



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 103: OBJECT ORIENTED PROGRAMMING I

DATE: 14/12/2020

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Outline FOUR ways in which constructors differ from methods. (4 marks)
- b) Java standard Library (or API) includes hundreds of classes and methods grouped into several functional packages. Highlight FOUR of the core Java APIs (4 marks)
- c) Briefly explain the difference between single inheritance and multiple inheritance as used in Object Oriented Programming. (4 marks)
- d) Using Scanner Class, write a program that asks the user to input the length and width values during execution of the program and the area would be calculated based on the provided values. (5 marks)
- e) Differentiate between the following OOP terminologies (6 marks)
 - i. Abstraction and Encapsulation
 - ii. *Final* key word and *this* key word
 - iii. Method overloading and method overriding
- f) Highlight how garbage collection and type safety have contributed to Java's growing popularity over other programming languages. (4 marks)
- g) Briefly explain the meaning of the following terms as used in object oriented programming
 - i. Class
 - ii. Interface
 - iii. Method (3 marks)

QUESTION TWO (20 MARKS)

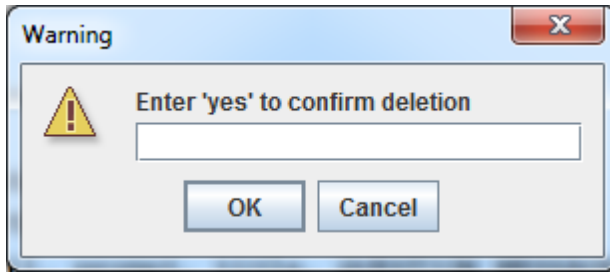
- a) Outline FOUR rules to bear in mind when using constructors in Java. (4 marks)
- b) Using a Scanner object called input that has been instantiated and initialized, write code to read a string (without spaces), double, and integer from a file into variables you declare. (4 marks)
- c) Using inheritance, write a program that has two classes named *Calculation* and *Computation*, respectively. The class *Calculation* should have two methods, *addition* and *Subtraction* that will enable it to find sum and difference of two numbers. The class *Computation* should have a method *multiplication* that calculates product of two numbers and also inherit the methods of Calculation class. The program should display the results of the three methods when called in the main program. (10 marks)
- d) Explain the concept of polymorphism as used in OOP. (2 marks)

QUESTION THREE (20 MARKS)

- a) Re-use is an important element in software development. Discuss the features of Java that enhance the reusability of classes and objects. (4 marks)
- b) Explain THREE types of variables used when writing a Java Program, giving an example of a variable declaration in each case. (6 marks)
- c) Write a Java program that stores in an array marks scored by a student in 5 subjects (90, 60, 40, 73, 62). The program should then display all the scores, calculate and display the total score as well as the highest score. (10 marks)

QUESTION FOUR (20 MARKS)

- a) Encapsulation defines the access levels for data elements of a class. Explain the three levels of access (access modifiers). (6 marks)
- b) Java possesses a rich Graphical User Interface (GUI) facility that allows one to make use of input boxes as well as various dialogs. Give a brief outline of FOUR of these dialogs. (4 marks)
- c) The Java application below displays the message dialog shown below. (6 marks)



- d) Write a Java program that uses a loop to compute the average of an array of integers called *aveArray*. Declare and initialize the array. The result should be stored in a variable called *Average* that has been previously declared and initialized to zero. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Explain TWO aspects of an object that are linked together by encapsulation. (4 marks)
- b) The smallest individual units in a program are known as *tokens*. Highlight any FOUR tokens applicable in Java programming (4 marks)
- c) You have been employed as a programmer at an upcoming bank. The bank's management requires you to develop a banking system. Required:
- Define a class for 'Bank Account' abstract data type. It should have the attributes account number (integer), account holder (string) and current balance (double). (2 marks)
 - Define methods to get and set account numbers and account holders. Add a method which will return the account holder's current balance. (6 marks)
 - Add two methods that will allow deposit and withdrawal of money, respectively, updating the current balance as appropriate. (4 marks)