

OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER II EXAMINATIONS 2003

1BA121 FIRST ARTS
CT100

Paper 1
Programming and Logical Methods CT107

Professor D. Bell
Professor G. Lyons
Mr. H. Melvin

Time allowed: THREE hours
Answer Q1 and three other questions.
All questions carry equal marks

Note 1: Where you are asked to write programs, it is sufficient to include a brief algorithm with your code.

- Q1.** (i) What are the main benefits of using the Software Development Method (SDM). Which steps are the most critical and why? (8)
- (ii) What is the role of a hierarchy chart in modular programming and what are its main benefits? (7)
- (iii) Write a brief note on operator hierarchy and explain why knowledge of the hierarchy is essential for programming. (8)
- (iv) Briefly describe how QBasic opens a file for random access. (5)
- (v) Distinguish between Pass-by-Reference and Pass-by-Value in QBasic. (7)
- Q2.** (i) Outline the general format of the block IF statement **and** the SELECT CASE statement in QBasic. (8)
- (ii) Use nested FOR loops to generate the following pattern: (7)
- ```

* * * *
* * * *
* * * *
```
- (iii) Explain the importance of input validation in programming. (5)

You are asked to develop a security system for a financial company. The company have 2 authorised users eg. USER1, USER2 with corresponding ID's eg. ID1, ID2 and passwords eg. PWORD1, PWORD2. Your system should do the following:

- Prompt the user for name, ID and password.
- Check details against the authorised user details. Access is given if all details match. If not, a warning is given. A maximum of 2 attempts is allowed.

(15)

**Q3.** (i) Outline the format of the MID\$ function in QBasic. (5)

- (ii) Write a program that processes a string as follows:
- Prompts user to enter a string
  - Passes string to a user-defined FUNCTION that calculate the total number of vowels (a,e,i,o,u) in the string. Note that both lower and upper case vowels should be counted.

(15)

- (iii) Write a program that generates 6 random numbers between 1 and 42. (10)

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

(5)

**Q4.** (i) Describe briefly the use and importance of arrays in a programming language. (5)

- (ii) You are asked by a company to develop a system that processes customer names. The system should allow the user to enter the customer's surnames. The system then sorts the names in alphabetical order and prints them to screen. The company currently have 100 customers. You can assume that names will be input in lower case letters.

(15)

In part (ii) above, how would you modify the code so that it will accept surnames in either lower or upper case letters and still function correctly.

- (iii) Briefly describe the binary search algorithm. (10)

(5)

**Q5.** (i) Distinguish between the Integer, Single and Double data types in QBasic and outline where each might be used. (5)

- (ii) The DodgyMotors company manufacture cars . You have been

You are asked to develop a security system for a financial company. The company have 2 authorised users eg. USER1, USER2 with corresponding ID's eg. ID1, ID2 and passwords eg. PWORD1, PWORD2. Your system should do the following:

- Prompt the user for name, ID and password.
- Check details against the authorised user details. Access is given if all details match. If not, a warning is given. A maximum of 2 attempts is allowed.

(15)

**Q3.** (i) Outline the format of the MID\$ function in QBasic. (5)

- (ii) Write a program that processes a string as follows:
- Prompts user to enter a string
  - Passes string to a user-defined FUNCTION that calculate the total number of vowels (a,e,i,o,u) in the string. Note that both lower and upper case vowels should be counted.

(15)

- (iii) Write a program that generates 6 random numbers between 1 and 42. (10)

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

(5)

**Q4.** (i) Describe briefly the use and importance of arrays in a programming language. (5)

- (ii) You are asked by a company to develop a system that processes customer names. The system should allow the user to enter the customer's surnames. The system then sorts the names in alphabetical order and prints them to screen. The company currently have 100 customers. You can assume that names will be input in lower case letters.

(15)

In part (ii) above, how would you modify the code so that it will accept surnames in either lower or upper case letters and still function correctly.

- (iii) Briefly describe the binary search algorithm. (10)

(5)

**Q5.** (i) Distinguish between the Integer, Single and Double data types in QBasic and outline where each might be used. (5)

- (ii) The DodgyMotors company manufacture cars . You have been

asked to develop a computerised system for the company. The company wishes to store the following details on each of its models:

- Model (can contain letters)
- Chassis Number (can contain letters)
- Weight
- Cost Price
- Selling Price

Show how a record type could be used to group the above data on each model. (5)

DodgyMotors currently manufacture 6 different models. Your system should do the following:

- Allow the company to enter details on each model. Details should be stored on the harddisk.
- Allow the user to modify details on any model.

(25)

**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 student grades. The user enters the number of students via a text box eg txtNumStud. Grades are then entered via a second text box and processed via a command button. A message is displayed in a third text box indicating whether the current student passed (grade  $\geq 40$ ) or failed. Input validation should be used to ensure that the user cannot enter a negative value for the grade. The value of txtNumStud should reduce after each student, indicating the number of students remaining. Your application should also have the facility to clear all fields and to exit the application. (22)