UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 2, Examination in Engineering, November 2017

Module Number: EE2201 **Module Name: Object Oriented Programming - REPEAT**

Part B

[2 hours]

[Answer **all** questions]

Q1. a) Explain what is a class and an object using an example.

[1 mark]

b) What are the differences between a constructor and a method in a class?

[1.5 marks]

c) Explain the difference between instance variable and static variable.

[1.5 marks]

d) Explain an advantage of using generic classes in C#?

[1.5 marks]

e) Explain **foreach** loop, using an example.

[1.5 marks]

f) Explain What is method overloading using an example.

[1.5 marks]

g) Explain the difference between value type variable and reference type variable.

[1.5 marks]

Q2. a) Describe the following terms found in Object Oriented Programming.

i) Encapsulation
ii) Inheritance
iii) Polymorphism

[3 mark]

b) Explain the following access modifiers.

i) public
ii) protected

[2 mark]

c) The Listing 1 shows a partially implemented Circle class.

Listing 1: Circle class

```
class GradeBook
{
  public string CourseName { get; set; }

  public GradeBook(string name)
  {
    CourseName = name;
  }

  public void DisplayMessage()
  {
    Console.WriteLine("Welcome to the grade book " +
    "for {0}",CourseName);
  }
}
```

i) Include a second string auto-implemented property that represents the name of the course's instructor.

ii) Modify the constructor to specify two parameters-one for the course name and one for the instructor's name.

iii) Modify method `DisplayMessage()` such that it first outputs the welcome message and course name, then outputs "This course is presented by: ", followed by the instructor's name.

[3 marks]

d) Explain how you would implement polymorphism using a suitable example.

[2 mark]

Q3. Create a class called `Complex` for performing arithmetic with complex numbers. Complex numbers have the form *realPart* + *imaginaryPart* * *i* where *i* is $\sqrt{-1}$. Use double precision floating-point variables to represent the private data of the class.

a) Provide a constructor that enables an object of this class to be initialized when real and imaginary parts are given.

[1.5 marks]

b) Provide a parameterless constructor with default values in case no initializers are provided.

[1.5 marks]

c) Provide public methods that perform the following operations:

i) Add two `Complex` numbers: The real parts are added together and the imaginary parts are added together.

[2 marks]

ii) Return a string representation of a `Complex` number in the form (a, b), where a is the real part and b is the imaginary part.

[2 marks]

d) Overload addition $(+)$ and multiplication $(*)$ operators in the `Complex` class.

[2 marks]

e) Write a class with `Main` method to test your `Complex` class.

[1 mark]