DUBLIN INSTITUTE OF TECHNOLOGY

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

Year 1

DT228 BSc. (Honours) Degree in Computer Science

Year 1

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

Year 1

SUMMER EXAMINATIONS 2016/2017

PROGRAMMING
[CMPU1025]

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DR. DEIRDRE LILLIS

TUESDAY 9TH 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 – 36 MARKS
SECTION B – 64 MARKS

SECTION A
(36 marks)

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

```
define SIZE 5;
int main()
{
    my_array[SIZE];
    ...
    return 0;
}
```

(3 marks)

(b) Explain the following line of C code:

```
unsigned int num;
```

(3 marks)

(c) Using sample code, show the use of the keyword `const` in C.

(3 marks)

(d) The * character has **three** different uses in the C programming language. With the aid of a short sample of C code, demonstrate each of these three uses.

(3 marks)

(e) Using the following code:

```
int array1[3] = {2,4,6};
int array2[3] = (0);
int i
```

Copy the contents of `array1` into `array2` in reverse order.

(3 marks)

(f) Explain the difference between passing function parameters by value and by reference.

(3 marks)

(g) Show **three** ways to initialise the string "Hello"

(3 marks)

(h) Briefly explain **two** differences between the `malloc()` and `calloc()` functions when dynamically allocating memory.

(3 marks)

(i) Show how to enter five numbers into the following array using pointer notation only:

```
float my_array[5];
```

(3 marks)

(j) The C programming language is generally described as a "low-level" language. Explain your understanding of this description.

(3 marks)

(k) What is wrong with the following code segment?

```
struct date
{
     int day;
     int month;
     int year;
}
struct
{
     char full_name[21];
     date birthday;
} details;
```

(3 marks)

(l) Show the output of the following code:

```
int main()
{
      char word[] = {'C','H','S','\0'};
      int i;

      for(i = 0; i < 3; i++ )
      {
            printf("%c", *(word + i) + 1 );
      }
}
```

(3 marks)

(m) SURPRISE

You may attempt the following question. If your answer is correct, 2 marks will be added to your overall written exam mark. However, if your answer is wrong, 2 marks will be deducted from your overall written exam mark. Decide carefully whether to attempt !!

Explain the bug in the following code segment:

```
...
int* fxn()
{
      int num;

      num = 100;

      return &num;
}
```

(+/- 2 marks)

SECTION B
(64 marks – Attempt TWO questions)

2. (a) Explain, with the aid of a small piece of code, each of the following variable storage types:

- auto
- static
- extern
- register

(16 marks)

(b) Write a program that uses a function to convert a temperature reading from Celsius to Fahrenheit.

Your program must enter the Celsius temperature inside the main(). It should then be passed to the function where it is converted into Fahrenheit using the formula:

$$\text{Fahrenheit} = (\text{Celsius} \times 1.8) + 32$$

Your function should then return the new Fahrenheit temperature back to the main() where it is then displayed beside the original Celsius temperature.

(16 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 program in C to implement the above requirements. You can ignore error-checking.

(22 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.

(10 marks)

4. Write a program that reads a sentence from standard input and **uses separate functions** to do the following:

(a) Determines the frequency of the word "is" in the sentence.

(15 marks)

(b) Calculates the number of characters in the sentence.

(7 marks)

(c) Appends the sentence to the end of the following string:

```
"My sentence is: "
```

(10 marks)

COLLEGE EXAMINATIONS

AMENDMENTS TO EXAMINATION QUESTION PAPER

COURSE REF: S228, 282, 211/106C VENUE: Base 1, 2, 3.

SUBJECT: PROGRAMMING

DATE: 9/5/2017

TIME: 9.30am - 12.30pm

SIGNED: Michael Curtis

INSTRUCTIONS:

Q3 (b) Change the size of the allocated block of memory in part (a) to allow for the new set of numbers entered in part (b) i.e. change the previous size block