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## **Autumn 2012 REPEAT EXAMINATIONS**

*Module Code:* **ICT1714**

*Module Description:* **Object Oriented Programming 1**

*Examiner:* **Kevin Coady**

*Internal Moderator:* **Paul Kelly**

*External Examiner:* **TBD**

*Date:*

*Time:*

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### **INSTRUCTIONS TO CANDIDATES:**

**Time allowed is 2 hours.**

**QUESTION 1 IS COMPULSORY**

**Answer any 2 other questions.**

**Question 1 – Compulsory – 30 Marks**

1. Discuss what is meant by inheritance in Object Oriented Programming giving C# examples? **(10 Marks)**
2. Explain the differences between abstract classes and interfaces. Give examples, including appropriate C# code, to show how abstract classes and interfaces are both defined and used **(10 Marks)**
3. What is meant by generic collections in relation to C#? Give an example of how this would be used in code. **(5 Marks)**
4. Explain what is meant by overriding and overloading. Give C# examples for each. **(5 Marks)**

**(30 marks)****Question 2 - 35 Marks**

HotCars is a car dealership company who sell cars (new and second hand) of different makes and models. The following is the Car Interface.

```
public interface ICar
{
    string Name { get; set; }
    string Model { get; set; }
    int YearBuilt { get; set; }
    double Price { get; set; }
    string Registration { get; set; }

    void SetPrice(double price);
}
```

- I. Provide C# code which implements the Car Interfaces. **(5 marks)**
- II. Create a class named Dealership which contains a property named Stock of type Cars.
  - a. Create a class Cars which should implements the ICollection interfaces. All methods and properties from ICollection must be implemented. **(10 marks)**
  - b. The class Cars should contain a method named GetNewModels which returns a collection of cars which have been built this year. **(5 marks)**
  - c. Cars should also provide a method which sorts all cars in the dealership by make and then by model. **(10 Marks)**
- III. You must provide a console application which tests your code **(5 marks)**

**(35 marks)**

**Question 3 - 35 Marks**

Please answer both A **AND** B for this question.

- I. Provide a UML class diagram for the details below (**7 marks**)
- II. Provide C# implementation for the details below

- I. An Address Class (**7 Marks**)

- Include properties for the following
  - House number
  - Street
  - City
  - County
- A ToString method which returns the details held in this class. (i.e. the properties of the class).

- II. A Person Interface (**7 Marks**)

- Include properties for the following
  - Title
  - First Name
  - Surname
  - Address (Use the class already created)
- A method to update a person's name (has parameters title, first name and surname)
- A method to update a person's address (i.e. has parameter of type Address)

- III. A Person Class (**7 Marks**)

- This class must implement the Person interface
- A constructor which includes the following parameters
  - person's title
  - first name
  - surname
  - address
- A default constructor which has no parameters

- IV. A Student Class which extends a Person (**7 Marks**)

- Create the properties for the following
  - Student Id
  - Course
- A constructor which accepts a student's title, first name, address, student id and course.
- Override the ToString method to display all properties in this class as follows:

Name: Mr John Murphy

Address: 1 Main St, Dublin City, Dublin

Student Id: 1799999

Course: Higher Diploma in Science in Computing

**(35 marks)**

**Question 4 – 35 Marks**

LiffeyBooks is an online book store which sells both physical books and electronic books (ebooks). Write a console application with the following details

An abstract class named Book. It should have the following: **(10 marks)**

- Properties to hold the following information:
  - Title
  - Author
  - Published Date
  - ISBN
  - NetPrice
- Implement a constructor which sets the values of the above properties.
- Define an abstract method named GetGrossPrice which is a parameterless method and returns the price of a book plus any taxes.

A class named PhysicalBook which is based on Book. It should have the following: **(7 marks)**

- Properties for the following:
  - Number Of Pages in the book
  - Physical Weight of the book in kilograms
- A default constructor which accepts no parameters.
- A constructor which allows a Title, an Author, a Published Date, an ISBN and a Net Price to be passed as parameters
- An implementation of GetGrossPrice which returns the gross price of book. The tax (VAT) on physical books is 15%. (HINT: If the net price of a book is €10 then the gross price is €11.50)

A class named eBook which is based on Book. It should have the following: **(7 Marks)**

- Properties for the following:
  - File Size in kilobytes
- A default constructor which accepts no parameters.
- A constructor which allows a Title, an Author, a Published Date, an ISBN and a Net Price to be passed as parameters
- An implementation of GetGrossPrice which returns the gross price of book. The tax (VAT) on ebooks is 5%. (HINT: If the net price of a book is €10 then the gross price is €10.50)

Note: you must also provide at least one implementation of overriding the ToString method. **(4 marks)**

Provide a program which tests the implementation of you code. Output similar to the following should be displayed on screen. **(7 Marks)**

Title: Pride and Prejudice  
 Author: Jane Austen  
 Net Price: 10.00  
 Gross Price: 11.50  
 Format: Physical Book

Title: The Lord of the Rings  
Author: JRR Tolkien  
Net Price: 10.00  
Gross Price: 10.50  
Format: eBook

**(35 marks)**