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## **Higher Diploma in Science in Computing**

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### **November 2017 Repeat EXAMINATIONS**

*Module Code:* **B8IT117**

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

*Examiner(s):* **Paul Laird**

*Internal Moderator:* **Damien Kettle**

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

*Date: 16<sup>th</sup> of November 2017*

*Time: 14:00-16:00*

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### **INSTRUCTIONS TO CANDIDATES:**

**Time allowed is 2 hours.**

**QUESTION 1 IS COMPULSORY (30 marks);  
Answer any 2 other questions (35 marks each).**

**Question 1 – Compulsory – 30 Marks**

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

- i. Constructor Overloading
- ii. Inheritance
- iii. Virtual Keyword
- iv. Abstract

**(20 marks)**

b. Explain the difference between the implementation of a C# interface and an abstract class by other classes using code examples

**(10 marks)**

**(Total: 30 marks)**

**Question 2 - 35 Marks**

a. Create a class called StudentRecord that a college might use to represent a student's grade. A StudentRecord should include four pieces of information as instance variables

1. a Student ID (type int)
2. a Name (type string)
3. a Course (type string)
4. grades (a sorted list of <ModuleID (type string), Grade (type decimal)> pairs

For the StudentID, if a negative number or a number over 8 digits is passed, an ArgumentException must be thrown.

**(12 marks)**

b. The class must have a constructor which initialises all variables.

**(3 marks)**

c. The class must have a method getAverageGrade() which returns as a decimal the average grade for the student.

**(10 marks)**

d. A getGradeByModuleCode method, and an AddGrade method must be provided. If the grade already exists in the record, it will be updated only if the new grade is higher. The updated grade must be the lower of 40 and the grade achieved.

**(10 marks)**

**(Total: 35 marks)**

**Question 3 - 35 Marks**

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

- a. A Contractor class with the following properties:

- i. Company Name
- ii. Contact Name (modifiable)
- iii. NumberOfEmployees (modifiable)

and a method ToString() to return all the details of a contractor.

**(10 marks)**

- b. A Project class that stores names of subprojects being undertaken, and the contractors assigned to subprojects, which must provide the following methods:

- i. Add subcontract (specifying the contractor assigned)
- ii. Cancel subproject (remove from project, throw exception if not present)
- iii. ToString() which lists the subprojects in alphabetical order

**(15 Marks)**

- c. A TestProgram class which uses a loop and menu to allow the methods to be selected and called, or quit.

**(10 Marks)**

**(Total: 35 marks)**

**Question 4 - 35 Marks**

A distance learning provider wishes to provide a class `LearnerCreditRecord` for recording the credits achieved by students, for the purposes of awards, and wants to test their system thoroughly.

- a. The class should hold:
  - 1. Learner Name
  - 2. PPS Number (set on account creation, not settable)
  - 3. Credits (Integer credits awarded, not settable)
- b. and should provide methods
  - 1. `bool awardCredits(int c, string moduleCode)` (increasing the Credits by c)
  - 2. `bool takeAward(int)` (this sets credits to zero if Credits exceed the int parameter (number required for the award) and returns true, otherwise returns false)
- c. The number of Credits assigned for a module must not exceed 30, and must be a positive multiple of 5, otherwise an `ArgumentException` must be thrown.

**(17 Marks)**

- d. Write a test class `TestCreditRecord` which has three test methods, testing the `LearnerCreditRecord` class in terms of requirements in subsections b1, b2, and c respectively

**(3\*6 Marks)**

**(Total: 35  
Marks)**