CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

CHUKA AND THARAKA CAMPUSES

EXAMINATION FOR THE AWARD OF DIPLOMA INCOMPUTER SCIENCE

COMP 0243: DATA STRUCTURES AND ANALYSIS OF ALGORITHM

STREAMS: DIP COMP SCI. Y2S2   **TIME: 2 HOURS**

DAY/DATE: FRIDAY 14/12/2018   **8.30 A.M – 10.30 A.M.**

INSTRUCTIONS:

- Answer question **ONE** and **TWO** other questions
- Do not write anything on the question paper
- This is a **closed book exam**, no reference materials are allowed in the examination room
- There will be **NO** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely.

SECTION A

Question one (30 marks)

a. Define what is data structure.   [2 marks]
b. Describe four properties that an algorithm should possess   [4 marks]
c. Highlight two ways of analysingan algorithm to determine its efficiency   [2 marks]
d. Define what is a pointer and write the syntax of declaring pointers   [4 marks]
e. Distinguish between enqueue and dequeue operations in a queue.   [4 marks]
f. Explain three cases used to compare various algorithm execution time in a relative manner.   [6 marks]
g. Differentiate between compilation time and run time of an algorithm   [4 marks]
h. Distinguish between Linear and Non-linear data structures   [4 marks]

SECTION B

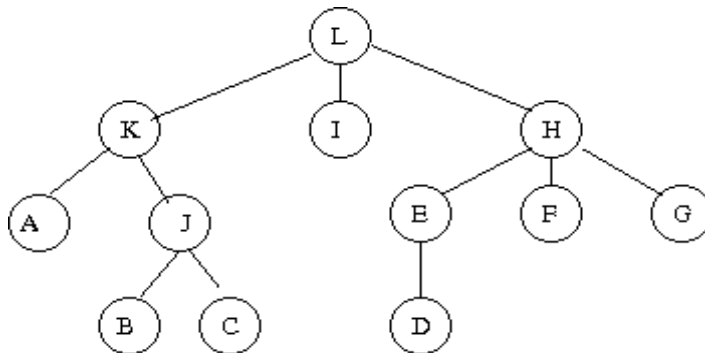**Question two (20 marks)**

a. Using the following data: 70, 36, 67, 55, 65, and 58. Construct

   i.   A balanced binary search tree with 58 as the root node   [10 marks]

b. Write an Algorithm for a linear array, for calling 14no.students and calculate length of the algorithm   [10 Marks]

Question three (20 marks

    a. State any four application areas of data structures   [4 marks]

    b. Explainthree asymptotic notations used in data structures and algorithms. [6 marks]

    c. Using the following data: 96, 72, 35, 54, 67, 40 and 65

        i. Construct an appropriate hash table.   [5 marks]

        ii. Using the hash table constructed, illustrate the algorithm for searching on item from the hash table. Use an example of item 35.   [5 marks]

Question four (20 marks)

    a. Nametwo basic operations on a stack   [2 marks]

    b. State and describe briefly three search algorithms   [6 marks]

    c. List the nodes of the tree below in Preorder,Postorder, and breadth-first order.

                                                 [12 Marks]

Question five (20 marks)

    a. Given the following set of data: 68, 75, 47 and 55, illustrate how you would sort the data using:

        i. Bubble sort   [5 marks]

        ii. Merge sort   [5 marks]

        iii. Quick sort   [5 marks]

        iv. Selection sort   [5 marks]