INSTITUTE OF COMPUTING AND INFORMATICS

Select department

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

ICS 2276: COMPUTER PROGRAMMING 2

END OF SEMESTER EXAMINATION

SERIES:APRIL2016

TIME:2HOURS

DATE:Pick DateMay2016

Instructions to Candidates
You should have the following for this examination
-*Answer Booklet, examination pass and student ID*
This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

Question ONE

a. The following program illustrates the working of Objects and Class in C++ Programming. Explain the program.   [10 marks]

```cpp
#include <iostream>
using namespace std;
class temp
{
  private:
    int data1;
    float data2;
  public:
    void int_data(int d){
      data1=d;
      cout<<"Number: "<<data1;
    }
    float float_data(){
      cout<<"\nEnter data: ";
      cin>>data2;
```

```cpp
        return data2;
      }
};
int main(){
    temp obj1, obj2;
    obj1.int_data (12);
    cout<<"You entered "<<obj2.float_data();
    return 0;
}
```

b. Define the following terms/phrases.   [10 marks]

   i.   Class member functions:

  ii.   Class access modifiers

 iii.   Constructor & destructor

 iv.   C++ friend functions

  v.   The this pointer in C++

c. Describe four storage classes used in C++ programming   [6 marks]

d. Write a C++ program that calculates the perimeter of a circle of radius 5.0 using defined statements
                                                                           [4 marks]

Question TWO

a. A Fibonacci Series is a series of number in which each number is the sum of preceding two numbers is known as Fibonacci series e.g:1, 1, 2, 3, 5, 8, 13, 21, and 34. Write a C++ program that prompts the user for a positive integer (Suppose n) and Fibonacci series is displayed up to nth term
                                                                           [5 marks]

b. Create a structure called student which contains student name, student number and marks as its data members. Write a C++ program that prompts the user for his name, his number and his marks for a course. The marks are then stored in a structure and displayed on the screen.
                                                                           [10 marks]

c. Write a C++ program that uses a for loop to output the following   [5 marks]

        1. value of a: 10
        2. value of a: 11
        3. value of a: 12
        4. value of a: 13

Question THREE

    a. State four benefits of Object Oriented Programming   [4 marks]

    b. Write a C++ program that uses a class called box with dimensions length, width and height. Show how the class can be implemented to calculate the volume of any box given the dimensions.   [8 marks]

    c. *The quadratic formula shown below can be used to get the roots of any quadratic equation in Mathematics.* Show how the formula can be implemented using a C++ program.   [8 marks]

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Question FOUR

a. The for loop has the following syntax; *for (initialization; condition; increase) statement;* Use five steps to explain how the loop works   [5 marks]

b. Describe using C++ code how the conditional ternary operator (?) works.   [5 marks]

c. Write a C++ program that calculates the factorial of any positive number   [10 marks]

Question FIVE

a. Define the term polymorphism in the context of object oriented programming.   [2 marks]
b. Differentiate using C++ code extracts an interface from an abstract class.   [5marks].
c. A student creates a class Polygon from which two other classes: Rectangle and Triangle are derived as shown in the figure below. Applying the principle of inheritance, write a C++ program that calculates the area of two objects: rectangle and triangle   [13m marks]