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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Information and Communication Technology
First Year - Semester II Examination –September/ October 2020

ICT 1306 – OBJECT ORIENTED PROGRAMMING

Time: Three (03) hours

- This paper consists of **seven (07)** pages including this page.
- This paper consists of **Five (05)** questions. Answer ALL the questions.
- This examination accounts for 40% of the course assessment. The total maximum mark attainable is 100. The marks assigned for each question and section, thereof are indicated in brackets.
- This is a closed book examination.
- Mobile phones or any other communication devices are not permitted.

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1 a) **Explain the relationship between Class and Object.**

(03 marks)

b) Explain the concept of **Abstraction** with an example code.

(05 marks)

c) Explain the following terms.

- namespace
- std
- enum
- <<

(04 marks)

d) **Describe how** the types of operands in the following program changes with its execution.

```
#include <iostream>
 using namespace std;
int main() {
        int count = 7;
        float avgWeight = 155.5F;
        double totalWeight = count * avgWeight;
        cout << "totalWeight=" << totalWeight << endl;
        return 0;
}
```

(04 marks)

e) Describe the function of the Scope Resolution Operator.

(04 marks)

2. a) Explain the concept of **Inheritance** with an example code.

(05 marks)

b) Write down the syntactically correct output of the following program.

```
#include <iostream>
using namespace std;
int main() {
        int count = 10;
        cout << "count=" << count*++count << endl;   //displays 10
        cout << "count=" << ++count*count << endl;  //displays 11 (prefix)
        cout << "count=" << count << endl;   //displays 11
        cout << "count=" << count++*++count << endl;  //displays 11 (postfix)
        cout << "count=" << count << endl;   //displays 12 return 0;
}
```

(05 marks)

c)

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

class A{
   void say()
   {
      std::cout<<"say A"<<std::endl;
   }
};

class B{
    void say()
   {
      std::cout<<"say B"<<std::endl;
   }
};

class C: public A,B{
    public:
    void sayAll()
    {
       std::cout<<"say All"<<std::endl;
       }
};

int main()
{
  C c;
  c.sayAll();
  c.say();
}
```

Consider the above program, Will it compile and produce an output? If so, write down the syntactically correct output. If not, describe the reason/reasons for that.

(04 marks)

d) Describe the technical difference between structures and classes in C++.

(04 marks)

e) Describe the differences between **reference** and **pointer** in C++.

(02 marks)

3. a) Explain the concept of **Inheritance** with an example code.

(05 marks)

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b) Factorial of a positive integer is indicated by *n*! is the product of all positive integers less or equal to *n*.
n!= n x n-1 x n-2 x n-3x....3x 2 x 1.
For an example 5! = 5x4x3x2x1=120
Consider the incomplete program below. It takes an integer **val** as an input. Write code (in the place indicated by the comment //**body**) using a loop to find the factorial of **val** and print it.

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

int main()
{
   int val;
   std::cin>>val;

         //body

   }
}
```

(06 marks)

c) Consider the question **3 (b).** Write a program to take input integer and print the factorial of that input integer using recursion (function that calls itself).

(06 marks)

d) Briefly describe the concept of **const** objects in C++.

(03 marks)

4 a)

```
#include <iostream>
#include <string>
using namespace std;

class vehicle
{
      private:
      string name;
      float speed;

      public:
      void setName(string nm){name=nm;}
      string getName(){return name;}
      virtual void setSpeed(float spd)=0;
};
```

Is it possible to create objects of this **Vehicle** class? Explain your answer.

(02 marks)

b) Is it possible to create a pointer to the Vehicle class in question **4 a)**? Explain your answer.

(03 marks)

c) Considering the program given bellow, describe how dynamic binding happens.

```
#include <iostream>

class Base
{
  public:
  virtual void speak() { std::cout << "Base"; }
};

class Derived : public Base
{
  public:
  void speak() { std::cout << "Derived"; }
};

int main()
{
  Base *b;
  Derived d;
  b=&d;
  b->speak();
  return 0;
}
```

(05 marks)

d) Write the output of the program given in question **4 b)**.

(02 marks)

e) Explain the concept of **Polymorphism** using the program given in question **4 b)**.

(05 marks)

f) Describe the three (03) types of inheritance in C++.

(03 marks)

5 a)

```
#include <iostream>
using namespace std;

class Employee {
  protected:
    int age;
    string name;
    float salary;
public:
    void setAge(int w)  {
      age = w;   }
    void setName(string h)  {
      name = h; }
     void setSalary(float f)  {
      salary = f;  }
};

class VIPEmployee: public Employee {
  public:
    float getBonus() {
         return (salary*1.5); }
};
```

Considering the above **Employee** and **VIPEmployee** classes, draw the class diagram for them reflecting their relationship.

(06 marks)

b) Describe two (02) usages of design patterns.

(04 marks)

c) Describe the singleton pattern with an example code.

(04 marks)

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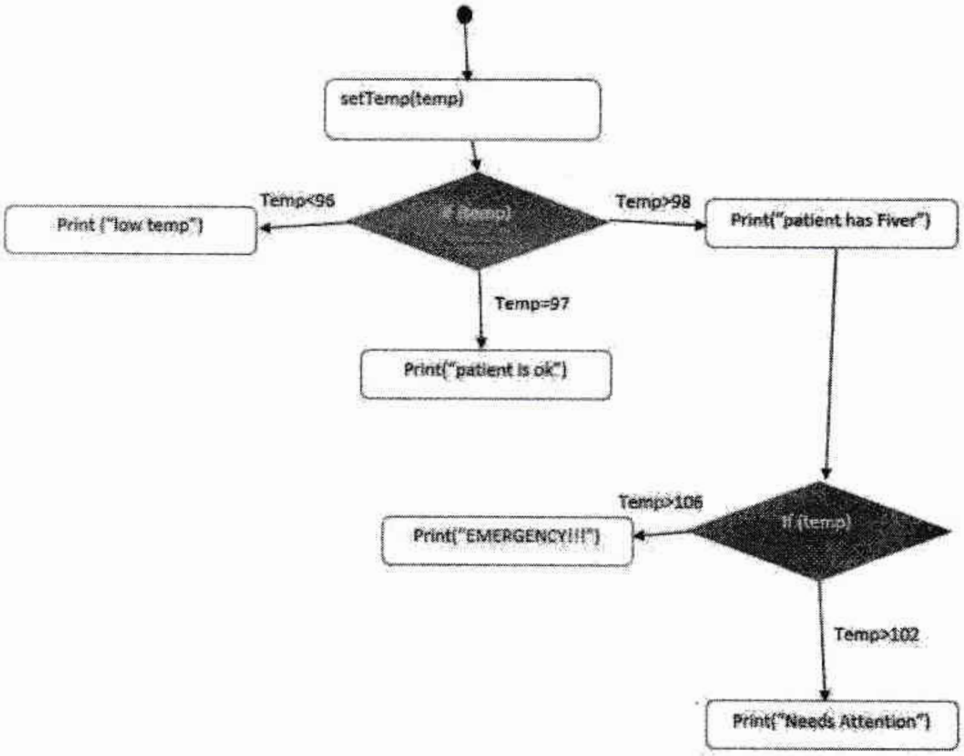
d) Following activity diagram describes the flow of a function called **setTemp**. Write the function according to the activity diagram.



(06 marks)

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