

**OLLSCOIL NA hÉIREANN**  
The National University of Ireland

THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

**SEMESTER 1 EXAMINATIONS 2002/2003**  
2<sup>nd</sup> Biomedical Science

**CT252**

INTRODUCTION TO PROGRAMMING

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Candidates are required to answer **Four** questions.  
All questions carry equal marks.  
Time allowed: **TWO hours**

- Q. 1**
- What is meant by the term pseudo-code (use examples)? (5)
  - A typist is entering some text on a computer keyboard at the rate of 43 words per minute. If each word is 7 characters long on average, how many bits per second are being sent to main memory? A space is a character. Assume that each word is followed by one space on average. (7)
  - Using the flowchart approach, solve the following problem. You are required to find the sum, minimum and maximum of a list of numbers. The list is terminated with the number 999. (13)
- Q. 2**
- You have 10Gbytes of information on your hard disk that you want to transfer to a set of 800 Kbyte floppy disks. How many floppies are required? (5)
  - Describe the four basic hardware components of a computer system (use examples). (9)
  - Write the C program which results in the following output (use the FOR loop). (11)

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

- Q. 3**
- What is a conversion specifier (use examples) ? (3)
  - Carry out binary addition on the following; (8)

10 1111	00 1111	00 1011	11 0110	01 1011
10 1111	10 1011	10 0100	01 1101	01 0001
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

- Write a program which allows the user to do the following;
  1. Lodge cash
  2. Withdraw cash
  3. Quit

The user has a starting balance of 3000 in his account.

The above screen will keep being presented to the user UNTIL he/she enters 3 as his/her choice.

If the user enters 1, then he/she will be prompted to enter the amount to lodge. Based on the lodgment, the balance will be displayed to the user.

If the user enters 2, then he/she will be prompted to enter the amount to withdraw. The program checks to ensure that the withdrawal amount is less than the balance. If it is greater than the balance, the following message is displayed "Sorry – you don't have enough money in your account". Otherwise, the amount is withdrawn and the new balance is displayed to the user. Use the SWITCH command. (14)

- Q. 4**
- Suppose a CPU is rated at 15 MIPS. What is the average length of time needed to execute one instruction? (4)

- If x = 5 and y = 8, calculate the value of total; (8)

```
total = 3 + ++x + y--
total = 9 + --x + y++
total = 2 + x ++ + --y
total = 4 + --x + y--
total = 5 + --x + --y
total = 7 + ++x + y++
total = 8 + --x + --y
total = 2 + ++x + ++y
```

- Write a C program which reads in a users name (i.e. christian name & surname) and based on the name entered, compares it to an existing name "Anne Mahony". If the name is similar, the following message is displayed "The name you entered is the same as the one in our files". Otherwise the following is displayed "Sorry – the names are not similar". The program also prints out the number of characters in the entered name. (13)

- Q. 5**
- What is a pointer? (5)
  - 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]

```

- What is the output of the following program?

```

#include <stdio.h>
void main()
{
    long num1 = 4;
    long num2 = 5;
    long *pnum;

    pnum = &num1;
    *pnum = 12;
    ++num2;
    num2 += *pnum;

    pnum = &num2;
    ++*pnum;

    printf("\nnum1 is %ld, \nnum2 is %ld, \n*pnum is %ld, \n *pnum +
    num2 is %ld", num1, num2, *pnum, *pnum + num2);
}

```

(12)

- Q. 6**
- Use an example to explain how the conditional operator works ? (5)
  - What are the rules regarding C variables ? (8)
  - Write a program which accepts a number from the user. This number has to be between 10 and 150. based on the number entered, the following is printed out X times; "I shall have a good time". (12)

- Q. 7**
- What is an array? (use examples) (5)
  - What is a function? (5)
  - Write a program which initialises a string called str1 to be "This is the greatest show on earth". The user is then asked to input a number between 0 and 43. The program checks to ensure that the number entered is between 0 and 43. If it is greater than 43 or less than 0,, the user has to keep a number. However if the user enters 9999, then the program ends. Based on the number entered, the letter at this position in str1 is displayed. (15)