



DUBLIN INSTITUTE OF TECHNOLOGY

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**DT228 BSc. (Honours) Degree in Computer Science**

**Year 1**

**DT282 BSc. (Honours) Degree in Computer Science  
(International)**

**Year 1**

**DT211C BSc. (Honours) Degree in Computer Science  
(Infrastructure)**

**Year 1**

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**SUMMER EXAMINATIONS 2015/2016**

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**PROGRAMMING  
[CMPU1025]**

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DR. DEIRDRE LILLIS

TUESDAY 10<sup>TH</sup> MAY                      9.30 A.M. – 12.30 P.M.

**3 HOURS**

ATTEMPT **THREE** QUESTIONS.

QUESTION 1 (SECTION A) **MUST** BE ATTEMPTED.  
ATTEMPT ANY **TWO** QUESTIONS IN SECTION B.

SECTION A – 40 MARKS  
SECTION B – 60 MARKS

**SECTION A**  
**(40 marks)**

1. (a) What is wrong with the following code segment?

```
float i = 0;
int my_array[10];

for (i = 0; i < 10; i++)
{
    my_array[] = i;
}
```

(2 marks)

- (b) Explain the output from the following code segment:

```
printf("%5.2d", 12.34);
```

(2 marks)

- (c) Explain when you would use a `switch` statement.

(2 marks)

- (d) Show how you would declare an array of five floating point numbers containing the values 1.1, 2.2, 3.3, 4.4, 5.5

(2 marks)

- (e) What is the purpose of the *indirection operator* `*` as used in pointers?

(2 marks)

- (f) In C, what is the name of an array equivalent to?

(2 marks)

- (g) Change the following code segment to output the contents of the array using pointer notation:

```
int arr[3] = {1, 2, 3};
int i;

for (i = 0; i < 3; i++)
{
    printf("%d", arr[i]);
}
```

(2 marks)

- (h) Using a `printf` statement, show how you would display the following sentence:

"Done, Like a Boss", said the student.

(2 marks)

- (i) Explain the following code segment:

```
char *p = "some text";

while (*p != '\0')
{
    printf("%c\n", *p);
    p++;
}
```

(2 marks)

- (j) Declare a function prototype that passes two parameters, which are a character pointer as the first parameter and an array of characters as the second parameter, and returns an integer value.

(2 marks)

- (k) Declare a structure template that can store a first name (up to 10 characters), a surname (up to 20 characters), age (whole number only), and student status (True or False only).

(2 marks)

- (l) Describe whether you would develop a real-time application required to operate very fast using the C or Java programming language. Give a reason for your decision.

(2 marks)

- (m) Show two ways to initialise the following string in a C program: "Bazinga".

(2 marks)

- (n) What is the output of the following code:

```
#include <stdio.h>

main()
{
    int x = 4, y, z;

    y = --x;
    z = x++;

    printf("%d%d%d", x, y, z);
}
```

(2 marks)

(o) Find and explain the error in the following code:

```
#include <stdio.h>

main()
{
    int ary[4] = {1, 2, 3, 4};
    int p[4];

    p = ary;
    printf("%d\n", p[1]);
}
```

(2 marks)

(p) Which of the following data types are not supported in a switch statement?

- bool
- short
- char
- long

(2 marks)

(q) What is a register variable? Show how to declare such a variable.

(2 marks)

(r) Correct any errors in the following code:

```
#include <stdio.h>

main()
{
    int i = 1, j = 2;

    if(i = 1) && if(j = 1)
    {
        printf("Both variables are equal");
    }
}
```

(2 marks)

(s) Explain the following code segment:

```
int* my_function(int *param)
{
    int local_var = 0;

    local_var += *param;

    return &local_var;

} // end my_function()
```

(2 marks)

- (t) Complete the code in the main() function indicated by comments:

```
#include <stdio.h>

struct student
{
    char *c;
}

main()
{
    struct student DIT_student;
    struct student *ptr;

    // Assign the string "hello" to the DIT_student
    // variable
    // Display the contents of the DIT_student variable
    // to standard output
}
```

(2 marks)

**SECTION B**  
**(60 marks – Attempt TWO questions)**

2. Write a program that uses an array to store data for 10 students in your course. Your program must:
- (a) With the use of an appropriate symbolic name, define a one-dimensional integer array called **DIT\_students**.  
(1 mark)
- (b) Using pointer-notation only:
- (i) Enter the ages of the students into the **DIT\_students** array.  
(5 marks)
- (ii) Calculate the average age of the students and display it to standard output.  
(10 marks)
- (iii) Find the youngest and oldest age in the class and display both to standard output.  
(10 marks)
- (iv) Display all the ages in the array.  
(4 marks)



3. (a) Write a program to dynamically allocate memory for a set of floating-point numbers. Your program must first ask the user to enter how many numbers they wish to enter. It should then dynamically allocate the required memory and input the numbers. (15 marks)
- (b) Write code to calculate the average of the numbers entered and display this to standard output. (5 marks)
- (c) Write extra code to accommodate an additional 10 numbers in the dynamically allocated memory from part (a). Input these additional numbers if the memory increase is successful. (10 marks)
4. Write a program that reads a string from the keyboard and uses separate functions to do the following:  
(Note: you can assume a string of max 20 characters will always be entered)
- (a) Count the number of vowels in the string and display this number to standard output. (10 marks)
- (b) Find the number of characters in the string you entered. Using this number, display the string in reverse. (10 marks)
- (c) Concatenate the string you entered to the end of the following string and display the new string:
- ```
char sentence[40] = "I entered the string "
```
- (10 marks)