

**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**

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

 

Illustrate the following operations

1. Add(2,Z,L)
2. Set(0,S,L)
3. Remove(Z,L)
4. Give four (4) classification of simple data types with examples (4 marks)
5. Declare an array that would hold twenty (20) integer numbers (4 marks)
6. Discuss briefly the greedy algorithm approach [4 marks]

**QUESTION 2**

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

**QUESTION 3**

1. What is an algorithm? (3 marks)
2. Explain the following (6 marks)
3. Interface
4. Interfaces in Java
5. APIs
6. Differentiate between a superclass and a subclass (3 marks)

**QUESTION 4**

1. Discuss Algorithm Analysis under the following sub-topics (4 marks)
2. Worst-case Complexity
3. Average-case Complexity
4. Describe the Graph Theory (4 marks)
5. What is a Data Structure? (4 marks)

**QUESTION 5**

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

$$\left[\begin{array}{c}1 4 8\\3 6 5\end{array}\right]$$

**QUESTION 6**

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