UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BCS 2233
COURSE	: OBJECT ORIENTED PROGRAMMING
SEMESTER/SESSION	: 2-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer ALL questions.
3. All answers should be written in answer booklet.
4. Write legibly and draw sketches wherever required.
5. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Define the **FOUR(4)** characteristic of object oriented programming. (8 marks)

b) Write a Java statement for the following instruction: (4 marks)

i. Declare a variable of type `int` named `age` and initialize it with the value `25`

ii. Declare a `constant` variable of type `double` named `PI` with the value `3.14159`

iii. Declare a `String` variable named `code` and assign it the value "`BCS 2233`"

iv. Declare a variable of type `boolean` named `status` and initialize it with the value '`true`'.

c) Assume that the variables `x, y, z,` and `result` are all integers. `x = 1, y = 3,` and `z = 5`. Analyze the following assignment statement and determine value stored in `result`.

i) `result = x + y;` (1 mark)

ii) `result = x + y * z;` (1 mark)

iii) `result = z + (y * x);` (1 mark)

iv) `result = z - y * x;` (1 mark)

d) Analyze the Java program in Figure 1 to detect errors and correct any errors. (4 marks)

```
1  import java.util.Scanner
2  public class Main {
3  public static void main(String[] args) {
4     Scanner input = new Scanner(System.out);
5     System.out.println("Please enter course name for
   BCS 2233:");
6     String cname = input.nextInt();
7     System.out.print("BCS 2233:",cname);
8     }
9  }
```

Figure 1

QUESTION 2

a) Consider to the following Java statements: (4 marks)

```
int a = -20;
char huruf = 'K';
boolean x = false, y = true;
```

Evaluate the logical expressions below as *True* or *False*.

i. `a != 20;`

ii. `false || !y && x`

iii. `'G' < huruf`

iv. `a + 20 > 1`

b) Determine the output for the following Java program in Figure 3, based on the input value of variable `n`. (6 marks)

	Input (n)	Output
i.	1	
ii.	11	
iii.	-1	

```
public static void main(String[] args) {
        boolean found = false;
        int n;
        do{
            Scanner in = new Scanner(System.in);
            System.out.print("Masuk no (atau -1 untuk
keluar):");
            n = in.nextInt();
                if (n < 10 && n > 0)
                    System.out.println(!found);
                else if (n > 10)
                    System.out.println(found);
            System.out.println("OK.");
        }while(n != -1);
    System.out.println("Terima kasih.");
```

Figure 3

c) The incomplete Java program in Figure 4(a) is intended to continuously input integers and calculate the sum of even numbers. The input stops when 0 is entered. The sample output is provided in Figure 4(b). Complete the program using an '*if*' statement to determine even input and a '*do-while*' statement to continuously input an integer. (6 marks)

```
import java.util.Scanner;

public class EvenNumberSum {
    public static void main(String[] args) {
        (i) declare and initiate object Scanner for input
        int total = 0;

        (ii)start do while loop
        System.out.print("Enter a number (0 to exit): ");
        int number = scanner.nextInt();

            (ii)if structures

        (iii) end do while loop

        System.out.println("The sum of the even numbers
entered is: " + total);
    }
```

Figure 4(a)

```
Enter a number (0 to exit): 1
Enter a number (0 to exit): 2
Enter a number (0 to exit): 3
Enter a number (0 to exit): 4
Enter a number (0 to exit): 5
Enter a number (0 to exit): 0
The sum of the even numbers entered is: 6
```

Figure 4(b)

d) Constructor is a block of code that initializes the newly created object. A constructor resembles an instance method in java but it's not a method as it doesn't have a return type.

i. How a class constructor gets called? (1 mark)
ii. What return type in constructor definition? (1 mark)
iii. What is the purpose of constructor? (2 marks)

QUESTION 3

a) Identify and correct an error in the following method definition. (2 marks)

```
i. double info();{
     System.out.println("Programmed by Abu");
   }
```

(2 marks)

```
ii.void average(int n1, int n2) {
     returnvalue (n1+n2)/2.0;
   }
```

b) Consider the following Java program in Figure 5. Identify the `access modifier`, `returnType`, `NameofMethod`, `Parameter list`, `method body`, and `returnValue` of a given method. (6 marks)

```
/** The program returns the minimum between two
numbers */

class Numbers {
   public int minimum(int n1, int n2) {
      int min;
      if (n1 > n2)
         min = n2;
      else
         min = n1;
      return min;
   }
}
```

Figure 5

c) Access specifier or modifier is the access type of the method. Describe **THREE (3)** types of access modifier. (6 marks)

d) A class can contain any of the following variable types. Describe each of variables: (4 marks)

i. Local variable
ii. Instance variable

QUESTION 4

a) Consider the following Java program in Figure 7, which includes a class named `Book` and respond to questions (i) to (v).

```
public class Book {
   private String title;
   private String author;
   private boolean isAvailable;

public Book(String title, String author) {
   this.title = title;
   this.author = author;
   this.isAvailable = true;
}

public String getTitle() {  return title; }

public String getAuthor() {  return author; }

public boolean isAvailable() { return isAvailable; }

public void borrow() {
   if (isAvailable)
  {
      isAvailable = false; }
   else {
      System.out.println("The    book    is    already
borrowed."); }
 }

public void returnBook() { isAvailable = true; }
```

Figure 7

i. Identify **THREE (3)** attributes/class variables (3 marks)

ii. Identify a constructor (4 marks)

iii. Identify number of methods for class `Book`. (1 mark)

iv. Write a statement to create an object for class `Book`. (2 marks)

v. Illustrate Unified Modeling Language (UML) diagram based on class `Book`. (10 marks)

QUESTION 5

a) What is difference between method overloading and overriding? (2 marks)

b) Refer to the following Java code in Figure 8.

```
class Calculation {
   private int z;

   public void addition(int x, int y) {
      this.z = x + y;
      System.out.println("The sum of the given
numbers:"+z);
   }

   public void Subtraction(int x, int y) {
      z = x - y;
      System.out.println("The difference between the given
numbers:"+z);
   }
}

public class My_Calculation extends Calculation {
   public void multiplication(int x, int y) {
      z = x * y;
      System.out.println("The product of the given
numbers:"+ z);
   }
}
```

Figure 8

i. Identify the an object oriented programming concept applied in the program. (1 marks)

ii. What is the keyword used in child class to show the inheritance in Java program. (1 marks)

iii. Illustrate the Unified Modeling Language (UML) class diagram. (8 marks)

iv. Write a driver program (main class) to create an instance of the class. The structure for the main class is as follows: (8 marks)

```
public static void main(String[] args) { }
```

----------**End of question**----------