Programme Codes: TU856, TU857, TU858
Module Code: CMPU1025

TECHNOLOGICAL UNIVERSITY DUBLIN

Grangegorman

TU856 – BSc. (Honours) in Computer Science
TU857 – BSc. (Honours) in Computer Science (Infrastructure)
TU858 – BSc. (Honours) in Computer Science (International)

Year 1

SEMESTER 2 EXAMINATIONS 2022/23

CMPU1025 PROGRAMMING

Internal Examiners:
Dr. Michael Collins
Dr. Paul Doyle

Attempt 3 Questions

Question 1 (Section A) **Must** be attempted.
Attempt any **Two** questions only in Section B.

3 Hours

SECTION A
(42 marks – Attempt ALL questions)

1. (a) Correct the errors in the following C code segment:

```
int num = 10;
do
{
    ++num;
    printf("num is %.2f", num);
}
while(num > 0)
```

(3 marks)

(b) In C, show how to initialise an appropriate array with the following strings:

"Yesterday", "Today" and "Tomorrow"

(3 marks)

(c) Explain the difference between the following C statements:

```
float average = 0;
unsigned float average = 0;
```

(3 marks)

(d) In C, what is the difference between a static and a global variable?

(3 marks)

(e) Show how to initialise the following 2-Dimensional array with the numbers 1 to 8 in ascending order:

```
int my_array[2][4];
```

(3 marks)

(f) In your own words, explain the following C code function signature:

```
float myFxn(float [][3]);
```

(3 marks)

(g) What is displayed to standard output when the following C code is run?

```
#include <stdio.h>

int main()
{
      char team[9] = "Cxgpigtu";
      char *ptr;

      ptr = team;

      for(int i = 0; i < 8; i++)
      {
         printf("%c", *(ptr) - 2);

         ptr++;
      }

      return 0;
}
```

(3 marks)

(h) Using C code, define a structure template for an individual that consists of the following structure members:

- First name (up to 10 characters)
- Surname (up to 20 characters)
- Date of Birth (format: ddmmyyyy using integers only)

(3 marks)

(i) Show how to display the following string to standard output using a `printf()` statement in C:

"Don't forget that '\' is the escape character", he said.

(3 marks)

(j) Using the following:

```
int arr1[3] = {5, 10, 15};
int arr2[] = {0};
```

Write a short piece of C code to copy the contents of arr1 into arr2 in <u>reverse</u> order.

(3 marks)

(k) In C, explain the issue when using `scanf("%s", ..)` to enter a string from standard input.

(3 marks)

(l) Correct the errors in the following C code segment:

```
#define SIZE 5
int main()
{
     int my_array[SIZE];

     for(i = 1; i < SIZE; i++)
     {
        scanf("%d", my_array[i]);
     }
     int i;

     return 0;
}
```

(3 marks)

(m) In C, explain the difference between the modes "w" and "a" with respect to file input/output?

(3 marks)

(n) In C, the `gets()` function has become deprecated and is no longer a valid built-in function. Suggest an alternative function for entering strings from standard input and give a short code example using C code.

(3 marks)

SECTION B
(58 marks – Attempt any TWO questions)

2. Write a C program that implements a name guessing game based on the Marvel comics/movies Avengers characters. Your program should implement the following (no error checking/validation required):

(a) Store the following Avenger members as strings in an appropriate array: "Iron Man", "Captain America", "Black Widow", "Thor", "Hulk" & "Hawkeye".

(5 marks)

(b) Using a separate function, ask the user to guess the name of an Avenger. They should enter any name from standard input and compare it to the names stored in the array only. If the guessed name entered matches a name in the array, display a message to standard output saying "Correct". Otherwise, display "Bad guess – not an Avenger".

(12 marks)

(c) Using a separate function, ask the user to enter from standard input the name of their favourite Avenger. Your function should append this name to the end of a file called "Avengers.txt".

Note: You can assume the file already exists.

(12 marks)

3. (a) Write a C program that asks the user to enter any set of letters. You can assume only the letters a to z (all lower case) are entered. The user must decide the size of the set of letters they will enter each time the program is run.

Your program must count the number of vowels, i.e., the letters 'a', 'e', 'i', 'o', 'u' that are entered in the set and display this number to standard output.

No error-checking / validation required.

(19 marks)

(b) Show how you would modify your program in part (a) to enable the user to enter a different sized set of letters after the initial set is entered.

(10 marks)

4. Write a C program that uses an array to store data for 10 students in your class. Your program must:

(a) With the use of an appropriate symbolic name, define a one-dimensional integer array called **CS_students**

(2 marks)

(b) Using **pointer-notation only**:

(i) Enter the ages of the students into the CS_students array.

(5 marks)

(ii) Calculate the average age of the students and display it to standard output.

(9 marks)

(iii) Find the youngest and oldest age in the class and display both to standard output.

(9 marks)

(iv) Display all the ages in the array to standard output.

(4 marks)