Q. P. Code: 35763

(2 ½ Hours) **[Total Marks: 75**

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

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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.

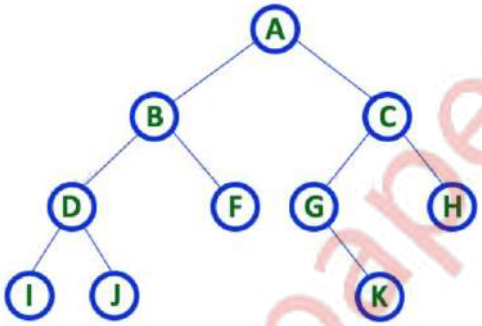
E Write a note on Method of Guessing and Confirming.

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?