GX1498

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

Semester 2 Examinations, 2003/2004

Exam Code(s)	1BA1
Exam(s)	1st Arts
Module Code(s)	CT100
Module(s)	Programming and Logical Methods (CT107)
Paper No.	1
Repeat Paper	Special Paper
External Examiner(s)	Prof. D. Bell
Internal Examiner(s)	Prof. G. Lyons
	Mr. H. Melvin

Instructions: Answer Q1 and any three other questions. All questions carry equal marks

Where you are asked to write programs, it is sufficient to include a brief algorithm with your code.

Duration	3 hrs
No. of Answer books	1

Requirements:

Handout	
MCQ	
Statistical Tables	✓
Graph Paper	
Log Graph Paper	
Other Material	
No. of Pages	4
Department(s)	Information Technology

Q1. (i) Briefly outline and describe the main steps in the Software Development Method (SDM). Which steps are the most critical and why?

(8)

(ii) Explain the importance of input validation. Show how you would implement input validation within a program where the user is required to enter a number that is between –10 and +10 inclusive.

(8)

(iii) Describe what is meant by an infinite loop, using an example to illustrate your answer.

(6)

(iv) Describe what is meant by random access for files and show how QBasic opens a file for random access.

(7)

(v) With regard to QBasic data types, distinguish between the *integer*, *single* and *double* types and outline where each might be used. (6)

Q2. (i) Your college bank has introduced a student loan scheme. The following outlines the conditions required to qualify for a loan:

- If a student is in 1st year, then he/she must be 17 or more AND have more than 1000 euro in an account.
- All other undergraduate students must have 700 euro or more in an account.
- If a student is a postgraduate, then he/she must have 500 euro or more in an account OR must have at least 3 years banking with the college bank.

Design an efficient algorithm to implement this policy (actual code not required).

(10)

(ii) Show how **both** the DO WHILE...LOOP and the DO....LOOP UNTIL statements can be used to add the following sequence of numbers:

5 10 15 20 25

(10)

(iii) Use **nested** FOR loops to generate the following patterns:

(a)

```
*
*   *
*   *   *
```

(7)

(b)

```
*       *       *       *
*       *       *
*       *
*
```

(8)

Q3. (i) In QBasic SUB Procedures, distinguish between call-by-reference and call-by-value. (6)

(ii) Write a short SUB procedure for swapping 2 values ensuring that the swapped values are visible back in the main module.

(10)

(iii) Outline the format of the MID$() function in QBasic.

(6)

(iv) Write a short program that implements the following segment of code that is commonly used for input validation.

- Code prompts user to answer either Yes or No to a question.
- Program checks that the users response is valid. As such YES, yes, Y or y are all valid as are NO, no, n and N. If a valid answer is given, the answer is printed out for the user, else the user is asked to reenter their answer. (Hint: Use MID$() and UCASE$())

(13)

Q4. (i) Describe briefly the use and importance of arrays in a programming language. Give examples of where 2 dimensional and 3 dimensional arrays might be useful.

(10)

(ii) Write a program that generates 6 random numbers between 1 and 42 and stores the numbers in an array.

(10)

Outline briefly how you would ensure that all six generated numbers are different (code not required).

(8)

(iii) Briefly describe the binary search algorithm.

(7)

Q5. (i) The following bubble sort code sorts an array of 50 numbers in ascending order.

```
FOR pass = 1 to 49
        FOR comp = 1 to 49
                IF array(comp) > array(comp+1) THEN
                        SWAP array(comp), array(comp + 1)
                END IF
        NEXT comp
NEXT pass
```

Outline the inefficiency in this code and show how it might be improved.

(15)

(ii) The DodgyPhone company have asked you to develop a computerised system to keep tabs of its customers. The company wishes to store the following details on each of its customers:

- Name
- Address
- Date of birth
- Age
- Phone Number

Explain the function of the record type in QBasic and show how a record type could be used to group the above data on each customer.

(8)

DodgyPhone currently have 100 customers. Your system should read in details on each customer. Details should be stored on the harddisk.

(12)

Q6. (i) Distinguish between the record type in QBasic and an object in an object-oriented programming language. Use an example to illustrate your answer.

(8)

(ii) Distinguish between procedural and event-driven programming languages.

(5)

(iii) Develop a VB application that processes text strings as follows. The user enters the string to be processed via a text box eg. txtInput. A command button processes the string as follows:

- It determines the frequency of each of the vowels A,E,I,O,U in the string. Both upper and lower case should be treated equally. It then prints our details via 5 separate textboxes.
- Code should initially check that user has entered something in the textbox i.e. input validation.
- Your application should also have the facility to clear all fields and to exit the application.

(22)