



13. a) Explain the following operations on a binary search tree with suitable algorithms. *13,K2,CO3*  
(i) Find a node.  
(ii) Find the minimum and maximum elements of binary search tree.

**OR**

- b) (i) What are AVL trees? Describe the different rotations defined for AVL tree. *7,K2,CO3*  
(ii) Insert the following elements step by step in sequence into an empty AVL tree 15, 18, 20, 21, 28, 2330, 26. *6,K2,CO3*
14. a) Explain the topological sorting of a graph G with example and Quote the step wise procedure for topological sort. *13,K2,CO4*

**OR**

- b) Differentiate depth-first search and breadth-first search traversal of a graph with suitable examples. *13,K2,CO4*
15. a) Compare and write an algorithm to perform a Linear and binary Search. *13,K2,CO5*

**OR**

- b) Compare the below different Sorting methods and discuss about each method in a very detailed Manner. *13,K2,CO5*  
(i) Bubble Sort.  
(ii) Selection sort.

**PART - C (1 × 15 = 15 Marks)**

16. a) (i) Given a rooted tree, one desires to find the shortest path from the root to a given node v. Which algorithm would one use to find this shortest path? *7,K2,CO4*  
(ii) Write a program to determine whether there is at least one path from the source to the destination. *8,K2,CO4*

**OR**

- b) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function  $h(x) = x \pmod{10}$ , show the resulting.  
(i) Open hash table.  
(ii) Closed hash table using linear probing.  
(iii) Closed hash table using quadratic probing. *15,K2,CO5*