



## MURANG'A UNIVERSITY COLLEGE

University Supplementary/Special Examinations

### FIRST YEAR SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY AND BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE

ICS 2104 : OBJECT ORIENTED PROGRAMMING 1

DATE: 29th OCTOBER 2015

TIME: 2HRS

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**Instructions: Answer Question 1 and Any Other Two.**

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#### **Question 1: (30 Marks)**

- (a) Explain the following concepts on Object Oriented Programming. (5 marks)
- (i) Abstraction
  - (ii) Class
  - (iii) Inheritance
  - (iv) Polymorphism
  - (v) State
- (b) Write a program in C++ that accepts any integer, and determines whether its an odd or even number. (6 marks)
- (c) Write a C++ program using a **for loop** that can display the first ten positive integers and their calculated squares (5 marks)
- (d) Use examples to explain the following functions used in C++ for implementation of class operations. (9 marks)
- (i) Constructors
  - (ii) Destructors
  - (iii) Friend functions
- (e) Explain the types of inheritance (5 marks)

#### **Question 2: (20 Marks)**

A proposed system intends to store the student data (Student Number, Student Name and Phone Number) and also allow for the access of the same data. The data should be hidden and not prone to direct manipulation. The data can be read and written using methods.

Required:

- (a) Create a class called Student for the above scenario in C++, using the get and set methods, to allow for data access and modification. (13 marks)

- (b) Write a main function in the same C++ program to instantiate an object from the class Student, and allow for student data to be inputted through the keyboard and then display that student data. (7 marks)

**Question 3: (20 Marks)**

- (a) Create a class called Rectangle with data members: width, length and area. The class should have functions to allow for setting of both length and width, calculate the area, and retrieve the width, length and area. (13 marks)
- (b) Write a main function that declares an object from the class above, and use the methods in that class to input the length and width, calculate the area and, retrieve and display those values (width, length and area). (7 marks)

**Question 4: (20 Marks)**

- (a) Differentiate between the following terms: (6 marks)
- (i) Abstraction and Encapsulation
  - (ii) Function call and Message passing
  - (iii) Interface and implementation
- (b) Create a class called BankAccount consisting of data members: account number, account holder, and balance and methods for depositing and withdrawing. (No need to implement the methods) (5 marks)
- (c) Create two subclasses, Current Account and Deposit Account from the class Bank Account in (b) above. Current Account allows for calculation of overdraft and Deposit Account allows for calculation of interest. (6 marks)
- (d) Encapsulation defines the access levels for data elements of a class. Explain the three levels of access (3 marks)
- (i) Public:
  - (ii) Protected
  - (iii) Private