

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN COMPUTER SCIENCE

COSC 0243: DATA STRUCTURES AND ALGORITHM

STREAMS: DIP (COMP SCI) Y2S2

TIME: 2 HOURS

DAY/DATE:

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.
- Marks are awarded for clear and concise answers.

SECTION A

QUESTION ONE (30 Marks)

- a. Define the following terms in data structures.
- i. Records (2 marks)
 - ii. Algorithm (2 marks)
 - iii. Non-Linear data structures (2 marks)
- b. Differentiate Static data structure from Dynamic data structure (4 marks)
- c. Why Learn Data Structure and Algorithms? (6 marks)
- d. Differentiate Time Complexity from Space Complexity (4 marks)
- e. What is Sorting, provide TWO examples? [2 marks]

f. State the operations that can be performed on a stack? [3 marks]

g. Write the stack overflow condition. [2 marks]

h. Write the postfix form of the following expression: $(A + B) * (C - D)$ [3 marks]

SECTION B (Answer any TWO questions Only)

QUESTION TWO (20 Marks)

a. Explain different types of data structures with an example [10 marks]

b. Describe FOUR Common orders of growth in Big “O” notation along with descriptions and examples where possible. [10 Marks]

QUESTION THREE (20 Marks)

a. List and Explain the Five properties Algorithms must have (10 marks)

b. With Appropriate example, Explain the following Operations that can be performed on an Array

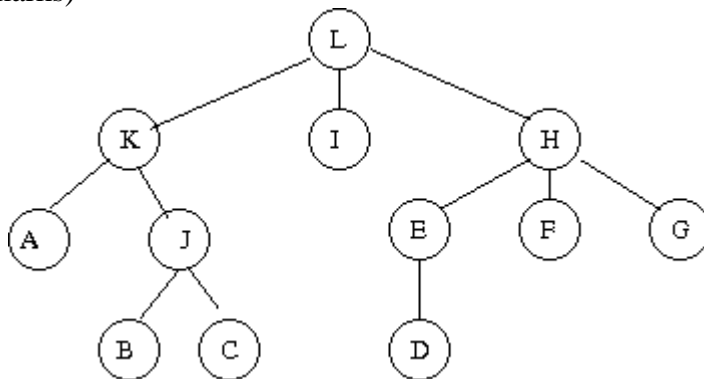
i. **Insertion:** (4 marks)

ii. **Sorting** (4 marks)

iii. **Deletion** (2 marks)

QUESTION FOUR (20 Marks)

a. List the nodes of the tree below in preorder, postorder, and breadth-first order. (12 marks)



b. Implement the following set of values {5, 1, 6, 2, 4, 3} in ascending order Using the following Sorting algorithms:

i. Bubble sort [4 marks]

ii. Insertion Sort [4 marks]

QUESTION FIVE (20 Marks)

a. Create an Algorithm for storing names of 5no.students and calculate length of the array [12 Marks]

b. Write the syntax in C for creating a node in the singly linked list [8 marks]
