# EASTERN UNIVERSITY, SRILANKA
## DEPARTMENT OF MATHEMATICS

EXTERNAL DEGREE EXAMINATION IN SCIENCE - 2008/2009
SECOND YEAR, SECOND SEMESTER (Jan. /Apr., 2011)

EXTCS104 – Object Oriented Programming Techniques

**Answer all questions** **Time: 1 Hours**

1.

i. Explain the difference between a **public** member, a **private** member and a **protected** member of a class.

ii. What is inheritance? Explain any three advantages of inheritance.

iii. What is a virtual function? With an example explain the use of virtual function.

iv. Define a class to represent a financial accounting system in a bank. Objects implementing Account should satisfy the following conditions:

- If balance() is called returning $b_1$, and then deposit(d) is called returning c, and then balance() is called returning $b_2$, then: if c is true, then $b_2 = b_1+d$, otherwise $b_2 = b_1$.
- If balance() is called returning $b_1$, and then withdraw(d) is called returning c, and then balance() is called returning $b_2$, then: if c is true, then $b_2 = b_1 - d$, otherwise $b_2 = b_1$.
- deposit and withdraw must return false if called with non-positive arguments.

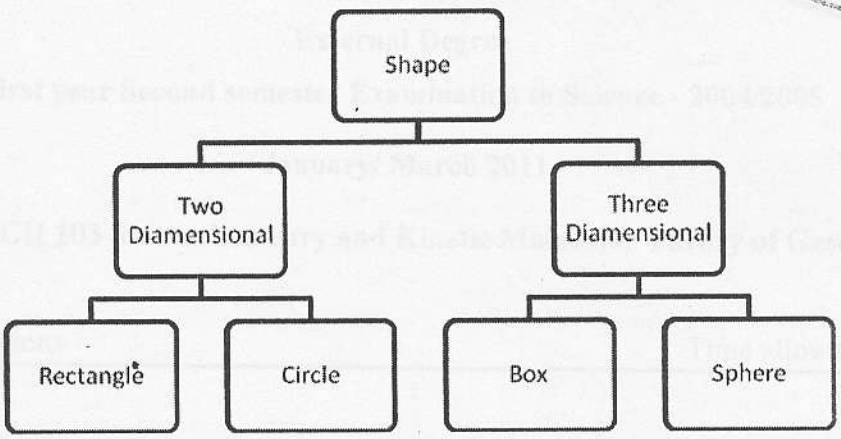
2.

i. Explain the difference between the following pair of terms:
   a. constructor and a destructor;
   b. default constructor and other constructors;
   c. copy constructor and the assignment operator.

ii. Write the output of the following program:

```
#include <iostream.h>
class CPolygon {
        protected:
                int width, height;
        public:
                void set_values (int a, int b)
                        { width=a; height=b; }
                virtual int area ()
                        { return (0); }
};
class CRectangle: public CPolygon {
        public:
                int area ()
                        { return (width * height); }
        };
class CTriangle: public CPolygon {
        public:
                int area ()
                        { return (width * height / 2); }
        };
void main () {
CRectangle rect;
CTriangle trgl;
CPolygon poly;
CPolygon * ppoly1 = &rect;
CPolygon * ppoly2 = &trgl;
CPolygon * ppoly3 = &poly;
ppoly1->set_values (4,5);
ppoly2->set_values (4,5);
ppoly3->set_values (4,5);
cout << ppoly1->area() << endl;
cout << ppoly2->area() << endl;
cout << ppoly3->area() << endl;
}
```

iii. Design and implement the following class hierarchy using C++ :




Your implementation should include the following:

The classes should have member variables;
The classes should have one constructor;
It should have a polymorphic function to print the details of shapes.