

061306T4CPM

COMPUTER PROGRAMMING LEVEL 6

IT/OS/CP/CR/05/6/A

DESIGN 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

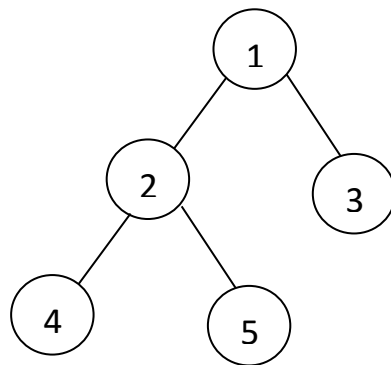
Candidates should answer the questions in English

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the 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)
 - i) Data structure
 - ii) Recursive function
2. Differentiate between file structure and storage structure. (4 Marks)
3. List THREE main categories of data structures (3 Marks)
4. State TWO reasons why arrays are a fundamental and widely used data structure in computer programming. (2 Marks)
5. Explain a situation where storing items in an array is clearly better than storing items on a linked list. (2 Marks)
6. Deduce the pre-order and post-order sequences for the following binary tree. (4 Marks)



7. Differentiate between homogeneous and heterogeneous data structures giving an example in each case. (4 Marks)
8. Explain the meaning of a balanced tree. (2 Marks)
9. Explain the following C# code (2 Marks)


```
int [] numbers = new int [5];
```
10. Explain the following operations in relation to queue data structures. (4 Marks)
 - i) Enqueue
 - ii) Dequeue
11. List TWO examples of divide and conquer algorithms. (2 Marks)
12. State any FOUR considerations that may influence the choice of an internal sorting algorithm. (4 Marks)
13. List THREE application areas of data structures. (3 Marks)