1) Find DFS and BFS traversals of the following graph and write the corresponding forest of tree. Give the topological sorting order for the following digraph (starting from ‘a’)



2) Show that the disk moves made in the classic recursive algorithm for the Tower of Hanoi puzzle can be used for generating the binary reflected Gray code. Also show how the binary reflected Gray code can be used for solving the Tower of Hanoi puzzle.

3) **a.** For *n* = 1*,* 2*,* 3*,* 4*,* and 5, draw all the binary trees with *n* nodes that satisfy the balance requirement of AVL trees

**b.** Draw a binary tree of height 4 that can be an AVL tree and has the smallest number of nodes among all such trees.

4) Write Shellsort algorithm and analyse its efficiency. Trace the same for the list ***M, I, T, M, A, N, I, P, A, L*** to sort in alphabetical order

5) Consider the problem of finding the distance between the two closest numbers in an array of *n* numbers. (The distance between two numbers *x* and *y* is computed as |*x* − *y*|.). Design a presorting-based algorithm for solving this problem and determine its efficiency class.