



QQI

Higher Diploma

OOP MAIN EXAMINATION

<i>Module Code:</i>	B8IT117
<i>Module Description:</i>	Object Oriented Programming
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Date: 05th of March 2018
Time: 18:30-20:30

INSTRUCTIONS TO CANDIDATES:

Time allowed is 2 hours.

QUESTION 1 IS COMPULSORY

Answer any 2 other questions.

Question 1 – Compulsory – 30 Marks

- a. What is inheritance in C# (**4 marks**)? In your answer describe the benefits inheritance provides (**4 marks**). Ensure you illustrate your answer with sample C# code (**2 marks**).
(10 marks)
 - b. What are constructors? Provide sample C# code to illustrate your answer.
(10 marks)
 - c. Describe, with code samples, two different forms of polymorphism available in C#
(10 marks)
- (Total: 30 marks)**

Question 2 - 35 Marks

BizWiz sell a range of products to both the domestic and business markets. They have approached you to build a system that will help them determine sales and discounts for both their domestic and business customers.

Your initial analysis has identified the following:

- There are two different types of customers: domestic and business.
- You are required to store a name and an Eircode for each customer. In addition, business customers will require their Company Registration number to be stored.
- Domestic customers can have a loyalty bonus. Domestic customers who have a loyalty bonus get a 5% discount to the total cost of each sale.
- Business customers can avail of a trade discount. The trade discount depends on the **total cost** of each sale item. Sale items with a total cost of €200 or less attract a 7.5% discount, those over €200 and less than €350 get 9% discount, while from €350 and over the discount is 12%.
- Each customer is associated with a list of sale items.
- A sale item has a product code (a string), a quantity (an int), a product cost. You also determine that you will need to provide way to calculate the total item cost and return it; for this you have decided that a read-only getter is best.
- BizWiz want to be able to get the total income from sales for each type of customer. In addition, they want to get the raw total income from sales. The raw total income from sales is the income from all sale items for a given customer **without any discount**, while the total income from sales has any relevant discount applied. (**Note: income for a given sale item is the total item cost**).

You are required to create a C# console application for the above BizWiz system. In addition, write test code in your Main() function to test the functionality by creating a domestic and business customer and add different sale items to each. Ensure you test total cost of sales and the raw total cost.

(Classes: 12 marks)
(Inheritance: 10 marks)
(Raw and total costs: 8 marks)
(Test code: 5 marks)
(Total: 35 marks)

Question 3 – 35 Marks

Northside University requires a C# console program that will allow them to manage student records. After an initial meeting with the University you have produced the following specification for your initial version of the application:

- a. Each student has a list of grades. Grades are integers, with a value from 0 to 5 inclusive.
- b. Each student has a GPA, a Grade Point Average. This is simply the average of the grades the student has accumulated.
- c. Each student is either a postgraduate, an undergraduate or a doctorate student.
- d. The system must store the student name, the programme code of the programme they are studying and the student's PPS number.
- e. The system must be able to store any number of students
- f. The system must provide a way to display the students in order of GPA.
- g. The system must provide a way to display all first-class students. First class students are those that have a GPA of 4.1 or higher.
- h. The system must provide a way to display all failed students. Failed students are those with a GPA below 2.0.

In addition to creating a C# console application, ensure your Main() function contains test code that tests the functionality you have written.

(Classes: 10 marks)
(Correct interfaces used & implemented: 15 marks)
(Correct data structures: 5 marks)
(Test code: 5 marks)
(Total: 35 marks)

Question 4 – 35 Marks

Safe-n-Secure Ltd have asked you to help them build a Windows Forms application that will enable their users to check their passwords. The Windows Forms application has the following screen:

The screenshot shows a standard Windows Forms application window. It has a title bar with the text 'Form1' and standard minimize, maximize, and close buttons. The main area of the form is light gray and contains four text boxes arranged vertically. Each text box has a label to its left: 'First Name', 'Surname', 'Year of Birth', and 'Password'. The text boxes contain the following values: 'joe', 'smyth', '1982', and 'joesmy20' respectively. Below the text boxes, there are three buttons arranged horizontally. The buttons are labeled 'Check Password', 'Reset', and 'Show All Users'.

Your application should satisfy the following specification:

- a. When the Check Password button is pressed, the application must check that all text boxes except for Year of Birth have at least 3 characters entered. The user must be notified via a message box of those text boxes that failed this test. The focus should be placed in the first of the failed text boxes.
- b. For Year of Birth, the date of birth needs to be 4 digits long and must be within the range 1918 to 2000.
- c. The system should work out the password by applying the following: take the first 3 characters of the first name and surname and concatenate them together with the Year of Birth value.
- d. Your code needs to ensure that what the user has entered in the Password field matches what the system comes up with as the password when the Check Password is pressed.
- e. If the comparison of passwords matches, the user is notified, and a User object should be created and added to a list of such objects. The fields of the User object are those listed in the dialog box above. Failed password matches should be notified to the user too.
- f. When the Reset button is pressed, all fields on the form should be cleared.
- g. When the Show All Users button is pressed, a message box should display all the User object details that have been saved in a list.

[Marks breakdown on next page]

(Validate text boxes: 20 marks)

(Class code: 5 marks)

(User listing: 10 marks)

(Total: 35 marks)