

**061306T4CSC**

**COMPUTER SCIENTIST LEVEL 6**

**ICT/OS/CS/CR/04/6/A**

**UNDERSTAND FUNDAMENTALS OF PROGRAMMING**

**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 three (3) 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. State FOUR advantages of design stage in programming (4 Marks.)
2. Explain the following data types as used in Java (4 Marks)
  - (a) Primitive data types
  - (b) Reference data types
3. Highlight FOUR features of java programming (4 Marks)
4. You are the lead architect of a software development project at a major tech company. Your team is considering using Java for the project, and you want to assess their knowledge of one of Java's fundamental concepts: Inheritance. Explain TWO benefits of using inheritance in Java (4 Marks)
5. Write a Java program that implements a class named Odd with a data member named x and the method named read that accepts an integer from the keyboard. The program determines whether the integer is odd or even and displays an appropriate message. Use the if statement (6 Marks)
6. Explain the term Encapsulation as used in Java programming (3 Marks)
7. State FIVE advantages of validating the program's functionality in Java (5 Marks)
8. State TWO differences between a public and a non-public class in Java (4 Marks)
9. Explain the significance of the of the keyword void as used in Java (2 Marks)
10. Outline FOUR rules regarding the use of identifiers in Java (4 Marks)

**SECTION B (60 Marks)***(Answer any THREE questions in this section)*

11.

- a) Outline FOUR characteristics of constructors as used in Java (4 Marks)
- b) Explain TWO differences between default constructor and parameterized constructor as used in Java (4 Marks)
- c) Write a Java program that defines a class named 'Rectangle' with two data members: 'length' and 'width.' The program should implement the following member functions:
  - read(): To prompt the user to input the length and width of a rectangle.
  - area(): To compute the area of the rectangle.
  - display(): To display the computed area of the rectangle.

Use a default constructor for the 'Rectangle' class (10 Marks)

- d) Explain the concept of constructor overloading in Java (2 Marks)

12.

- a) Explain the following terms as used in programming (10 Marks)
  - i. Algorithm
  - ii. Source code
  - iii. Compiling
  - iv. Debugging
  - v. Object-oriented programming (OOP)
- b) Use the following code to answer the questions that follow:

```
public class ThreeNumberAddition {
    public static void main(String[] args) {
        // Create a Scanner object to read input from the user
        Scanner = new Scanner(System.in)
        // Prompt the user to enter three numbers
        System("Enter the first number: ")
        double num1 = scanner.nextDouble()
        System("Enter the second number: ");
```

```

double num2 = scanner.nextDouble();
System("Enter the third number: ");
double num3 = scanner.nextDouble()
// Calculate the sum of the three numbers
sum = num1 + num2 + num3
// Use an if statement to check if the sum is greater than 10
if (sum > 10) {
    System.out.println("The sum of the three numbers is greater than 10.")
} else {
    System.out.println("The sum of the three numbers is not greater than
10.")
}
// Close the Scanner
scanner.close();
}
}

```

- i. Identify FOUR bugs in the code (4 Marks)
- ii. Re-write the code correctly (6 Marks)

13.

- a) You are designing a program for a simple game. The game involves checking user input and performing certain actions based on that input. As part of your design, you need to implement both selection control structures and loop control structures. Explain TWO key differences between selection control structures and loop control structures (4 Marks)
- b) Write a Java program that calculates the sum of all even numbers between 1 and 100 using a 'for' loop (6 Marks)
- c) John is leading a software development project. To ensure the successful development of a program, He needs to explain the various phases that will be involved in the process. Describe the phases of program development (10 Marks)

14.

- a) Peter is a software architect responsible for selecting the appropriate programming paradigms for different projects in the company. Describe FIVE distinct practical applications of Object-Oriented Programming (OOP) that Peter would consider for different projects within the organization (10 Marks)
  
- b) Create a Java program using single inheritance to calculate the volume of a cylinder. You need to design two classes: 'A' and 'B.' In 'class A,' define two data members, 'height' and 'radius,' and a member function 'read()' to get user input for these values. In 'class B,' create a member function 'compute()' to calculate and display the cylinder's volume.

(10 Marks)

**THIS IS THE LAST PAGE.**