TECHNOLOGICAL UNIVERSITY DUBLIN

CITY CAMPUS

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 2021/22

Programming

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Attempt 3 Questions

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

Section A – 48 marks
Section B – 52 marks

SECTION A
(48 marks)

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

```c
int i = 0;
int numbers[10];
for (i = 0 i < 10 i--)
{
    numbers[] = i;
}
```

(3 marks)

(b) Change the following piece of C code to use the *switch* statement.

```c
char grade;

printf("Enter a grade");
scanf("%c", &grade);

if (grade == 'A')
    printf("Grade A");
if (grade == 'B')
    printf("Grade B");
if (grade == 'C')
    printf("Grade C");
if (grade == 'D')
    printf("Grade D");
else
    printf("Fail");
```

(3 marks)

(c) Declare a function signature that passes 2 parameters, (an integer array and a character) and returns an integer.

(3 marks)

(d) In C, what is the purpose of the keyword `unsigned`?

(3 marks)

(e) In C, when an array is passed as a parameter to a function, it is automatically done so using *Pass by Reference*. Explain the reason for this.

(3 marks)

(f) Explain the following C code segment:

```c
int my_array[5] = {2,4,6,8,10};
int *p;
int i = 0;


p = my_array;


for (i = 0; i < 5; i++)
{
   printf("%d\n", *(p + i));
}
```

(3 marks)

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

```c
#include <stdio.h>

int main()
{
    int i;

    for(i = 0; i == 10; i++)
    {
        printf("value of i is %d\n", i);
    }

    return 0;
}
```

(3 marks)

(h) In C, show **three** ways to initialise a string to contain "Hello".

(3 marks)

(i) Using C code, show how to open a file named "file.txt" for appending.

(3 marks)

(j) What is wrong with the following C code segment? Suggest a solution to correct the issue.

```
int* fxn()
{
        int num = 5;
        int *ptr;

        ptr = &num;
        return ptr;
}
```

(3 marks)

(k) Regarding Dynamic Memory Allocation (DMA), explain the potential problem that may occur when using `realloc()` to **increase** the size of an existing dynamically allocated block of memory.

(3 marks)

(l) Explain the following C code segment:

```
typedef int * INTEGER_POINTER;
INTEGER_POINTER p1;
```

(3 marks)

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

```
#include <stdio.h>

int main()
{
    char letters[9] = "STCtakhm";

    for(int i = 0; i < 9; i++)
    {
        printf("%c", *(letters + i) + 1 );
    }

    return 0;
}
```

(3 marks)

(n) Describe what is meant by the "scope" of a variable.

(3 marks)

(o) In the C programming language, show **three** different uses for the asterix character, i.e., *

You may use a short piece of code to demonstrate each use you identify.

(3 marks)

(p) Imagine you are employed by a large social media company. Your manager has tasked you to develop the software for advertisements to appear on the social feed that support one political party only for an upcoming general election even though your company's policy is to be unbiased for the election.

What would you do in this matter? (max 200 words)

(3 marks)

SECTION B
(52 marks – Attempt any TWO questions)

2. **(a)** Using appropriate data types, design a structure template to hold the following patient information in a hospital record system:

- First name
- Surname
- Date of Birth
- Address
- Phone number

(6 marks)

(b) Write a C program using the structure template in part (a) above, which uses a **function** to enter the details for **two** patients.

(10 marks)

(c) Write another **function** to display the details of the patients entered in part (b) above.

(10 marks)

3. **(a)** You are a software developer and asked to develop a program that allows a user to enter a set of numbers. The user can decide the size of this set when the program runs. Your program must find the highest and lowest number in the set and display both to standard output.

Write a C program to implement the above requirements. You can ignore error-checking.

(18 marks)

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

(8 marks)

4. **(a)** Explain, with the aid of a small piece of code, each of the following variable storage types in C:

- auto
- static
- extern
- register

(8 marks)

(b) Write a C program that asks the user to enter a string. The string may contain more than one word with a maximum of 30 characters.

Your program should check for the number of occurrences of the word "is" and display this number to standard output as follows:

The word "is" occurs x times.

(18 marks)