INSTRUCTION: Answer question one and any other two questions

QUESTION ONE (30 MARKS)

a) Define the following:
   i. Data structure
   ii. Algorithm

b) Write a pseudo-code to demonstrate the following:
   i. Array
   ii. Stack

(c) Explain the following terminologies:
   i. Abstract Data Type (ADT)
   ii. File structure

d) State five properties which something must have to qualify as an algorithm

e) Describe the following list terminologies:
   i. Empty list
ii. Length of a list
iii. Head
iv. Tail

f) Explain the meaning of LIFO with regard to stacks

(3 marks)

g) Discuss briefly the following:
   i. Bubble sort
   ii. Divide and conquer algorithm

(2 marks)

(2 marks)

QUESTION TWO (20 MARKS)

a) The situations in which knowledge of data structures and algorithms can be used to solve problems can be categorized into three. Discuss the following
   i. Real-world data storage
   ii. Programmer’s tools
   iii. Modeling

(5 marks)

(5 marks)

(5 marks)

b) Discuss the concept of recursion

(5 marks)

QUESTION THREE (20 MARKS)

Demonstrate the following concepts:

a) Binary tree
b) Binary search tree
c) Insertion sort
d) Merge sort

(5 marks)

(5 marks)

(5 marks)

(5 marks)

QUESTION FOUR (20 MARKS)

Explain the following:

a) Binary tree traversal
b) Graphs
c) Greedy algorithm
d) Linked lists
e) Selection sort

(4 marks)

(4 marks)

(4 marks)

(4 marks)

(4 marks)