

Assignment- 08

Developing the Fundamentals of Tree and Graph [CO 7]

| Deadline:

Instructions:

For every task you need to show **tracing/simulation** and final output. *If tracing/simulation is missing, half of the marks will be deducted.* Try to maintain sequence. Write name, student id, assignment number and date of submission clearly.

Task 1

```
Int no_Of_Nodes= (last 3 digit of your student ID%12 + last 3 digit of your student ID % 4 + 9);
Int [] array=new int [no_Of_Nodes+1];
Int x= last digit of your ID;
for (int i=1; i<= no_Of_Nodes; i++){
    array[i]=x;
    x+=5;
}
```

- i) Consider the above code and **draw the array**.
- ii) **Draw the complete Binary** Tree from the array
- iii) **Write** in-order, pre-order, post-order, and level-order traversal of constructed complete binary tree.
- iv) **Draw a BST1** from the array [assume, you don't have idea that the array is sorted]
- v) **Write** in-order, pre-order, post-order, and level-order traversal of constructed BST1.
- vi) **Draw a BST2** from the array [You know that the array is sorted]
- vii) **Write** in-order, pre-order, post-order, and level-order traversal of constructed BST2.

Task 2

$X+76, X+100, X-39, X+44, X+27, X-28, X+19, X-10, X+15, X+12$

$X = \{(\text{last 4 digit of your id} \% 33) + (\text{last 3 digit of your id} \% 34) + 2\}$

$Y = \{(\text{last 2 digit of your id} \% 4) + (\text{last 3 digit of your id} \% 5)\}$

- a) **Insert** each element in **BST** showing each steps
- b) **Write** in-order, pre-order, post-order, and level-order traversal of constructed tree.
- c) **Delete** the element from position Y and **show** new tree.
- d) **Delete** a random node with 1 child and **show** new tree.
- e) **Delete** a random node with 2 child and **show** new tree.

Task 3

- a) **Define** and **give examples of**:
 - I. Binary Tree
 - II. m-ary Tree
 - III. Binary Search Tree (BST)
- b) **State two differences** between a tree and a graph

Task 4

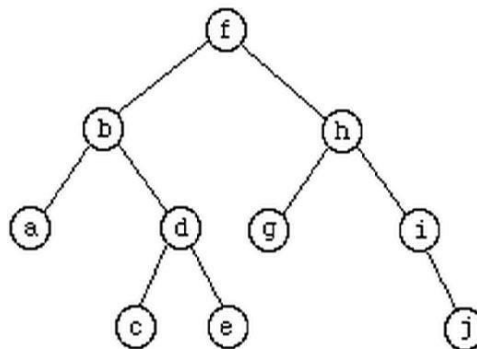
Following is the Array representation of a Binary Tree:

		2		7		5		3		6		4		8				9		14				12		1	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15												

- Draw** the Binary Tree
- Write** down the sequences for: Pre-order, Post-order, In-order , and level order Traversal for the tree you draw.

Task 5

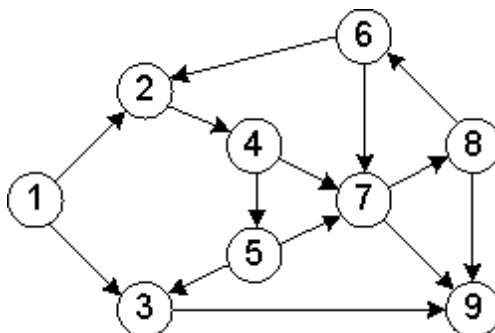
Consider the following Binary Tree.



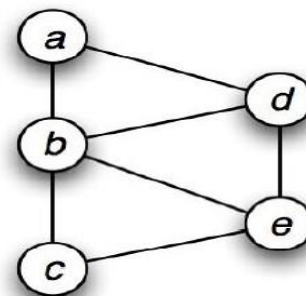
- Write** the array representation of the Binary Tree.
- Write** down the pre-order, post-order and in-order traversal sequence of the tree.

Task 6

Consider the following Graphs:



(a) Directed



(b) Undirected

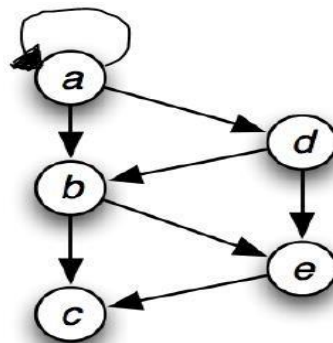
- Draw the Adjacency Matrices** for the above graphs.
- Then from the Adjacency Matrices **draw the graph** and see if the resultant graph matches or not
- Draw the Adjacency list** for the directed graph.

Task 7

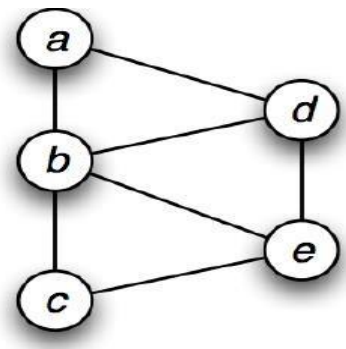
Consider the following (a) Adjacency Matrix (b) Directed Graph and (c) Undirected Graph.

	A	B	C	D	E	F
A	0	1	1	1	0	0
B	1	0	0	0	1	1
C	1	0	0	0	0	1
D	1	0	0	0	0	0
E	0	1	0	0	0	0
F	0	1	1	0	0	0

(a) Adjacency Matrix



(b) Directed Graph



(c) Undirected Graph

Draw Adjacency Lists for each of the figures above.