# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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**UNIVERSITY EXAMINATIONS 2021/2022**

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE, BACHELOR OF SCIENCE IN DATA SCIENCE, BACHELOR OF SCIENCE IN COMPUTER TECHNOLOGY, BACHELOR OF SCIENCE IN COMPUTER SECURITY AND FORENSIC, BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE, BACHELOR OF SCIENCE IN STATISTICS, BACHELOR OF SCIENCE IN SYSTEM MANAGEMENT, BACHELOR OF SCIENCE IN ACTURIAL SCIENCE, BACHELOR OF SCIENCE IN BUSINESS INFORMATION TECHNOLOGY, BACHELOR OF SCIENCE IN INFORMATION SCIENCE, BACHELOR OF EDUCATION ARTS, BACHELOR OF SCIENCE IN EDUCATION SCIENCE AND BACHELOR OF SCIENCE IN BUSINESS INFORMATION TECHNOLOGY

**CIT 3102: FUNDAMENTALS OF COMPUTER PROGRAMMING**

**DATE: JANUARY 2022** **TIME: 2 HOURS**

**INSTRUCTIONS: Answer Question ONE and any other TWO questions.**

**QUESTION ONE (30 MARKS)**

a) Differentiate between a flowchart and pseudocode (4 Marks)

b) List and explain any four attributes of a good algorithm (4 Marks)

c) Differentiate between a local variable and a global variable (4 Marks)

d) Using a suitable example, illustrate the structure of a two-dimensional array. (4 Marks)

e) Give two differences between the *while-do* and *do- while* control structures. as used in computer programming (4 Marks)

f) Using an example in each case, explain two ways of declaring constants in C (4 Marks)

g) Differentiate declaration and definition in programming. Write the syntax for function declaration and definition (4 Marks)

h) Differentiate between a compound statement and simple statement. (2 Marks)

**QUESTION TWO (20 MARKS)**

a) Using a SWITCH statement, write a C program that prompts a user to enter two integers. The program then prompts a user to select from options 1-3 inclusively. If a user selects option 1 the code returns the sum of the two integers, if the user selects option 2 it returns the product of the numbers; if the user selects option 3 it returns the sum of the squares of the numbers (5 Marks)

b) Write a C program, using a WHILE LOOP, to print the sum of all odd integer numbers between 1 and 20. (5 Marks)

c) Describe the various stages of a software development life cycle (5 Marks)

d) Write a function to calculate and return the factorial of a number supplied to the function as a parameter. (5 Marks)

**QUESTION THREE (20 MARKS)**

a) Design a flow chart for a solution to a problem of calculating the average of a set of n (user specified) numbers. (6 Marks)

b) Write a C program to accept two integers, determines and display the largest among them on the screen. (5 Marks)

c) Outline the five rules that should be followed when declaring variables in C. (5 Marks)

d) Using an example, explain the following terms as used in C programming. (4 Marks)
   i) Type casting
   ii) Dry running

**QUESTION FOUR (20 MARKS)**

a) The following code fragment is a pseudocode used to solve a problem.

1. Declare variables ***x, y, z***, and ***result*** of type ***int*** (in separate statements)
2. Prompt the user to enter three integers
3. Read three integers from the keyboard and store them in the variables x, y and z
4. Compute the product of the three integers contained in variables x, y and z and assign the result to the variable result.
5. Print "the product is" followed by the value of the variable result.

   i) Write a program to implement the above pseudocode (5 Marks)

   ii) Use a flowchart to implement the fragment in (i) above (4 Marks)

b) Explain any three advantages of using functions in a program. (6 Marks)

c) Study the program code below, then identify the errors, and rewrite the correct program code without the errors. (5 Marks)

```
#include <stdio.>
void main()
  {
    int a, b, sum, product
    double 8average;
    printf("Enter a value for a\n”);
    scanf(“%d”,a);
    printf("Enter a value for b\n);
    scanf(“%d”,&c);
    sum = a + b;
    product=a*b;
    8average = (double) sum/2;
    printf(“\n%d+%d=%d”,num1,num2,sum);
    printf("The average is %4.2lf\n”);
    return 0;
   )
```

**QUESTION FIVE (20 MARKS)**

a) Write the output of the following code (5 Marks)

```
#include <stdio.h>
int main ()
  {
    int i, j;
    for(i=50; i<75; i++) {
       for(j=2; j<=(i/j); j++)
       if(!(i%j)) break; // if factor found, not prime
       if(j > (i/j)) printf("%d is prime\n", i);
     }
  return 0;
}
```

b) Write a C program that output values that are divisible by 3 in descending order, between 1 and 100 (5 Marks)

c) Watoto CBC class has 15 pupils, who learn 3 subjects (Maths, English, and Drawing) each. Using arrays, write a code that will enable their teacher capture the marks of all the students and display the marks and totals for each student. (*each student marks should be in its own line, separated by a tab space placed under the subject title*). (6 Marks)

d) Use examples to describe two ways of representing comments in C programming. (4 Marks)