

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) By using which method sorting is not possible?

- a) Insertion b) Selection c) Deletion d) Exchange

ii) In binary search trees, _____ tree walk prints the key of the root of a sub tree Between the values in its left sub tree and those in its right sub tree.

- a) post order b) preorder c) in order d) none of these

iii) Algorithms can be represented:

- a) Relaxtion b) Improvment
c) Shortning d) costing

iv) Prim's and Kruskal's algorithm are examples of _____

- a) binary search tree b) maximum spanning tree
c) unweighted graphs d) minimum spanning tree

v) A pivot element to partition unsorted list is used in.....,
is based on the divide-and-conquer paradigm.

- a) Merge Sort b) Quick Sort c) Insertion Sort d) Insertion Sor

B) Fill in the blanks:

(5M)

{ lower, upper, prim, kruskal, $O(n \log n)$, computational problem, Program, big theta }

i) -----is any well-defined computational procedure that takes some value, or set of values, as input and produces some value, or set of values, as output

ii) algorithm as a tool for solving a well-specified

iii) ----- bounds a functions from above and below, so it defines exact asymptotic behavior

iv) -----Select the next shortest edge which does not create a cycle

v) IN ----- algorithm uses a priority queue worst-case running time of insertion sort is.

C) Explain the following terms in one or two lines

(5M)

- i) Asymptotic Analysis
- ii) Expressy tree
- iii) Correctness of Algorithm
- iv) Omega- Ω Notation
- v) N-ary tree

Q.2 Attempt the following: (Any THREE)

(15M)

- A Write short note what is Algorithm
- B Briefly describe the Master method for solving recurrences .
- C Explain Running time analysis in detail.
- D Write a note on Worst Case ,Best case,Avg case.
- E Briefly describe the "Theta- Θ Notation".
- F Write a note on divide-and-conquer approach.

Q.3 Attempt the following: (Any THREE)

(15M)

- A. Explain properties of binary tree
- B Write a note on shortest path algorithm
- C What is an AVL tree? Explain.
- D Explain with suitable example the Kruskal algorithm
- E Expalin Partition-based Selection Algorithm
- F Write a note on median-of-median algorithm.

Q.4 Attempt the following: (Any THREE)

(15M)

- A Explain Rod cutting problem that is based on dynamic programming.?
- B what are Elements of Greedy Algorithms?
- C Explain Advantages and Disadvantages of Divide and Conquer strategy.
- D write short note on Master Theorem.
- E Explain top-down with memorization, and bottom-up in dynamic approach.
- F Write advantages and disadvantages of greedy strategy?

Q.5 Attempt the following: (Any THREE)

(15M)

- A. List the various properties of binary tree.
- B What is a threaded binary tree? Explain.
- C What is a Topological Sort? Explain it with a suitable example
- D Explain Breadth-first search algorithm.
- E. What is inorder and post order traversal of a binary tree? Compute them for the following tree.

