



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2020 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER AND LIBRARY SCIENCE

REGULAR PROGRAMME

CMT 210: OBJECT ORIENTED PROGRAMMING 1

Date: APRIL 2020

Duration: 3 Hours

INSTRUCTIONS:

1. Question one is **COMPULSORY**. Answer **Question ONE** and any **Other TWO**
2. Questions **Q1b, 3b, Q4 & 5d** are practical questions and therefore should be done on **PC**.
3. Students **MUST** ensure all the work done on the PC has been successfully saved in their **folders** bearing **APPROPRIATE student registration** and submitted for marking at the end of the exam time
4. The format of naming the folder is **“CMT 210-registration number”** e.g. **CMT 210-1000001** if the student registration number is **1000001**

- Q1. a) Define the following as they relate OOP
- i). Overloaded functions (1 mark)
 - ii). Constructors (1 mark)
- b) Explain **TWO** advantages of using a function (2 marks)
- c) C++ is regarded as an object-oriented programming language despite the

fact that a programmer can write programs using structured program design. Explain any THREE features that make the language OOP

(6 marks)

d) You have been approached by a car selling company to make for them a C++ console based application with the following specifications

Urban Car selling App

1. Add new Vehicle
2. Find Vehicle
3. My Vehicles
4. Exit

Based on the selection's users make from the keyboard, the program should call appropriate user defined function.

If users select option 1, the program should call a function which allows the user to enter vehicle name, price, body type, vehicle make, engine size and year of manufacture.

Option two should allow a user search for desired vehicle using three parameters; i.e. body type, vehicle make and engine size. If vehicle exists matching the three criteria, the program should store the name and price in appropriate variables. At the end of the function, a user should be prompted if he/she wants to search for another vehicle and if user selects yes, the program should repeat the above logic else the menu should be presented to the user.

If a user selects option three, a relevant function should be invoked which displays the details of the vehicles(s) matching the search criteria and display the information in the following criteria. Please note this is a dummy output

My vehicles

#	Vehicle Name	Vehicle Type	Price
1	Volvo Series	Volvo	2,000,000
2	Benz E series	Benz	17,000,000

Total price for selected vehicles:

Ksh _____

*****End of Transaction*****

If option four is selected, the program should call a function which terminated the menu

Additional information

- i). Use objects and classes to implement the program
- ii). Use a constructor to initialize the total price of the vehicle to zero
- iii). The first function should be implemented as a friend function

Write, debug and test the program then transfer the project file to a folder bearing your registration number. Name the project "Q1" **(18 marks)**

- e) Explain the effects of public and protected inheritance to the members of the base class **(2 marks)**

- Q2. a) Explain the role of the following operators as they relate to C++

Write a C++ Object Oriented code to do the following:

Create a class called bank account with the following description:

- i. Two attributes called balance and account_number (2 Marks)
 - ii. A method called deposit that accepts an argument called amount of type double and returns void (2 Marks)
 - iii. A method called withdraw that accepts an argument called amount of type double and returns void (2 Marks)
 - iv. A method called checkbalance that accepts no argument and returns a double (2 Marks)
 - v. A constructor that initialized the two attributes and takes two arguments (4 Marks)
- b) Include a main method in the class to test the bankAccount class. Create 2 bankAccount objects. Call the methods deposit, withdraw and checkBalance on the objects (8 Marks)
- Q3. a) using the concepts of array of objects, write a C++ program to capture information about n products and display their information as shown below for all the n products.

#	Product code	Product price	Product name	Quantity	Expiry date
1					
2					
3					

Information to be captured includes product code, product name, product price, quantity and expiry date

Write, debug and test the program then transfer the project file to a folder bearing your registration number. Name the project "Q3" (12 marks)

- b) What is meant by ‘friendly’ functions in C++? Explain THREE characteristics associated with the function **(4 marks)**
- c) Differentiate between function overloading and function overriding in context of object-oriented programming. Give examples of your own for each **(3 marks)**
- d) Explain the role of constructors when writing object oriented programs in any programming language **(1 mark)**
- Q4. a) State and explain any **three** variable types used in C++ **(6 Marks)**
- b) Write a C++ program that uses a programmer-defined function “maximum” to determine and return the largest of THREE integers **(7 Marks)**
- c) Write a C++ program (using the switch statement) that takes an arithmetic operator (+, -, *, /) and two integer operands from a user and performs the operation on those two operands depending upon the operator entered by user. **(7 Marks)**
- Q5. a) what is the rationale behind using protected access specifiers in a C++ class ? **(1 mark)**
- b) Explain TWO major differences between Object Oriented programming and structured programming **(4 marks)**
- c) Write a C++ program containing three classes; movies,moviefind and mymovies
- The movie class shall define movie name, movie genre, price, rating, actor and year of release as attributes. The class should contain a member function known as newmovies() which accepts the above information. The class should also declare a member function known as display (). All the above information shall be inherited by a third class below

The second class known as moviefind should declare moviegenre, rating and year of release as class attributes which shall only be used for searching movies only. The class shall also declare a member function known as findMovies() which shall be implemented by a later class. All the members of the class shall be inherited by the third class below.

A third class known as mymovies shall inherit members from the above two class. The class shall implement the findMovies() found in class two by prompting the user to enter movie genre, movie rating and year of release then set the movie name, price and actor accordingly.

The class shall also implement the display() declared by class one. The function should display movie name, actor and price of the movies matching the above search operation

REQUIRED:

Write, debug and test the program then transfer the project file to a folder bearing your registration number. Name the project "Q1" **(15 marks)**

END

