NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE TITLE: **CIT341**
COURSE TITLE: **DATA STRUCTURES**

Time: **3 HOURS**
INSTRUCTION: ***Answer any five questions out of Seven***

1.
   a) Briefly explain the difference between linear and non-linear data structures.
   b) Write a brief note on each of the following:
      i. List
      ii. Array
   c) Distinguish between a stack and a queue making sure to illustrate your answer.

2.
   a) Consider the following operations carried out on a queue Q. Provide the content of the queue and the returned value, after each operation, to complete the table.

Operation	Content of Q	Returned Value
Initialise(Q)		
Add(D,Q)		
Add(A,Q)		
Add(O,Q)		
Remove(Q)		
Add(T,Q)		
Remove(Q)		

   b) Using a simple example explain the process of storing a queue in a dynamic data structure illustrating how a node can be added and removed.
   c) Explain briefly two modes of stack storage.

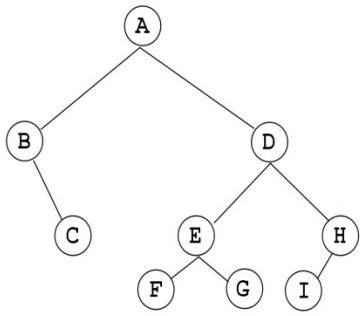
3.
   a) Explain clearly what a hash function is.
   b) Write down three characteristics of a good hash function.
   c) Briefly describe what a hash table is giving an example of its application.

4.

a) Briefly describe the mathematical definition of a tree giving its salient properties.
b) Explain the recursive nature of the definition of a tree.
c) Using an example describe the inverted pictorial representation of a tree.

5.

a) Briefly describe what a search tree is listing its main properties.
b) Concisely define what a perfect binary tree is.
c) Using the simple tree shown in the figure below as an example, describe the following traversal methods:
    i. Preorder
    ii. In order
    iii. Postorder



6.

a) Briefly explain the concept of garbage accumulation in a Java Programme
b) Write short notes on the following garbage collection techniques
    i. Reference Counting
    ii. Mark-and-Sweep
c) Briefly describe four Memory Allocation methods.

7.

a) Explain clearly what greedy algorithm is.
b) Describe four functions of greedy algorithm
c) Briefly describe the three phases of the divide-and-conquer paradigm.