THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME : LEVEL 03
CPU1142- DATA STRUCTURES AND ALGORITHMS
NO BOOK TEST II – 2014/2015

DURATION: One Hour (1 Hour)

Date: 06.09.2015 **Time: 1.00 p.m. – 2.00 p.m.**

Answer All Questions.

Write your answers in the answer sheets provided.

1. Fill in the blanks with appropriate terms.

   a) The number of subtrees of a node is called as .....
   b) If every non-leaf node in a binary tree has non empty left and right subtrees, we call it as a ..... tree.
   c) Vertex V1 is said to be ..... to vertex V2, if there is an edge (V1, V2) or (V2, V1).
   d) A graph which has a path from every vertex to every other vertex, we call that graph as a ..... graph.
   e) Each edge of a graph is an ordered pair of vertices, we call that graph as a ..... graph.
   f) The children nodes of a given parent node are called as ..... .
   g) Breadth first traversal algorithm uses a ..... to store the nodes of each level of the graph as they are visited.
   h) Level 3 of a complete binary tree contains ..... nodes.
   i) Trees are a unique type of ..... data structures.
   j) A graph is said to be a ..... graph, if every edge in the graph is assigned some value.

2. State whether the following statements are **True** or **False**.

   a) Graphs are hierarchical data structures.
   b) In extended binary trees, the nodes which have two children are known as external nodes.
   c) Each of the nodes of a height balanced (AVL) tree has the property that the height of the right subtree is either one more, equal or one less than (1, 0, -1) the height of the left subtree.
   d) A stack is used to eliminate the recursion in depth-first traversal.
   e) In a directed graph, "out degree" means the number of edges directed towards the vertex.

f) The size of the two dimensional array that can be used to form an adjacency matrix depends on the number of edges on the graph.
g) If a binary tree contains **m** nodes at level **l**, it contains at most **2m** nodes at level **(l+1)**.
h) For an empty queue, the pointers **Rear = -1** and **Front = 0**.
i) For a circular queue, if **Front = Rear +1** the queue will be empty.
j) A complete or fully connected graph with **n** vertices will have **n(n-2)/2** edges.

3.

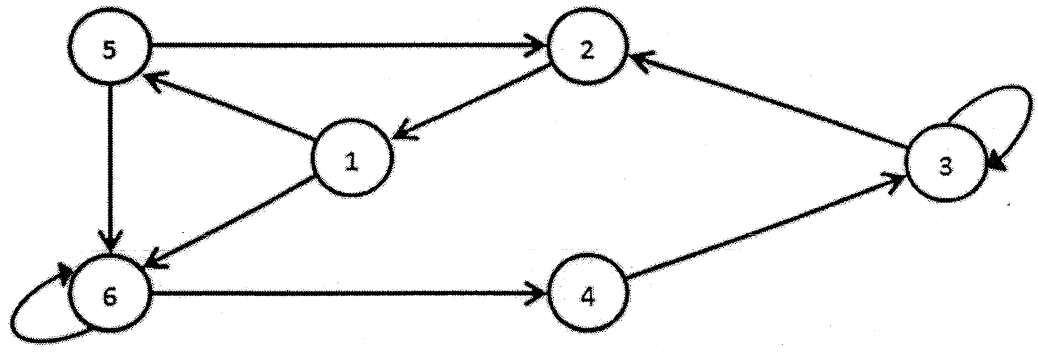
a) Construct a binary tree for the following set of integers.
10, 8, 9, 15, 12, 3, 15, 11, 6, 2, 16, 18, 20, 5, 10

b) What will be the output when you traverse the above constructed binary tree in the following orders?
   I. Pre order
   II. In order
   III. Post order

c) What is the depth of the above constructed binary tree?
d) What are the leaf and non-leaf nodes of the above constructed binary tree?

4.

a) Draw the corresponding adjacency matrix for the following digraph.



5.

a) Consider the following expression in **infix** form and convert it into the **postfix** form. Clearly show the 7 steps required for the conversion.

A+B/C*D$E-F/(G-H)