

- 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 5Marks)

(15M)

(a) Multiple Choice Questions

1)..... level is where the model becomes compatible executable code

- A – Abstract level
- B – Implementation level
- C - Application level
- D – All of the above

2) Which one of the below is not divide and conquer approach?

- A - Insertion Sort
- B - Merge Sort
- C - Shell Sort
- D - Heap Sort

3) Which of the following is true about the characteristics of abstract data types?

- i) it exports a type
- ii) It exports a set of operations

- A- True, False
- B- False, True
- C- True, True
- D- False, False

4) To represent hierarchical relationship between elements, Which data structure is suitable?

- A- Dequeue
- B- Priority
- C- Tree
- D- Graph

5) What is the worst case time complexity of linear search algorithm?

- A - $O(1)$
- B - $O(n)$
- C - $O(\log n)$
- D - $O(n^2)$

(b) Fill in the blanks
(greater than , FIFO, end, postorder, a precondition)

- 1) The assertion given in the beginning segment in an algorithm is called _____.
- 2) In _____ traversal, the root node is visited last.
- 3) New nodes are added at the _____ of the list.
- 4) A queue, in other words, is called a _____ list.
- 5) The lower limit is modified when the key is _____ the middle element in the array in a binary search method.

(c) Short Answers

- 1) Define data structure.
- 2) Define priority queue.
- 3) Define hash function.
- 4) Define 2D array.
- 5) Define tree.

Q. 2 Attempt the following (Any THREE)(Each of 5Marks)

- (a) Write short note on Map ADT. (15M)
- (b) What is python set? List and explain any five functions of set.
- (c) If X is an algorithm and n is the size of input data, then explain the factors which decide the efficiency of X.
- (d) Write a short note on Big O notation.
- (e) Define ADT. Explain Bags ADT.
- (f) Sort the given set of numbers using insertion sorting:
12, 50, 20, 15, 10, 30, 45
Show step by step process.

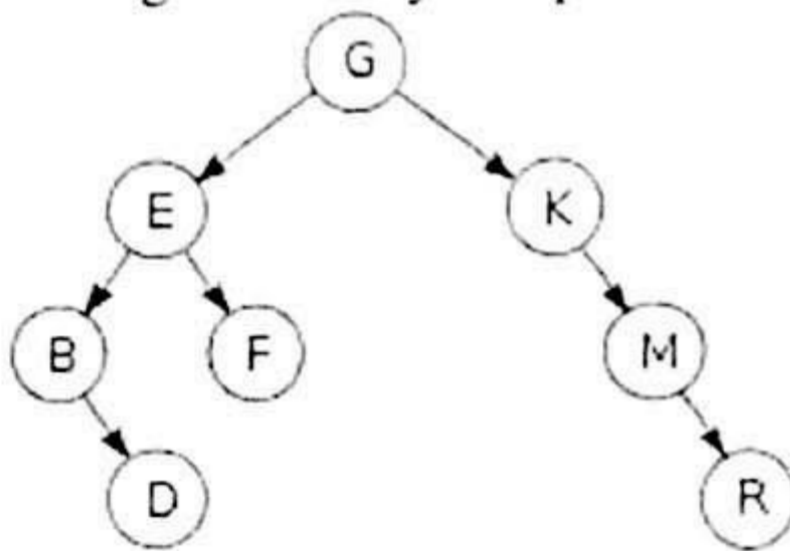
Q. 3 Attempt the following (Any THREE) (Each of 5Marks)

- (a) Define linked list. How linked list is implemented. (15M)
- (b) Write a python code to implement queue operations using python list.

- (c) Write algorithm to convert postfix into infix.
- (d) Convert following infix expression to postfix:
 - i) $A+(B*C-(D/E-F)*G)*H-B$ ii) $A * (B + C * D) + E$
- (e) What is difference between queue and priority queue. Explain with example.
- (f) Write short note on circular linked list traversal.

Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)

- (a) What is recursive function? List and explain the properties of recursion.
- (b) What is rehashing? Explain with example.
- (c) Why collision occurs in Hash table? Explain any one of the method to solve it.
- (d) Sort the given set of numbers using merge sorting technique:
12, 1, 5, 88, 79, 75, 42, 31
- (e) Define search tree. Explain B-search tree with example.
- (f) For a given binary tree perform inorder, preorder, and postorder traversal:



Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)

- (a) What is difference between time and space complexity.
- (b) What is List? Explain usage of list.
- (c) What is expression tree? Represent expression $3 + ((5+9)*2)$ using expression tree.
- (d) Convert $abc+de-fg-h+/*$ postfix to infix.
- (e) Write short note on heaps and heapsort.