



**QQI**  
**HIGHER DIPLOMA IN SCIENCE IN COMPUTING**  
**FINAL EXAMINATIONS**  
**SEPTEMBER 2016 INTAKE**

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*Module Code:* **B8IT117**

*Module Description:* **Object Orientated Programming**

*Examiner:* **Dr Shazia A Afzal**

*Internal Moderator:* **Mr Rory O' Donnell**

*External Examiner:* **Dr Paul Stynes**

**Date: Monday, 16<sup>th</sup> January 2017**

**Time: 10:00 – 12:00**

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**INSTRUCTIONS TO CANDIDATES**

**Time allowed: 2 hours**

**Total: 100 marks**

**QUESTION 1 IS COMPULSORY (30 marks)**

**Answer any 2 other questions (35 marks each)**

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**Question 1 – Compulsory – 30 Marks**

a) Explain the following by providing appropriate examples for each of them.

- i. Method Overloading
- ii. Overriding
- iii. Constructor
- iv. Sealed Class

**(4 \*5 = 20 marks)**

b) Explain the difference between abstract class and interface by giving at least one code example for each of them.

**(10 marks)**

**(Total: 30 marks)**

**Question 2 - 35 Marks**

Create a class called Inventory that a retail store might use to represent an inventory item for sale at the store.

a) An inventory should include four pieces of information as instance variables

- an item number (type string)
- an item description (type string)
- a quantity of the item stored (type int)
- and a price per item (decimal)

For the quantity and PricePerItem, if the value passed on to the accessor is negative, an exception must be thrown.

**(12 marks)**

b) Your class should have a parameter less constructor and a constructor that initialises the four values.

**(5 marks)**

c) Also provide a method named GetTotalCost that calculates the total inventory cost of the item (i.e. multiplies the quantity by the price per item), then returns the amount as a decimal value.

**(8 marks)**

- d) Write a test class that demonstrates the class Inventory's specification.

**(10 marks)**

**(Total: 35 marks)**

**Question 3 - 35 Marks**

A private local college has requested a software company to develop an information system for the college. As part of the software team, you are required to write the following classes:

- a) A class student with the following specifications:

- Id (Property)
- Name (Property)
- A constructor to initialise Id and Name
- CalculateTuition() (abstract method)
- A ToString() method to return the details of student

**(9 marks)**

- b) An UndergraduateStudent class that extend the Student class with the following specification:

- NoOfYears (Property) - Duration of course is determined
- FeePerYear (Property)
- A constructor to initialise all the properties
- A ToString() method to return the details of an undergraduate student
- An overridden CalculateTuition() method that calculates tuition based on the NoOfYears and FeePerYear ( $\text{NoOfYears} * \text{FeePerYear}$ )

**(9 marks)**

- c) A PostgraduateStudent class that extends the Student class with the following specification:

- NoOfCredits (Property) - Duration of course is determined
- FeePerCredit (Property)
- A constructor to initialise all the properties

- A ToString() method to return the details of a postgraduate student
- An overridden CalculateTuition() method that calculates tuition based on the NoOfCredits and FeePerCredit ( $\text{NoOfCredits} * \text{FeePerCredit}$ )

**(9 marks)**

- d) Write a test class to create two objects, one of type UndergradStudent and one of type PostgradStudent and display their results.

**(7 marks)**

**(Total 35 marks)**

**Question 4 – 35 Marks**

Develop a console application named as Library in C#. To develop this application, write the following classes:

a) A Book class with the following properties:

- ISBN
- Title
- PublicationDate
- Price
- And a method ToString() to return all the details of a book.

**(8 marks)**

b) A Books class that implements ICollection<Book> interface with a property Booklist<Book> to store number of books.

**(12 marks)**

c) A test class with menu for the following functions:

- Add a Book
- Remove a Book
- Show all books (sorted by publication year and then by title)
- Quit.

**(15 marks)**

**(Total 35 marks)**

**End of Examination**