

061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CR/08/6/A

UNDERSTAND ALGORITHMS AND DATA STRUCTURES

NOV/DEC 2023



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL
(TVET CDACC)**

WRITTEN ASSESSMENT

TIME: 3 Hours

INSTRUCTIONS TO CANDIDATE

1. *The paper consists of **two** sections: **A** and **B***
2. *Answer **ALL** questions in Section **A** and any **Three** from section **B***
3. *Marks for each question are indicated in the brackets*
4. *A separate answer booklet will be provided*
5. *Do not write on the question paper*

Candidates should answer the questions in English

This paper consists of **FOUR (4)** printed pages

***Candidates should check the question paper to ascertain that all pages are
printed as indicated and that no questions are missing***

SECTION A: (40 Marks)

(Answer all the questions in this section)

1. Define the following terms. (4 Marks)
 - a) Data structure
 - b) Algorithm analysis
 - c) Arrays
 - d) Stacks
2. Outline FOUR specific characteristics of algorithms that you would prioritize when creating an algorithm. (4 Marks)
3. Algorithm X and Algorithm Y are two sorting algorithms. Algorithm X has a time complexity of $O(n^2)$, while Algorithm Y has a time complexity of $O(n \log n)$. Which algorithm would you choose for sorting a large dataset? Justify your answer. (4 Marks)
4. Using a suitable example, state the difference between static and dynamic data structures. (4 Marks)
5. Basic operations form the foundation of stack functionality; Identify THREE basic operations within the stack. (3 Marks)
6. Write an algorithm that is used to implement enqueue operations as used in queue data structure. (4 Marks)
7. Searching algorithms are used for the purpose of determining the existence and/or position of a target element within a provided data structure. Explain the following terms:
 - a) Hashing technique. (2 Marks)
 - b) Linear search (2 Marks)
 - c) Binary Search (2 Marks)
8. Write an algorithm for a simple program that will display the largest of the three numbers. (4 Marks)
9. Outline THREE factors that June should consider when selecting appropriate data structure. (3 Marks)
10. Use a binary search tree to sort the following data in ascending order: 8, 9, 7, 12, 5, 4, 6, 10, 13, 2. (4 Marks)