Faculty of Technology - University of Ruhuna

Bachelor of Engineering Technology Honours
Level 2 (Semester 1) End Examination, April 2021
Academic Year 2020/2021

Course unit: ENT2142 Object Oriented Programming (Theory)
Duration: 2 hours

Instructions to the candidates

- The medium of this examination is **English**.
- This is a **closed book** examination.
- This examination consists of **four (04)** questions that are given equal marks.
- Answer **all four (04) questions**.

01.

a) Write down **two** advantages of object-oriented programming.

(4 marks)

b) Define the meaning of **class and object** in object-oriented programming.

(4 marks)

c) Explain the difference between a **public** member and a **private** member of a class.

(2 marks)

d) Write down definitions of functions for a private member and a public member of a class named **worker** with the following specifications in C++.

i. **Specifications (attributes and functions) of private** member of class:

worker_no	integer
worker_name	array of characters of size 20
hours_worked	float
wage_rate	float (wage rate per hour)
total_wage	float
calculate_wage	A function to find total wage with float return type

ii. **Specifications (attributes and functions) of public** members of class worker

set_data	A function to accept values for worker_no, worker_name, hours_worked, wage_rate and invoke calculate_wage to calculate total_wage
get_data	A function to display all the data members on screen

You should provide definitions of functions.

(15 marks)

02.

a) Explain the **importance** of having a Database Management System (DBMS) for an organization.

(4 marks)

b) Assume that a database table named worker consists of WORKER_ID, FIRST_NAME, LAST_NAME, SALARY, JOINING_DATE, DEPARTMENT columns.

i. Write down a SQL query to **fetch** "FIRST_NAME" from the worker table.

ii. Write down a SQL query to **update** Sunil's salary as 50,000 LKR in the worker table.

(6 marks)

c) Explain the term **"constructors"** and **"destructors"** in Object Oriented Programming. Explain how constructors and destructors **differ** from a normal function.

(4 marks)

d) Write down the **three** main types of constructors.

(3 marks)

e) Write down the **output** of the program given in Code 01 given in page 03.

(8 marks)

```
#include <iostream>
#include <string>

using namespace std;

class Circle {
    private:
        float radius;
        string color;

    public:
        Circle(float r = 1.0, string c = "white") {
            radius = r;
            color = c;
        }

        Circle(Circle &circle1) {
            radius = circle1.radius;
            color = circle1.color;
        }

        float getRadius() {
            return radius;
        }

        string getColor() {
            return color;
        }

        double getArea() {
            return 3.14 * radius * radius;
        }
};


int main() {

    Circle c1(1.2, "blue");

    cout << "\nRadius=" << c1.getRadius() << "\nArea=" << c1.getArea() << "\nColor="
             << c1.getColor() << endl;

    Circle c2(3.4);

    cout << "\nRadius=" << c2.getRadius() << "\nArea=" << c2.getArea() << "\nColor="
             << c2.getColor() << endl;


    Circle c3;
    cout << "\nRadius=" << c3.getRadius() << "\nArea=" << c3.getArea() << "\nColor="
             << c3.getColor() << endl;

    Circle c4(c1);
    cout << "\nRadius=" << c4.getRadius() << "\nArea=" << c4.getArea() << "\nColor="
             << c4.getColor() << endl;

    return 0;
};
```

Code 01

03.

a) Explain why **static** data members are used in a class.

(3 marks)

b) Write down and explain **four** types of Inheritance using block diagrams.

(8 marks)

c) Write down **two** advantages of using Inheritance for programming.

(4 marks)

d) Answer the questions below based on the program in code 02.

i. Write down the **type of Inheritance** depicted by the given code 02.

ii. Write the names of **all the members** (data members and member functions) accessible from member functions of the class: school.

iii. Assume that the class **school** was derived privately from teacher and privately from student Name the **functions** that could be accessed through objects of class **school**.

(10 marks)

```
class teacher {
     char teacher_No[5], teacher_Name[20], Dept[10];
     int Workload;

protected:
     float Salary;

public:
     teacher();
     void teacher_Entry();
     void teacher_Display();
};

class student {
     char Admno[10], student_Name[20], Stream[10];

protected:
     int attendance, Totmarks;

public:
     student();
     void student_Entry();
     void student_Display();
};

class school :public student, public teacher {
     char school_Code[10], School_Name[20];

public:
     School();
     void School_Entry();
     void School_Display();
};
```

Code 02

04.

a) Briefly explain the term **Polymorphism** in object-oriented programming.

(4 marks)

b) Explain the main **two types** of polymorphism.

(4 marks)

c) Describe the functionality of '**operator** overloading'.

(2 marks)

d) Write down a C++ program segments to carryout the following.

i. Define a base class named **Shape** that has length, width, and radius as attributes.

ii. Define a child class called **Rectangle** to implement inheritance. Rectangle class has set_data, get_data, and print_area as member functions. (Hint: Length and width can be taken as input data members)

iii. Define a **friend function** "getcoordinates" to the class Rectangle, which will access & print values of private data members of the Rectangle class as output when called in main().

iv. Define an **overload '+' operator** for the Rectangle class and create an object name as rectangle_new with its length and width equal to the sum of first_rectange and first_rectange. At the end, create a new object named R3 and display the length, width, and area of a newly created object R3.

(15 marks)