

Course Title: Object Oriented Programming – Java I.

Content: Examination

Instructions

1. Answer question **ONE (Compulsory)** and any other **TWO** questions.
2. Write all your answers in the answer booklet provided.
3. Time allowed: **Two hours**.

SECTION ONE

QUESTION ONE [30 Marks]

- a) State and explain any three features that characterize a programming language as Object Oriented. [6 Marks]
- b) Using an appropriate example, explain how encapsulation is achieved in Java. [5 Marks]
- c) State and explain the roles of two instance method types that can be defined in Java classes [6 Marks]
- d) Using Java, demonstrate how to create an array containing five Kenyan universities: Maseno, Kenyatta, Nairobi, Moi and Egerton. Then further explain how you could use a while loop to display all university names in the array the array. [6 Marks]
- e) Using an appropriate example, explain polymorphism as used in Object Oriented Programming. [7 Marks]

SECTION TWO

QUESTION TWO [20 Marks]

- a) State and explain any four differences between Object Oriented Programming and Procedural/Imperative Programming. [8 Marks]
- b) Consider exceptions in Java:
 - i) What four types of exceptions can occur in a Java program? [4 Marks]
 - ii) Using an appropriate example, discuss the mechanism used by Java to handle any one of the above mentioned exceptions [8 Marks]

QUESTION THREE [20 Marks]

- a) Write a program that prompts for name and year of birth from the console then computes the age. Let the program display the name and age on the console as it stores the same in a text file called "ages". [12 Marks]

- b) Consider a program that prompts for two integer values from the console then stores them in two variables x and y. It should then divide x by y as it stores the results in variable z.
- What two potential reasons could make such a program to crush at runtime? [2 Marks]
 - Write the program with proper mechanisms that avoids the two potential crush occurrences. [6 Marks]

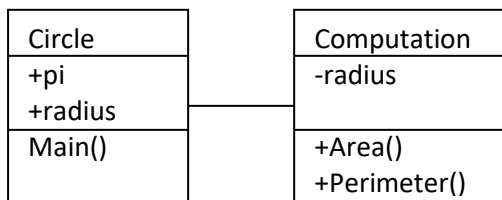
QUESTION FOUR [20 Marks]

- a) Consider a Java program with two value-returning methods area() and perimeter(). Let the program prompt the user for the length and width of a rectangle through main(). It should then compute the area and perimeter from respective methods. The program should then display the values returned to main(). Let the output be as follows.

Enter Length:
 Enter Width:
 The area is ___ cm²
 The perimeter is ___ cm

[10 Marks]

- b) Consider the following UML diagram



Write a java program that implements the model

[10 Marks]

QUESTION FIVE [20 Marks]

- a) Three employees in a company are up for a special pay increase. You are given a file, say EmployeeData.txt with the following data:

Miller Andrew 10000 5.0
 Green Sheila 12000 6.0
 Omollo John 35000 1.0

Each input line consists of employee’s last name, first name and current salary and percentage increase. For example, in the first input line, the last name of the employee is Miller, first name is Andrew, the current salary is 10000 and the pay increase is 5.0%. Write a program that reads data from the specified file and stores the output in another file EmployeeOutput.txt. For each employee, the data must be output in the following format: firstname lastname updatedsalary.

[10 Marks]

- b) Create a class named Employee with a name and a salary. Make a class named Manager that inherits from Employee with an instance field named department. Supply a toString() method that prints the manager's name, department, and salary. Make another class named Director that inherits from Manager with an instance field named stipendAmount. Supply the toString() method for Director that prints all of its instance variables. Also, write a program named myOutput that instantiates an object of each of the classes and invokes the toString() method of each of the objects. [10 Marks]