Mount Kenya University

INSTRUCTION: Answer question one and any other two questions

QUESTION ONE (30 MARKS)

a) Define the following:
   i.   Data structure   (2 marks)
   ii. Algorithm   (2 marks)

b) Write a pseudo-code to demonstrate the following;
   i.   Array   (4 marks)
   ii. Stack   (4 marks)

c) Explain the following terminologies:
   i.   Abstract Data Type (ADT)   (1 mark)
   ii. File structure   (1 mark)

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

e) Describe the following list terminologies:
   i.   Empty list   (1 mark)

ii.   Length of a list   (1 mark)
        iii.   Head   (1 mark)
        iv.   Tail   (1 mark)

    f) Explain the meaning of LIFO with regard to stacks   (3 marks)

    g) Discuss briefly the following:
        i.   Bubble sort   (2 marks)
        ii.   Divide and conquer algorithm   (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   (5 marks)
        ii.   Programmer's tools   (5 marks)
        iii. Modeling   (5 marks)

    b) Discuss the concept of recursion   (5 marks)

QUESTION THREE (20 MARKS)

Demonstrate the following concepts:

    a) Binary tree   (5 marks)
    b) Binary search tree   (5 marks)
    c) Insertion sort   (5 marks)
    d) Merge sort   (5 marks)

QUESTION FOUR (20 MARKS)

Explain the following:

    a) Binary tree traversal   (4 marks)
    b) Graphs   (4 marks)
    c) Greedy algorithm   (4 marks)
    d) Linked lists   (4 marks)
    e) Selection sort   (4 marks)