NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91, Cadastral Zone,
Nnamdi Azikiwe Expressway, Jabi, Abuja

FACULTY OF SCIENCES
APRIL 2019 EXAMINATION

Course Code: **CIT 341**
Course Title: **DATA STRUCTURES**
Course Credit Unit: 3
Time Allowed: 3Hours
Instruction: Answer Question 1 and any other four questions

QUESTION 1
   a. Briefly describe merge sorting   [5 marks]
   b. Given the list **L** below   (5 marks)

V	R	T	W

Illustrate the following operations
   i.   Add(2,Z,L)
   ii.   Set(0,S,L)
   iii.   Remove(Z,L)
   c. Give four (4) classification of simple data types with examples (4 marks)
   d. Declare an array that would hold twenty (20) integer numbers (4 marks)
   e. Discuss briefly the greedy algorithm approach [4 marks]

QUESTION 2
   a. Explain the four steps involved in Dynamic Programming Design (4 marks)
   b. Describe in detail the Divide-and-Conquer Algorithm (4 marks)
   c. Enumerate four(4) functions of the greedy algorithm (4 marks)

QUESTION 3
   a. What is an algorithm?   (3 marks)
   b. Explain the following   (6 marks)
      i.   Interface
      ii.   Interfaces in Java
      iii.   APIs
   c. Differentiate between a superclass and a subclass (3 marks)

QUESTION 4
   a. Discuss Algorithm Analysis under the following sub-topics (4 marks)
      i.   Worst-case Complexity
      ii.   Average-case Complexity
   b. Describe the Graph Theory   (4 marks)

    c.   What is a Data Structure?   (4 marks)

QUESTION 5
    a.   What do you understand by Dynamic Programming?   [4 marks]
    b.   Briefly explain Binary Search   [3 marks]
    c.   Find the transpose of the matrix given below: (5 marks)

$$\begin{bmatrix} 1 & 4 & 8 \\ 3 & 6 & 5 \end{bmatrix}$$

QUESTION 6
    a.   List and explain the factors for measuring the effectiveness of an algorithm (6 marks)
    b.   What is the difference between public class and protected class (3 marks)
    c.   List and discuss the two main operations applicable to all Stack (3 marks)