. None.

2. A tool for specifying logical properties of a data type is…
    a. Abstract Data Type   b. Logical Data Type
    c. Non Abstract Data Type   d. Linear Data Type

3. Hierarchial data structure
    a.Tree   b. Graph
    c.Node   d. All

4. Which Data Structure is used to manage Printer Buffers?
    a. Stack   b. Queue
    c. Linked List   d. Tree

5. Given the fully parenthesized expression , the prefix form of this expression would be _____.
    a. +-ABC   b. −A+BC
    c. A_B+C   d. -+ABC

(b) Fill in the blanks (Stack,Queue,,ABCD,ACBD,PUSH,POPPeek,Enqueue,DeQueue)

1. A _____ is a linear list, also known as LIFO list.
2. A _____ is a linear list, also known as FIFO list.
3. _____ is the term coined for insertion of elements in a stack list.
4. In the stack, if a user tries to remove an element from the empty stack, then it is called _____.
5. If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, the order in which they will be removed will be _____

(c) Answer in one sentence

1. Explain what a complete Binary Tree is.
2. What is Abstract data Type?
3. Explain Big Omega Notation.
4. What is an algorithm?
5. Write the difference between single linked list and double linked list.

Q.2. Attempt any three of the following: **15**
1. Explain different data types.
2. Write the difference between Stack and Queue.
3. Explain different applications of stack
4. Explain dequeue in details
5. Explain Big o notation
6. Write the difference between single linked list in double linked list

Q.3. Attempt any three of the following: **15**
1. Explain Advantages & Disadvantages of Doubly Linked list
2. Explain Binary Search Tree with an example
3. What are AVL Trees? Explain how we Balance AVL Trees.
4. Explain the difference between Priority Queues & Heaps.
5. What is Heapsort? Explain two different types of HeapSort with diagrams.
6. What is a Threaded binary tree?

Q.4. Attempt any three of the following: **15**
1. What is a Graph ? Explain different types of graphs.
2. Explain Graph representation using adjacency matrix and adjacency list,
3. Write Graph operations like insertion and deletion of nodes,
4. Write DFS in detail with an example.
5. What is Hashing? Explain different types of Hashing in brief.
6. Explain different Applications of hashing.

Q.5. Attempt any three of the following: **15**
1. Convert the following infix expression into prefix and postfix expressions.
   i. -axbx(c—d)-(e*3xf)+g/h
   ii {axbxc42)+d-(c/d+e)
2. Draw max and min heap with the following elements
   80 59 25 30 100 45 62 89 51 23:11 27 323
3. Explain with example the following terms:
   i. Degree of a node
   ii. Height of a tree
   iii. Depth of a tree
   iv. Similar binary trees
   v. Complete binary tree
4. Explain with example Dijkstra shortest path algorithm.
5. Explain with example Prim's algorithm to find the Minimum Spanning Tree (MST).
6. List different hashing methods. Explain with example any two of them.