

MAKERERE UNIVERSITY

COLLEGE OF ENGINEERING, DESIGN, ART AND TECHNOLOGY
SCHOOL OF ENGINEERING
ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

CMP1201 – COMPUTER PROGRAMMING FUNDAMENTALS

TUESDAY, APRIL 2ND, 2019 – FROM 8:00AM – 10:00 AM

INSTRUCTIONS:

Answer all questions. Each question in Section A carries 2 points.

SECTION A: TRUE/FALSE (50 Marks)

Answer “TRUE” or “FALSE” for each of the statements in Section A and provide a one-sentence reason for your choice of TRUE or FALSE for each of the statements in the space provided.

- [1] *fprintf()* and *fscanf()* are some of the file handling functions in the header file `string.h` .

- [2] Passing elements of an array to a function is no different than passing a variable to a function except for the increased memory. _____

- [3] Since variables are fundamental in the storage of data, their declarations in a program must be consistently maintained. _____

- [4] *scanf()* and *gets()* are applicable when manipulating strings and will always return the same result as required. _____

- [5] All programming operators in C are specified such that they can be applied to any data type as the programmer deems fit. _____

- [6] Since arrays are not fundamentally variables, their use always requires initialization outside of the *main()*. _____

- [7] Strings are defined as an array of characters and as such can be manipulated in the same way you would handle any other array. _____

- [8] .txt and .bin files are equally as important in C programming because they contain system information. _____

- [9] As contrasted with the *enum* keyword, the *struct* and *union* keywords have the capacity to hold different points of data of different types. _____

- [10] Pointers allow C programmers the ability to access memory and manipulate addresses as seen fit, a feature that is often missing in other languages. _____

- [11] In the ladder *if else* statement, a TRUE evaluation of any of the *if else* statements requires that all the statements after must be executed too. _____

- [12] All the four types of loops in C programming allow the user to perform a function repeatedly with similar efficiency. _____

- [13] Types such as array, union, struct, etc are referred to as derived types mainly because they are based on the primitive types. _____

- [14] When the relationship between operands returns a non-zero value after evaluation, execution of the program gets terminated without errors. _____

- [15] Since constants store values that cannot be changed, it is not always required to assign a variable name and/or data type to a constant in a program. _____

- [16] Since by definition, an array is a collection of a fixed number values of a single type, it suffices to declare the array with just one data type. _____

- [17] Members of an array can be referenced by their position within the array which positions are assigned in numerical order. _____

- [18] In this statement `printf("%d", ++var);`, the value of the function *var* would be printed after it is increased by 1. _____

- [19] User-defined functions are similar to standard library functions and follow the same basic syntax when used. _____

- [20] The struct and union keywords are essential in creating data types that are no different from those created using the enum keyword. _____

- [21] When a block of statements needs to be executed among many blocks, the switch, case and default would be an appropriate way of doing it. _____

- [22] The float and double data types can be used to hold real numbers in a program. As a result, they require the exact same memory for storage. _____

- [23] When one of the operands in a mathematical computation is declared as a float, its effect on the integer variables within the computation is seen in the evaluation result that returns a floating point. _____

- [24] The return statement in a program gives the “exit status” of the program signifying the end of program execution. _____

- [25] The use of bitwise operators allows for faster processing because the symbols used are more acceptable to the processors in computing devices. _____

SECTION B:

Question 1:

- a) What is a programming language? (1)
- I. List three broad categories of programming languages and explain how they differ. (3)
 - II. Variables, in computer programming, are defined by their data types and storage classes. Using pseudo code to illustrate the thought process in implementing the task of , highlight and define the local, global and static variables for the process. (8)
 - III. Explain your reasons for categorizing the variables in (ii) as such. (3)

Question 2:

Use the extract of code below to answer the questions that follow

```
#include <stdio.h>
int sum(int n);

int main()
{
    int number, result;

    printf("Enter a positive integer: ");
    scanf("%d", &number);

    result = sum(number);

    printf("sum = %d", result);
    return 0;
}

int sum(int num)
{
    if (num!=0)
        return num + sum(num-1); // sum()
    else
        return num;
}
```

- a) What are the two main programming concepts illustrated in the code extract? (1)
- b) What are the possible shortfalls of the said concept and how would one overcome them? (4)
- c) For a positive integer of 5 entered by the user at the prompt, how would the program process the input and what would be the final output of the program. (5)
- d) Study the following piece of code and answer the questions that follow:

```

#include <stdio.h>
int main()
{
    int marks[10], i, n, sum = 0, average;
    printf("Enter n: ");
    scanf("%d", &n);
    for(i=0; i<n; ++i)
    {
        printf("Enter number%d: ",i+1);
        scanf("%d", &marks[i]);
        sum += marks[i];
    }
    average = sum/n;

    printf("Average = %d", average);

    return 0;
}

```

- i. What function does the above program serve? (1)
- ii. Identify the variables in the program and explain the logic behind the variable choices made in the program. (2)
- iii. In your complete interaction with the program for its execution, provide the expected output. (3)
- iv. Add statements to the program that would multiply the first two (2) data points for as long as one of the entries is less than 10. (4)

Question 3:

- a) The *main()* function in C provides the starting point in the execution of a program.
 - i. What is a function and under what categories are functions classified? (2)
 - ii. Discuss the benefits of classifying functions as described in (i) above. (3)
- b) The Fibonacci sequence is a series where the next number of the sequence is the sum of the previous two (2) numbers. The first two elements of a Fibonacci series is 0 and 1 respectively.
 - i. Write a program that computes and returns to the user the first 10 numbers in the Fibonacci series. (10)