UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR ONE SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE
COMPUTER SCIENCE

COURSE CODE : CSC 111 (SMA)

COURSE TITLE : INTRODUCTION TO PROGRAMMING

DATE:02/08/2023 **TIME: 2:00 P.M – 4:00 P.M**

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Define the following terms as used in C? [2Mks]

i. Assembler

ii. Variable

b) Draw a flow chart for calculating simple interest [4Mks]

c) Explain why data types are important to the compiler. [2Mks]

d) Consider the program shown below

```
#include<stdio.h>
int main ()
{
        int x;
        int sum;
        for(x=1; x<=10; x++)
        {
                if(x=5)
                {
                        continue;
                }
                sum+=1;
        }
        printf("The sum is:%d ",sum);
        return 0;
}
```

i) Identify the error(s) in the program above. [2Mk]

ii) Explain the output of the program if the error(s) is/are corrected [3Mks]

iii) Which operators have been used in the program above [2Mks]

iv) How can ***sum+=1;*** *be written to achieve the same task.* [1Mk]

e) Contrast the following terms as used in C programming? [4Mks]

i) Compiler and Assembler

ii) Low-level languages and High-level Languages

f) Mary, an REN student at Kibabii University has been from a programming class where her teacher advised her to use functions in doing an assignment. She's is wondering why she should use functions while she can accomplish the same thing without functions. Give her your considered advice with reasons.

[6Mks]

g) Write C program to calculate the area of rectangle [4Mks]

QUESTION TWO [20 MARKS]

a) What do you understand by a function in C [2Mk]

b) Outline three characteristics of a function [3Mks]

c) Using examples explain how a function is defined. [6Mks]

d) Write C function that will return the cube of an integer passed. [6Mks]

e) Differentiate call-by-value and call-by-reference [3Mks]

QUESTION THREE [20 MARKS]

a) Define an array. [3Mks]

b) Write a program that initializes an array of 10 elements. Each element should be equal to its subscript. The program should then print each of the 10 elements. [6Mks]

c) Write an if statement that assigns the value of x to the variable y only if x is between 1 and 20. Leave y unchanged if x is not in that range. [5Mks]

d) The area of a rectangle is the product of the length and the width. Write a program that reads the length and the width of the rectangle from the keyboard, computes the area of the rectangle and displays the area on the standard output (screen monitor). [6Mks]

QUESTION FOUR [20 MARKS]

a) Suppose you have the following function prototypes:

```
double answer(double data1, double data2);
double answer(double time,int count);
```

which function would be used in the following function call and why ? (x and y are of type double)

```
x=answer(y,6.0);
```

[4Mks]

b) Outline any two looping and two conditional structures and explain how they are implemented in C. Illustrate each using a flow chart. [6Mks]

c) Write a C Statement that outputs the word *passed* provided the value of the variable exam is greater than or equal to 60 and also the value of the variable programs_done is greater than or equal to 10. Otherwise, the statement output the word *Failed.* The variables exam and programs_done are both of type int. [6Mks]

d) Explain the rules of naming a variable in C [4Mks]

QUESTION FIVE [20 MARKS]

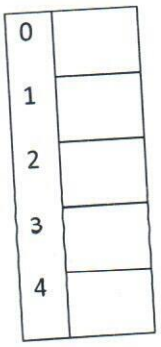
a) What are the limitations of C as one of the High-Level Languages and suggest ways to improve it. **[4Mks]**

b) Given the following program, show the values of the array in the following figure: **[4Mks]**

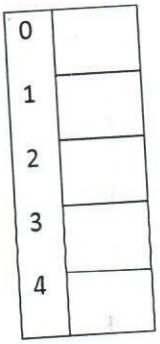
```
#include<stdio.h>
int main()
{
    int values[5];
    for(int i=1;i<5;i++)
    {
            values[i]=i;
    }
    values[0]=values[1] + values[4];
    return 0;

}
```

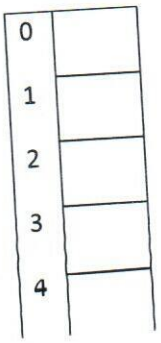
After the array is created



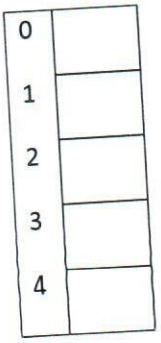
After the first iteration in the loop is done



After the loop is completed



After the last statement in the main method is executed



c) How is function recursion different from looping? **[2Mks]**

d)

i. Declare (give a prototype for) a function named *average_grade*. This function returns a double and has four double arguments, test1, test2, test3 and test4. The return value should be the average or arithmetic mean of the four arguments. **[4 Mks]**

ii. Define the above prototyped function and include a comment that tells *briefly* what the function does. **[6 Mks]**