

Ollscoil na hÉireann, Gaillimh  
*National University of Ireland, Galway*

GX 1475

**CHRISTMAS Examinations, 2003/2004**

Exam Code(s)	2BS1
Exam(s)	Biomedical Science
Module Code(s)	CT252
Module(s)	Introduction to programming
Paper No.	1
Repeat Paper	
External Examiner(s)	Professor D. Bell
Internal Examiner(s)	Professor G. Lyons
	Dr. A. Brennan

**Instructions:**

Answer 4 questions.  
All questions will be marked equally.

Duration	2hrs
No. of Answer Books	

**Requirements:**

Handout	
MCQ	
Statistical Tables	
Graph Paper	
Log Graph Paper	
Other Material	

No. of Pages	5
Department(s)	IT

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CHRISTMAS EXAMINATIONS 2003/2004

CT252

INTRODUCTION TO PROGRAMMING

Professor D. Bell  
Professor G. Lyons  
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Candidates are required to answer **Four** questions.  
All questions carry equal marks.  
Time allowed: **TWO hours**

Q. 1

- Explain how the logical operators, AND, OR, and NOT work. Given that x is 5 and y is 6, what is the result of the following;  
 $((x \geq 5 \ \&\& \ y < 6) \ || \ y = 6 \ || \ x < y) \ \&\& \ ((y > x \ || \ x > 5) \ || \ x < y))$  (5)
- Describe 5 of the following (use examples to highlight your understanding) (5)  
Pre-processor directive, keyword, argument, control character, conversion specifier, unary operator.
- Write the pseudocode for the following: "The user can enter a total of 10 numbers only. If the number 5 is entered the following message is presented 'You entered 5'. Once the 10 numbers have been entered, the average, the maximum and the minimum of these numbers is presented". (15)

Q. 2

- What is an algorithm? What is the importance of algorithms? (5)
- Draw a flowchart for an algorithm to ask a user to input a salary. The tax due on this amount is then displayed. (10)  
Here is a table for calculating income tax on annual salary

Income	First £5,000	£5,000 - £10,000	> £10,000
Tax Rate (%)	0	25	42

- Write a C program that allows a user to input an integer variable. The program checks to see if this number is odd or even. If it is an odd number, then the following message is displayed "Odd number". However, if the number is even, then the program checks to see if half of this same number is also even. If it is, then the following message is displayed "Half of this even number results in an even number". Otherwise, it displays the following message; "Half of this even number results in an odd number" (10)

Q. 3

- Convert the following decimal numbers into binary form; (5)  
12, 34, 18, 41, 21
- Carry out binary addition on the following; (8)

11 1011	01 1101	01 1011	10 0011	11 1111
10 1111	11 1111	10 1101	11 1111	01 0101
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

- Write the C program which results in the following output (use the FOR loop).

```
*****
* 5 - 10 - 15 - 20 - 25 *
*****
* 7 - 14 - 21 - 28 - 35 *
*****
* 9 - 18 - 27 - 36 - 45 *
*****
```

(12)

Q. 4

- What is meant by the conditional operator ? (use examples) (5)
- Explain how the switch statement works. Use examples. (7)
- Write a simple calculator program with the following menu options;
  - 1 - Add
  - 2 - Subtract (note : if number 2 is greater than number 1, an error message is displayed)
  - 3 - Multiply
  - 4 - Divide
  - 5 - exit

The program keeps looping until the user enters 5 to exit.  
If the user enters 1, he/she is then asked to enter the first number and then the second number. The result of the addition is displayed and the menu is once more presented to the user. (13)

Q. 5

- Given that x is 0 0 1 0 0 1 1 1 and y is 0 0 1 0 0 0 1 1, using the bitwise operators, calculate the following; (5)  
x&y, x^y, ~y, ~x, x|y, x >> 2, y << 3, x & x, y & y, x | x.
- What is the output of the following program?

```
#include <stdio.h>
void main()
{
    int x = 5;
    int y = 6;
    do
    {
        printf("%d", x);
        y = 2;
        x = x - 1;
        while (y > 0)
        {
            printf("x is %d", x);
            printf("y is %d", y);
            y = y - 1;
        }
    } while (x > 0);
}
```

(8)

- Write the code for a program, which allows the user to enter two strings. The

program then checks to see if these strings are similar. If they are similar the following message is displayed "You entered the same words", otherwise the following message is displayed "The strings are not the same". (12)

Q. 6

- Explain how the function strcat works (use examples) (5)
- If  $x = 4$  and  $y = 6$ , calculate the value of total; (8)
  - total = 7 + ++x + y--
  - total = 2 + --x + y++
  - total = 5 + x ++ + --y
  - total = 6 + --x + y--
  - total = 2 + --x + --y
  - total = 1 + ++x + y++
  - total = 9 + --x + --y
  - total = 3 + ++x + ++y
- Write a guessing game in C. The user has 3 attempts to identify the chosen number, which in this case is 12. With each guess, the user is told whether they were correct or not in their guess, how many attempts they have left and whether they need to start guessing a higher or lower number e.g. if they guess 10 on the first attempt, the output then is; you've guessed 10. That is not correct. You have 2 tries left. You need to guess higher. If they use all 3 attempts and still have not guessed the correct number, the following message is displayed; "You have tried 3 times and failed. The correct number is 12". If they guess within the three attempts, then the following appears "You've guessed correctly. Congratulations. You had 1 try left too". (12)

Q. 7

- Given the following information; (7)
  - Shop : 1-Dunnes, 2-Superquinn, 3-Tesco, 4-Lidl
  - Veg : 1-potatoes, 2-carrots, 3-parsnips, 4-broccoli, 5-other
  - Choc : 1- buy chocolate

You can go shopping if only if

  1. The shop is not Dunnes, the vegetables are broccoli or carrots only, and you cannot buy any chocolate or
  2. The shop is either Tesco or Lidl, the vegetables are carrots and you get to buy chocolate or
  3. It can be any shop, but you have to get potatoes and you cannot buy any chocolate

Write the conditions for shopping.

- Given the following information; (8)

```
int values[5][3][2]={
    {{12, 4}, {32, 12}, {23, 34}},
    {{1, 65}, {3, 25}, {30, 23}},
    {{21, 24}, {26, 7}, {1, 17}},
    {{6, 87}, {3, 23}, {9, 4}},
    {{8, 23}, {21, 19}, {12, 2}}
};
```

Calculate the following;

```
values[0][0][0]
values [1][2][0]
values [2][1][1]
```

values [0][2][1]  
values [4][2][0]  
values [1][1][1]  
values [3][0][1]  
values [5][0][1]

- Write a program which allows the user to enter a character. The program returns the ascii equivalent of this character and it also identifies whether the character is in upper or lower case. (10)