



# MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 308: COMPUTER PROGRAMMING II

DATE: 17/4/2023

TIME: 8:30 -10:30 AM

---

## INSTRUCTIONS

*This paper consists of FIVE questions*

*Answer **question one** and other **two** questions.*

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the following terms as used in Object-oriented programming: (6 marks)
- Object
  - Class
  - Encapsulation

- b) Outline FOUR reasons for the rise in popularity of Object Oriented Programming languages (4 marks)

- c) Given the code segment below, state the output of the program when it is ran (4 marks)

```
int main(){  
    int x, y;  
    x = 10;  
    y = 3;  
    cout << x << " / " << y << " is " << x / y << " with a remainder of " << x % y << "\n";  
    cout << x << " / " << y << " is " << x / y << "\n" << x << " % " << y << " is " << x %  
    y;  
    return 0;}
```

- d) Write a C++ program that prompts the user to enter the radius of a circle (float data type), then uses the entered data to calculate and display the area and circumference of the circle. (  $\text{Area} = \pi * \text{radius} * \text{radius}$ ; Take  $\pi = 3.14$ ) (6 marks)
- e) With aid of a sample code segment, demonstrate the syntax of multiple inheritance. (6 marks)
- f) Write a code snippet to print the integers from 1 to 20 using a while loop and counter variable x. Assume the variable x has been declared but not initialized. Print five integers per line. (4 marks)

## QUESTION TWO (20 MARKS)

- a) Describe THREE class access modifiers applicable in C++. (6 marks)
- b) Students at a university are graded based on the marks scored in the subject. Using the **switch statement**, write a C++ program that prints the character “A” if a student scores 70 and above, character “B” if the score is between 60 and 69, C for score between 50 and 59, D for score between 40 and 49, F for scores below 40. (8 marks)
- c) Using relevant examples, discuss the following concepts as used in object-oriented Programming (6 marks)
  - i. Function overloading
  - ii. Function overriding
  - iii. Inheritance

## QUESTION THREE (20 MARKS)

- a) Analyze THREE types of constructors used in a C++ program. (6 marks)
- b) A music producer would like to associate noise loudness measured in decibels with the effect of the noise. The following table shows the relationship between the noise level and human perception of the noise.

| Loudness in decibel | Perception    |
|---------------------|---------------|
| 50 or below         | Quiet         |
| 51 – 70             | Intrusive     |
| 71 -90              | Annoying      |
| Above 90            | Uncomfortable |

Write a C++ program using if ..else statements that will prompt for the user to input noise in decibels and display loudness and the noise perception, respectively (6 marks)

- c) Using a class named *Student*, write a code snippet to illustrate the syntax of a constructor. (4 marks)
- d) Highlight FOUR main steps followed in order to execute an object-oriented program written in a high-level language. (4 marks)

#### QUESTION FOUR (20 MARKS)

- a) Discuss TWO methods of parameter passing with respect to functions in C++ (4 marks)
- b) Students in a programming class scored marks as shown in the table below. Write a C++ program that creates an array of 6 elements and assigns each element a value. The program should then compute the average score and find the minimum and the maximum scores. (8 marks)
- |    |    |    |    |    |    |
|----|----|----|----|----|----|
| 31 | 43 | 80 | 17 | 52 | 66 |
|----|----|----|----|----|----|
- c) Write a C++ code snippet to demonstrate the concept of friend function. (4 marks)
- d) Identify FOUR characteristics of a friend function (4 marks)

#### QUESTION FIVE (20 MARKS)

- a) Differentiate between the following operators. (4 marks)
- i) `&&` and `||`
- ii) `==` and `=`
- b) Explain FOUR types of inheritance applicable in C++ (8 marks)
- c) Write a C++ program that would instantiate a class named *Types* with the following properties:
- A data member named *num*;
  - A member function named *input*, for setting the value of *num* to 100;
  - A member function named *display*, for outputting the value of *num*
  - Instantiate an object *MyObj* from the class and use it to call the methods in the main function (8 marks)