**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**University Village, 91 Cadastral Zone, NnamdiAzikwe Expressway, Jabi, Abuja**

**FACULTY OF SCIENCE**

**DEPARTMENT OF COMPUTER SCIENCE**

**JULY 2018 EXAMINATIONS**

**CIT341: Data Structures Credit Units: 3**

**Instruction**: *Answer Question 1 (22 marks) and any other four questions each carrying 12 marks* **Time Allowed:** *2½ hours*

1a) Write short notes on Abstract data type. Give examples.***(5 marks)***

b) What is a Data Structure?***(2 marks)***

c) State and define with examples the classes of Data structure. ***(4 marks)***

d) State the properties of Linked Lists ***(7 marks)***

e) State the Principle of Optimality. ***(1 mark)***

f) State three reasons why you might use a Number object rather than a primitive. ***(3 marks)***

2a). Describe the Divide-and-conquer technique. ***(2 marks)***

b) State in the correct order the major phases in the divide-and-conquer paradigm. ***(3 marks)***

c) Briefly define the following:

 i) Accessor Methods ***(1 mark)***

ii) Palindrome***(1 mark)***

iii) Subclass ***(1 mark)***

iv) Superclass***(1 mark)***

d) Write short notes on Interfaces in Java. ***(3 marks)***

3a) Discuss Dynamic Programming. ***(5 marks)***

b) Enumerate the major steps involved in Dynamic programming design. ***(4 marks)***

c) What does Bottom-up mean?***(3 marks)***

4a) Generally describe Greedy algorithm. ***(3 marks)***

b) Enumerate the various functions contained in the greedy algorithm. ***(4 marks)***

c) State the general structure of Greedy algorithm. ***(5 marks)***

5a) Define the following:

i) A Block ***(1 mark)***

ii) An Expression ***(2 mark)***

iii) A Package ***(1 mark)***

iv) ASuballocator***(1 mark)***

b) State reasons for writing suballocators. ***(3 marks)***

c) State the characteristics of a good hash function. ***(1½ marks)***

d) State any five things you can do in a Subclass.***(2½ marks)***

6a) Define AVL Balance condition.***(2 marks)***

b) Describe the process of inserting items into an AVL tree. ***(7 marks)***

c) Describe an array? ***(2 marks)***

d)Give the syntax for concatenating two strings. ***(1 mark)***