University of Technology
Computer Science Department
Examiner: Dr. Rehab F. Hassan

Subject: OOP
Class: Second
Time: 3 hours

Final Exam / First Trail / 2010 -2011

Notes: Answer only five questions, 10 marks for each question.

Q1. Answer five of the following:

a. Show the output of the following program:

```
#include<iostream>
class A{
public:
        int f()  {return 1;}
         int g() {return 2;}
};
class B: public A{
public:
        int f()  {return 3;}
        int g() {return 4;}
};
class C: public A{
public:
        int g() {return 5;}
};
int main(){
A a;
B b;
C c;
        cout<<a.f<<endl; cout<<a.g()<<endl;
        cout<<b.f() + b. g()<<endl,
        cout<<c. f()<<endl; cout<<c.g()<<endl;
return 0;
}
```

b. Write a template for the Binary search function then trace it for the following data:
A C E F H H J K M O Q R S U V W W X Z
Suppose that the item we are looking for is W.....

c. How can we initialize a constant member in a class? Give an example.

d. What are the main features of object oriented programming?

e. What is the difference if we overload an operator as a member or as a global (i.e., not member of the class)

f. Write a function that returns the first letter and last letter in a string.

Q2. Answer only one of the following branches:

a. Define an array of objects with initial values as given in the following table:

Student name	Age	Class	Degree average
Salem	**20**	**2**	**90.33**
Yasser	**19**	**2**	**82.49**
Mahmood	**22**	**2**	**71.98**

b. Declare a class named Triple with three private data members (floats) x, y, and z. Provide public functions for setting and getting values of all the Private data members. Define a constructor that initializes the values to user-specified values or, by default, sets the values all equal to 0. Also overload the following operators:

- Addition so that corresponding elements are added together
- Output so that it displays the Triple in the form "The triple is (x, y, z)".
- Assignment that copies x to z, y to x, and z to y.
- increment so that x and z are increased by one each.

Q3. Write class Point, where each point represented by two integer numbers (X, Y), with a suitable constructor and a function to print the point, then derive class circle, where each circle represented by the central point and radius, with a suitable constructor and a function to compute the area of the circle.

Q4. For class Binary, write a suitable constructor and two overloaded operator:

- >> That shifts right the binary number by a specific number of bits.
- << That shifts left the binary number by a specific number of bits.

Include the class in a test program.

Q5. How can we write a function to reverse the order of an array of integers or characters, give two solutions?

Q6. Define a class called Time. The time can be represented as two integers in 24-hour notation. Include the following functions in your class:

(1) Two overloaded functions to set the time, in 12-hour and 24-hour notations. For example, calling set (20, 30) will store the corresponding time 20:30; while calling set (8, 30, 'P') will convert from 12-hour to 24-hour notation and store the same time 20:30.

(2) Two overloaded functions to get the current time, in 12-hour and 24-hour notations. For example, if the current time is 14:25, then calling get(hr, min) will return two integers:14 and 25; while calling get(hr, min, am/pm) will convert from 24-hour to 12-hour notation and return two integers: 2, 25, and the A.M./P.M. information as a value of type char ('A' for A.M. and 'P' for P.M). Thus, this function will have a call-by-reference formal parameter of type char to record whether it is A.M. or P.M.

(3) Two overloaded functions to output the current time, in 12-hour and 24-hour notations. For example, if the current time is 23:15, then output () will show "23:15"; while output (HR12) will show "11:15PM". (HR12 is defined as a boolean constant with value of true.), Finally, includes the class in a test program.