

- N.B.** 1) All questions are compulsory.
 2) Figures to the right indicate marks.
 3) Draw suitable diagrams and illustrations wherever necessary.
 4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All the Questions

A) Choose the correct alternative

(5M)

- i) A path that starts and ends on the same vertex is called _____.
 - a) cycle
 - b) tree
 - c) spanning tree
 - d) none of these
- ii) Prim's and Kruskal's algorithm are examples of _____.
 - a) binary search tree
 - b) maximum spanning tree
 - c) unweighted graphs
 - d) minimum spanning tree
- iii) Which of the following hold true?
 - i. An AVL tree is an example of balanced binary search tree.
 - ii. Number of vertices in the path gives the length of the path.
 - a) i-true, ii-false
 - b) i-false, ii-true
 - c) i-true, ii-true
 - d) i-false, ii-false
- iv) An algorithm is a sequence of computational steps that transform the _____ into the _____.
 - a) output, input
 - b) input, output
- v) Divide-and-conquer approach is a _____ approach.
 - a) Non-recursive
 - b) recursive

B) Fill in the blanks:

(5M)

{ postorder, shortest, preorder, best, full, successors, worst, longest, ancestor }

- i) A _____ tree walk prints the root after the values in its subtrees.
- ii) In greedy choice, when we are considering which choice to make, we make the choice that looks _____ in the current problem, without considering results from subproblems.
- iii) A _____ binary tree is a tree in which every node has either 0 or 2 children.
- iv) Dijkstra's algorithm finds the _____ paths from the source vertex to all other vertices in the graph.
- v) Leaf nodes represent the nodes that do not have any _____.

C) Explain the following terms in one or two lines

(5M)

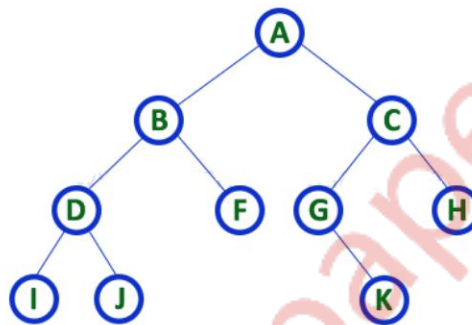
- i) Generic Trees
- ii) Directed graph
- iii) Binary Search tree
- iv) Running time of an algorithm
- v) Shortest path problem

Q.2 Attempt the following: (Any THREE)**(15M)**

- A What is meant by asymptotic analysis of algorithm? Explain.
- B Write a note on theta (θ)-Notation. Give example.
- C What are the essential properties of algorithms? Explain.
- D Briefly describe the Master Theorem for Divide and Conquer methods.
- E Write a note on Method of Guessing and Confirming.
- F Briefly describe the Master Theorem for Subtract and Conquer Recurrences.

Q.3 Attempt the following: (Any THREE)**(15M)**

- A What is a binary tree? What are its properties?
- B What is preorder and post order traversal of a binary tree? Compute them for the following tree.



- C Briefly explain the concept of AVL trees.
- D Write a note on various ways of representing graphs.
- E Explain with suitable example the Kruskal algorithm.
- F Outline any one algorithm that follows shortest approach.

Q.4 Attempt the following: (Any THREE)**(15M)**

- A Briefly describe the Greedy Property.
- B Explain the divide and conquer approach of designing algorithms. What are its advantages?
- C What is the Longest Common Subsequence problem? Explain.
- D Write a note on dynamic programming.
- E Explain any one algorithm that is based on dynamic programming.
- F Write a note on Classification by Implementation Method.

Q.5 Attempt the following: (Any THREE)**(15M)**

- A What is a threaded binary tree? Explain with suitable illustration.
- B Briefly describe the median of medians algorithm.
- C What are the Advantages and Disadvantages of Greedy Method?
- D Write a note on partition-based selection algorithm.
- E What is analysis of algorithm? Why is it important?