CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE COMPUTER SCIENCE OPTION

COSC 225: C. PROGRAMMING

STREAMS: BSC. COMP **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 24/03/2021 **8.30 A.M. – 10.30 A.M**

INSTRUCTIONS: Answer ALL questions in section A and any other TWO in section B.

SECTION A (COMPULSORY - ANSWER ALL QUESTIONS IN THIS SECTION)

QUESTION ONE (30 MARKS)

a) Discuss the three main basic features of a programming language. (3 marks)

b) Consider the code below. How many times will the loop get executed? What will be the output?. (5 marks)

```
int main  ( )
{
    int  i :
    for ( i = 9; i = i - 2 )
{
  printf ( " n%d", i );
  }
}
```

c) Give two reasons why initial values are useful in a program ; (2 marks)

d) Translate the following while loop into a for loop which does the same thing as the while loop. (4 marks)

```
i = 20
  while ( i > 0 )
  print " i = i ", i
  i = - 1
```

e) Distinguish between the following set of terms as used in programming; (4 marks)
   i. Source code and object code

   ii. Loosely typed and strongly typed languages

   iii. Parameters and arguments

   iv. Compiler and Interpreter

f) With an example of a suitable syntax, describe the three main parts of a user defined function. (4 marks)

g) Use a diagram to describe the C Program Development Cycle (2 marks)

h) Write a program using a nested for loop that finds and displays all the prime numbers from 2 to 100: (4 marks)

i) Distinguish between L- values and R- values in C (2 marks)

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION {20 MARKS EACH}

QUESTION TWO (20 MARKS)

a) Structured programs are often composed of simple, hierarchical program flow structures; Discuss (5 marks)

b) Distinguish between the following three categories of High level programming languages ; (6 marks)

   i.   Procedure-oriented languages.

   ii.   Problem-oriented languages.

   iii.   Natural languages .

c) Evaluate the following expressions using the rules of precedence and associativity:
   (2 marks)
   I). Sum = 2 * ((i % 5) * (4 + (j – 3) / (k + 2)));   Given that, i =8, j=15 and k=4.

II). Total = a + b * c / d % e ((8 * c) + 30 / (b * d)); where a= -1, b=5, c=3, d=1 and e=7.

d) Translate the following for loop into a while loop (which does the same thing as the for loop).   (7 marks)

for i in the range (1 ; 10):
print " i = ", i

QUESTION THREE (20 MARKS)

a) Using suitable examples name and describe three main categories of operators used in computer programming.   (6 marks)

b) Write a simple code in C language that would print the words "**COVID 19 Pandemic**":

(4 marks)

c) Describe three components required by looping control structures to successively iterate a block of statements.   (6 marks)

d) Discuss the concept of arrays as used in structured programming.   (4 marks)

QUESTION FOUR (20 MARKS)

a) Study the following program available in C programming language, write the result produced at every line when you compile and execute the program.   (6 marks)

```
#include <stdio.h>
Int  main()
{
int a = 21;
int b = 10;
int c ;
c = a + b;
printf("Line 1 - Value of c is %d\n", c );
c = a - b;
printf("Line 2 - Value of c is %d\n", c );
c = a * b;
printf("Line 3 - Value of c is %d\n", c );
c = a / b;
printf("Line 4 - Value of c is %d\n", c );
c = a % b;
printf("Line 5 - Value of c is %d\n", c );
c = a++;
printf("Line 6 - Value of c is %d\n", c );
c = a--;
printf("Line 7 - Value of c is %d\n", c );
return 0 ;
}
```

b) Highlight four characteristics of a well-engineered software that can be considered to adhere to good programming practices. (4 marks)

c) An electrical designer needs a C program that can compute the area of a rectangle and displays the computed area on the screen. Use a flow chart to illustrate the code sequence of the program. (5 marks)

d) Write a syntax to show how to declare a struct variable inside its declaration. (5 marks)

QUESTION FIVE (20 MARKS)

a) Distinguish between static and dynamic binding (4 marks)

b) Explain three benefits of modular programming. (6 marks)

c) Write a C program that mimics a simple calculator. The program should prompt for two integers and a mathematical operator. The computations should be performed depending on the operator entered. (10 marks)