



kasneb

CICT PART II SECTION 4

OBJECT ORIENTED PROGRAMMING

WEDNESDAY: 27 November 2019.

Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

ALL programs written should be in Java object oriented programming language.

QUESTION ONE

(a) Define the following terms as used in object oriented programming:

- (i) Encapsulation. (2 marks)
- (ii) Method. (2 marks)
- (iii) Message. (2 marks)
- (iv) Field. (2 marks)

(b) Object oriented development methodology uses private and protected class members:

Required:

- (i) Explain the circumstances in which you would use class members defined as protected. (4 marks)
- (ii) With the aid of a diagram, demonstrate how you would represent private and protected class members in a unified modelling language (UML) diagram. (2 marks)
- (iii) Explain the other type of class members used in object oriented development methodology. (2 marks)

(c) Write a Java program to find the quotient and remainder when one number; Num1 is divided by another number; Num2.

Hint: If 8 is divided by 5, quotient = 1 while remainder = 3.

(4 marks)

(Total: 20 marks)

QUESTION TWO

(a) Java Integrated Development Environment (IDE) is a software application enabling users to write and debug Java programs.

Required:

- (i) Describe three main components of IDE. (6 marks)
- (ii) Explain two types of IDEs that support Java development. (2 marks)
- (iii) List three Java programming language platforms. (3 marks)

(b) Write a Java program that prompts for the user's name, then greets the user by name.

Ensure that the user's name is output in uppercase.

(4 marks)

(c) Write a Java program to calculate the future investment value of a business using the following formula:

Future value = present value (PV) $\times (1 + i)^n$;

Where n is the number of periods and i is the interest paid.

(5 marks)

(Total: 20 marks)

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QUESTION THREE

- (a) The cause of the disturbing message flashing on the screen is an uncaught exception.

With reference to the above statement:

- (i) Enumerate four common types of exceptions in Java. (2 marks)
- (ii) Write a program to throw an exception after details of an employee are entered. The program should be such that if an employee's name is a number, a name exception must be thrown. If an employee's age is greater than 50, an age exception should be thrown or else, an object be created for the entered employee. (6 marks)

- (b) Write the expected output on executing the following program code segment:

```
public class conversion
{
    public static void main (string [ ] args)
    {
        int i;
        double d = 0.0;
        i = (int) d;
        system.out.println ("d =" + d);
        system.out.println ("i =" + i);
        i = 9;
        d = (double) i;
        system.out.println ("d =" + d);
        system.out.println ("i =" + i);
    }
}
```

(2 marks)

- (c) (i) A class named student has three variables; name, schoolname and rollnumber.

Required:

Write a program that captures details of students by creating instances of new students. The program should use a constructor function. (6 marks)

- (ii) Write a program to demonstrate the calling of a parametrised constructor. (4 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) Distinguish between a Java reader and a Java writer. (4 marks)

- (b) Complete the table below of object oriented symbols and their purpose.

	Symbol	Purpose
(i)	[]	
(ii)	< >	
(iii)	/* */	
(iv)	()	

(4 marks)

- (c) Explain two differences between "function overloading" and "function overriding" as used in object oriented programming. (4 marks)

- (d) Masomo College stores the following student's biodata: name, address, phone number, email address and registration number. A student should enrol and pass in a minimum number of courses in order to be awarded a certificate. A student's final mark is computed by getting the average mark of the courses taken. Course instructors are lecturers who may take one or more courses. A lecturer's salary is computed from the number of courses taught.

Required:

Draw a class diagram to represent the scenario above that consists of:

- (i) Three classes showing the name, member variables and methods. (6 marks)

- (ii) The relationship between the classes. (2 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Explain the purpose of each of the following Java keywords:

- (i) import. (1 mark)
- (ii) abstract. (1 mark)
- (iii) default. (1 mark)
- (iv) new. (1 mark)

(b) Distinguish between garbage and garbage collection as used in Java programming. (2 marks)

(c) (i) Write a recursive function in Java named “addNumbers” that returns the sum of natural numbers. (4 marks)

(ii) Show the expected output of the program given below:

```
public class MyClass
{
    public static void main (string [ ] args)
    {
        string x = "10";
        int y = 20;
        string z = x + y;
        system.out.println (z);
    }
}
```

(2 marks)

(d) Study the TV class description given below:

- channel (1 – 120)
- volume (1 to 7)
- On (Either on or off)
- + TV () constructor
- + turn on this TV
- + turn off this TV
- + set a new channel
- + set new volume level
- + increase the channel number by 1

Required:

Write a program in Java language to implement the TV class above.

(8 marks)

(Total: 20 marks)

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