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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

FOR THE DEGREE

IN

ELECTRICAL AND COMMUNICATION ENGINEERING

COURSE CODE: ECE 223

COURSE TITLE: COMPUTER PROGRAMMING II

DATE: 24/04/2023 **TIME:** 12:00-2:00p.m

INSTRUCTIONS TO CANDIDATES

Answer **Question ONE (1)** and any other **TWO**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over.

Question one (20 Marks)-Compulsory

a) Differentiate between a variable and a constant. With example, demonstrate how we declare variables C++ languages. [4 marks]

b) Explain the major characteristics of object oriented programming. [4 marks]

c) Write a C++ program which accepts the marks of 5 students then pass this marks to a function which calculates and returns the grade of the students. The grading criteria is as follows; [8 marks]

Student marks	Grade
>=70 and <=100	First class honors
>=60 and <=69	Second class honors
>=50 and <=59	Second lower class
>=40 and <=49	Pass
>=0 and <=39	fail

The program should then display the output using the following format, make use of a class

#	Marks	Grade
1	85	First class honors
2	56	second lower class honors
3	40	pass
4	20	Fail
5	71	Second class honors

d) Draw a flow chart program which accepts n numbers from the keyboard and find their sum and their average then display them. [6 Marks]

e) With an example, explain how a C++ function is defined [2 Marks]

f) Write a C++ program which output even numbers and their squares in a tabular format. The even numbers being numbers being calculated range from 0 to 200 inclusive. [6 Marks]

No	**Square**
4	8
6	36
8	64

Question two [20 marks]

a) Using switch decision statement, write a C++ program which displays a choice of menu for users and prompts him/her to select an operation, based on selected operation (add, subtract, divide, multiplication and quite), The program can make the decision to add two numbers entered by the user and display the output. The program keeps repeating the process until the user selects option of quitting. [8 marks]

b) Write an object oriented program which accepts three numbers and prints the largest out of the three. The program should make use of conditional operator and a user defined function which accepts the numbers and returns the largest to the calling code. [4 Marks]

c) What is a recursive function? Write a C++ recursive function which calculates the factorial an integer n entered from the keyboard. [8 marks]

Question three [20 Marks]

a) The C++ standard library provides numerous built-in functions that your program can call. List and briefly describe four of this function. [4 Marks]

b) Write a program that reads two values from the keyboard and calculate their sum. Use two functions i.e **main** and **getsum** to write the program, making appropriate function calls. The function **getsum** is used to calculate the sum. [6 marks]

c) C++ is a high level language with strong support of object oriented programing language. Explain the meaning of the following OOP Concepts. [6 marks]

i. encapsulation
ii. Inheritance
iii. Polymorphism

d) i. Describe what is meant by an infinite loop [2 Marks]
ii. Using C++, illustrate an example of an infinite loop [2 Marks]

Question four [20 Marks]

a) The moon's gravity is about 17 percent of the earth's. Write a program that displays a table that shows Earth's pounds and their equivalent moon weight. Have the table run from 1 to 100 pounds. Output a new line every 25 pounds. [5 marks]

b) Write a C++ program that creates an array of ten elements and assigns each element value. The program should then compute the average of those values and find the minimum and the maximum value, (ranging from 1-100) and display them. [7 marks]

c) i. Given a flexibility inherent in all of C++'s loops, what criteria should one use when selecting a loop? i.e, how does one choose the right loop for a specific job? [2 marks]
(2 Marks)

ii. Outline any three salient features of high level programing languages. [3 Marks]

d) Explain the following programing terminologies [3 Marks]

i. Identifiers
ii. Data structure
iii. Constant

Question five [20 Marks]

a) Study the following C++ program and write a hypothetical output. [6 Marks]

```
//Example usage of the do … while loop
#include<iostream>
Using namespace std;

Int main ()
{
Int counter;

Count <<"How many hellos?";
Cin>> counter;

Do {
cout <<"Hello\n";
counter--;
}While (counter>0);

Cout <<"counter is " <<counter<< endl;
Return 0;
}
```

b) Differentiate between operator overloading and function over loading in a C++ program [4 Marks]

c) Declare and initialize an array called AVERAGES to contain the following averages [5 Marks]

36.20	30.00	67.20	100.00
53.65	93.50	45.60	21.90
20.70	45.30	67.30	78.36
92.45	35.90	67.45	90.45

d) A program is required to calculate the volume of a cylinder. It is required that base area be calculated using a function **basearea( )** and its return value in the **main( )** to calculate the volume. Implement this in C language. [5 marks]