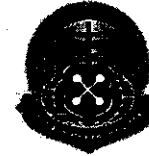


REGENT UNVIERSITY
COLLEGE OF SCIENCE AND TECHNOLOGY



EXAMINATION PAPER

END OF SEMESTER EXAMINATIONS,
JANUARY 2007

COURSE: SICS 151: PRINCIPLES OF PROGRAMMING
(C LANGUAGE)

TIME: TWO HOURS

LECTURER: Kenneth Azumah

ATTEMPT *FOUR* QUESTIONS

SECTION B

Question 2 [17 marks max]

The Airtime object has hour and minute properties. Two Airtime objects can be added together to obtain another Airtime object. If the sum of the minute properties of the two objects exceeds 60, the hour increases by 1. (eg. [5 hours, 57min] + [5hours, 10min] = [11 hours, 7min].) Consider the Airtime class below...

```
class Airtime{
public:
int hour;
int min;
Airtime(){
    hour=0;
    min=0;
}
Airtime(int x, int y){
    hour = x;
    min = y;
}
Airtime Add(Airtime airtime){
    Airtime c;
    c.hour = this->hour + airtime.hour;
    c.min = this->min + airtime.min;
    .
    .
    .
}
};
```

Use code listing above to answer to following questions:

(a) In the Airtime class above **two Airtime objects C and D** can be summed using the **Add** function in the class above thus:

```
Airtime Sum = C.Add(D);
```

Complete the **Add** function replacing the dots with the appropriate code that ensures that value of the **min** attribute does exceed 59.

[8 marks]

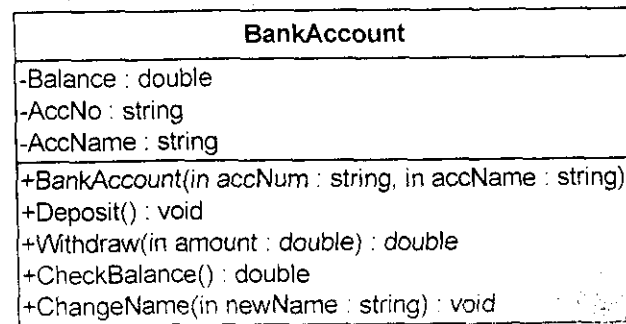
(b) Rewrite the **Add** function above by overloading the '+' operator to facilitate the summation of two airtime objects can thus:

```
Airtime Sum = C + D;
```

[9 marks]

Question 3 [17 marks]

Study carefully the following UML class diagram:



Represent the diagram fully in C++ code, implementing completely the attributes, constructor and member functions. The name of the member functions provides an idea of

what it does. Example: the **Deposit** and **Withdraw** functions increase and decrease the bank account balance (**Balance**) respectively. Add useful comments to your code.

Mark distribution :

- Member data declarations
[3 marks max]
- Constructor implementation
[4 marks max]
- Deposit & Withdraw** member function implementations
[6 marks max]
- CheckBalance & ChangeName** member function implementations
[4 marks max]

Question 4

[17 marks max.]

- a) Using **struct** data structure of C++, write a programme to add up two vectors **C** and **D** and print and print the result to the screen. You may assume your own integer values for x1, y1, ... z2.

$$\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} x1 \\ y1 \\ z1 \end{bmatrix} + \begin{bmatrix} x2 \\ y2 \\ z2 \end{bmatrix}, \quad C = \begin{bmatrix} x1 \\ y1 \\ z1 \end{bmatrix} \text{ and } D = \begin{bmatrix} x2 \\ y2 \\ z2 \end{bmatrix}$$

Hint: Create the structure and sum function outside the main and call them within the main. [8 marks]

- b) A programme is to be designed where any word entered is printed out in a reverse column format. Write out a C++ programme to demonstrate this mentioned functionality. Put comments in your code. An example input and output is as follows:

Enter your word: PROGRAMME

E
M
M
A
R
G
O
R
P

[9 marks]