



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

BACHELOR OF SCIENCE (MATHEMATICS)

SMA390: SCIENTIFIC PROGRAMMING

DATE: 17/4/2023

TIME: 2:00 – 4:00 PM

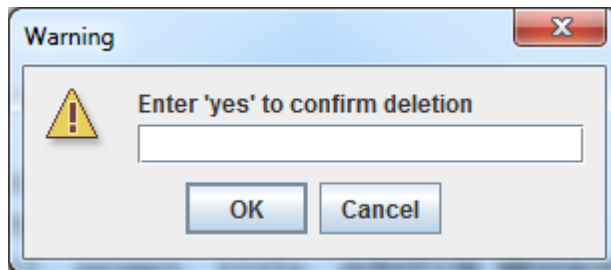
INSTRUCTIONS

*This paper consists of FIVE questions
Answer question **one** and **two** other questions.*

QUESTION ONE -COMPULSORY (30 MARKS)

- a) Explain the term scientific programming and explain its importance. (4 marks)
- b) Briefly explain the meaning of the following as used in Java programming. (4 marks)
 - (i) Byte-codes
 - (ii) Java virtual machine
- c) Given the following code snippet, rewrite the code using a do-while loop. (4 marks)

```
for(i=1,j=1;i<=10;i++,j++)  
{  
    System.out.println(i*j);  
}
```
- d) Java possesses a rich Graphical User Interface (GUI) facility that allows one to make use of input boxes as well as various dialogs. Outline of FOUR of these dialogs. (4 marks)
- e) Write a Java application to display the message dialog shown below. (6 marks)



- f) Highlight FOUR tokens applicable in Java programming (4 marks)
- g) Differentiate the following terms as used in Java Programming giving an example in each case. (4 marks)
- Inheritance
 - Polymorphism

QUESTION TWO (20 MARKS)

- a) i) Outline FOUR benefits of using objects when writing computer programs. (4 marks)
- ii) Explain the following OOP concepts (4 marks)
- Exception
 - Dynamic binding
- b) Write a program that prompts the user for the length of a rectangle and the width of a rectangle through Graphical User Input (GUI). Use a message box to calculate the area of the rectangle. (The area of a rectangle is its length multiplied by the width.) (8 marks)
- c) Discuss Java's *JOptionPane*. (4 marks)

QUESTION THREE (20 MARKS)

- a) Explain THREE visibility controls / levels used in object oriented programming (6 marks)
- b) Briefly describe the purpose of THREE *math* methods used in Java programming. (6 marks)
- c) Write a Java program with the following:
- Create a class "Check" which has a variable "amount" to store the current amount. (2 marks)
 - Create a method *setAmount()* to set the value of amount (2 marks)
 - Create a method *getAmount()* to get the value of amount (2 marks)
 - Create objects in the main class that passes and displays the amount 200 to the methods respectively. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Assess THREE variable types that a class can contain. (6 marks)
- b) Write a program that has two classes A and B, with appropriate methods, to demonstrate the concept of method overloading in Java programming. (8 marks)

- c) Using Scanner class, write a Java program that should input the following information:
- i. Total kilometres driven per day.
 - ii. Cost per kilometres of fuel.
 - iii. Average kilometres per litre.
 - iv. Parking fees per day.

It should then calculate one's daily driving cost and display the user's cost per day of driving to work (6 marks)

QUESTION FIVE (20 MARKS)

- a) Briefly explain the meaning of the following statements used in Java programming. (6 marks)
- i. Static
 - ii. Strings [] args
 - iii. Garbage collection
- b) Write a Java Program to store five numbers of type double in an array, calculate and display the average of numbers. (6 marks)
- c) Develop a program that uses exception handling to process Arithmetic Exceptions and Input Mistmatch Exceptions that arise. The application should prompt the user for two integers and pass them to method *quotient*, which calculates the quotient and returns an integer result. The exception handling should work such that if the user makes mistake, the program catches and handles the exception, allowing the user to re-enter the input. (8 marks)