



UNIVERSITY OF ENERGY AND NATURAL RESOURCES, SUNYANI, GHANA
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING

LEVEL 300 END OF FIRST SEMESTER EXAMINATIONS 2017/2018
Bachelor of Science (Computer Engineering)
CENG301: OBJECT ORIENTED PROGRAMMING

December, 2017

Time: 2 Hours

Instructions:

Answer all questions in Section A, and two (2) questions in Section B including QUESTION 1 in the answer booklet provided.

SECTION A

1 x 40 = 40 Marks

1. Which of the following is a mechanism by which object acquires the properties of another object?

- a) Encapsulation
- b) Abstraction
- c) Inheritance
- d) Polymorphism

2. What will be the output of following program?

```
#include<iostream.h>
void main()
{
float x;
x=(float)9/2;
cout<<x;
}
```

- a) 4.5
- b) 4.0
- c) 4
- d) 5

3. The term _____ means the ability to take many forms.

- a) Inheritance
- b) Polymorphism
- c) Member function
- d) Encapsulation

4. Access to private data

- a) Restricted to methods of the same class
- b) Restricted to methods of other classes
- c) Available to methods of the same class and other classes
- d) Not an issue because the program will not compile

5. A static data member is given a value

- a) Within the class definition
- b) Outside the class definition
- c) When the program is executed
- d) Never

6. What will be the result of the expression 13 & 25?

- a) 38
- b) 25
- c) 9
- d) 12

7. In a class specifier, data or function designated private are accessible

- a) To any function in the program
- b) Only if you the password
- c) To member functions of that class
- d) Only to public members of the class

8. Which of the statements are true ?

- I. Function overloading is done at compile time.
- II. Protected members are accessible to the member of derived class.
- III. A derived class inherits constructors and destructors.
- IV. A friend function can be called like a normal function.
- V. Nested class is a derived class.

- a) I, II, III
- b) II, III, V
- c) III, IV, V
- d) I, II, IV

25
25
50

9. At which point of time a variable comes into existence in memory is determined by its

- a) Scope
- b) Storage class
- c) Data type
- d) All of the above

10. When the compiler cannot differentiate between two overloaded constructors, they are called

- a) Overloaded
- b) Destructed
- c) Ambiguous
- d) Dubious

11. Which of the following is the valid class declaration header for the derived class d with base classes b1 and b2?

- a) class d : public b1, public b2
- b) class d : class b1, class b2
- c) class d : public b1, b2
- d) class d : b1, b2

12. Which of the following operator can be overloaded through friend function?

- a) \rightarrow
- b) $=$
- c) $()$
- d) $*$

13. The mechanism that binds code and data together and keeps them secure from outside world is known as

- a) Abstraction
- b) Inheritance
- c) Encapsulation
- d) Polymorphism

14. The operator $<<$ when overloaded in a class

- a) must be a member function
- b) must be a non member function
- c) can be both (A) & (B) above
- d) cannot be overloaded

15. To access the public function fbase() in the base class, a statement in a derived class function fder() uses the statement.fbase();

- a) fbase();
- b) fder();
- c) base::fbase();
- d) der::fder();

Fill in the spaces provided to make the statements valid

16. The ability or characteristics of an object to respond differently under different situation is known as

17. You can perform an iterative process by using the keyword

18. A location in the computer memory that enables us to temporary hold data when our program is executing is known as

19. The data type ideal for storing the value (\$120.89) in memory is the

20. Correcting errors in a computer program is typically known as

21. The type of error in a computer program that results in invalid results or answers generated by the computer is known as

22. The term refers to the process of converting a high level programming to an object codes or executable codes.

23. The function must be available in all C++ programs.

24. The keyword in a function that enables the function to send data or result back to the statement that called it is the.....

25. is a term used for a function defined inside a class.

27. is a concept of OOP which means exposing only necessary data.

29. is considered to be an instance of a class.
30. The concept means adding new components to a program as it runs.
31. Using the wardrobe structure within the ShopList structure is an example of a good programming principle, known as.....
32. A function that returns no values to the program that calls has return type.
33. The concept of wrapping up of data and functions together is known as.....
34. Initialization of an object is performed by a.....
35. A function that is called automatically each time an object is destroyed is a
36. Paying attention to the important properties while ignoring inessential details is known as.....
37. Which of the OOP characteristics provides a reuse mechanism?.....
38. The keyword used to define a structure is.....
39. A(n) is used to store the address of another variable.
40. To expose a data member to the program, you must declare the data member in the..... section of the class

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SECTION B

Answer QUESTION 1 and any other question

QUESTION 1

[3 Marks]

a) What is a Class?

b) A programmer designed a class called arith in order to use it to perform common arithmetic operation. The design is illustrated below

```
class arith{
public:
    double a,b;
public:
    arith(){a=0;b=0;}
    void setA(int x){a=x;}
    void setA(float x){a=x;}
    void setA(double x){a=x;}
    void setB(int y){b=y;}
    void setB(float y){b=y;}
    void setB(double y){b=y;}
    double add(){return a+b;}
    double div(){return a/b;}
    double mul(){return a*b;}
    double sub(){return a-b;}
};
```

```
#include <iostream>
using namespace std;
int class Multiply;
```

```
float Numbers[] = { 6, 8 }
```

public:

```
double a, b;
arith() { a = 6; b = 8; }
void set A(int x) { a = x; }
void set A(float x) { a = x; }
void set A(double x) { a = x; }
void set B(int x) { b = x; }
void set B(float x) { b = x; }
void set B(double x) { b = x; }
```

O. APIIAH

*translator
instructor.
declaration definition.*

Implement a derived class called calculator that inherits from the arith class as the base class. Your new derived class must have the following

- Override the variable a and b in the base. Let the data type be string [2 Marks]
- Write a method that will override the "add" method in the base class to perform concatenation of two string values that is passed to the function. [5 Marks]
- Implement an overloading of add in the derive class to perform any task of your choice. [5 Marks]
- Implement a method called "Square" in the derived class that returns the square of a given number [5 marks]

v. Write a program that uses your derived class "calculator" to perform the basic arithmetic operations. Your program must request for a number representing the type of operations to be perform and data from the user. Fig 1.0 illustrates the screen to be displayed as a menu for operation. Type the option number of a menu, press enter, and supply the two values to perform task. Use "switch - case" structure or syntax to implement your menu selection. [15]

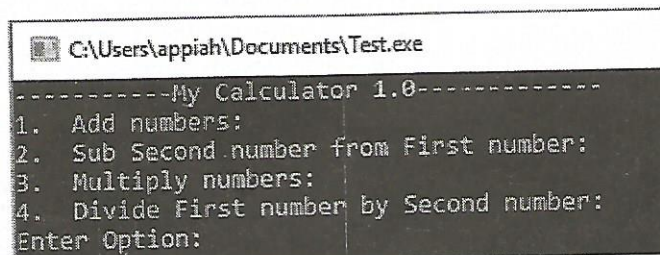


Fig 1.0

c) An array is declared as float Amount[11]. The figure below illustrates the content of the array.

50.0	10.5	15.0	11.0	2.5	3.0	8.9	1.1	1.1	10.0	10.0
------	------	------	------	-----	-----	-----	-----	-----	------	------

```
#include <iostream>
using namespace std;
int main(){
    float Amount[]={50.0, 10.5, 15.0, 11.0, 2.5, 3.0, 8.9, 1.1, 1.1, 10.0, 10.0};
    float D=0;
    string txtMsg = "";
    int I, J, K, L;
    J = -2;
    K = 10;
    L = 0;
    for(I=K; I>=L; I=I+J){
        //txtMsg = txtMsg + (Amount[I]);
        D=D+Amount[I];
    }
    cout<<D;
    return 0;
}
```

- Determine the content of txtMsg after the execution of the above codes [3 Marks]
- What will be displayed after the line cout<<D; has been executed [3 Marks]
- Replace the for loop in the above codes to while codes [4 marks]

QUESTION 2

Design and implement a function called "multiply" in C++ that accept two numbers and returns either the arithmetic multiplication or repetition of a given string a specific number of times depending on the data types of the argument values. The overloading must be done in the following ways

If both arguments are float data types, the function returns arithmetic multiplication [3 Marks]

If the first value is a string and the second is numeric, the function repeats the string value the number of times that of the numeric value [6 Marks]

Define the following:

i. Overloading [3 Marks]

ii. Operator Overloading [3 Marks]

QUESTION 3

a) Explain the term polymorphism using the operator + for illustration [5 Marks]

b)

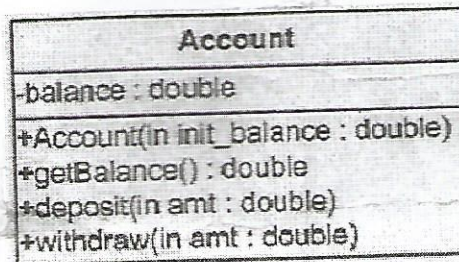


Fig 1.0

Create a class Account that implements the UML diagram given in Fig 1.0 above.

i) Declare one private attribute: balance; this attribute holds the current (or "running") balance of the bank account. [2 Mark]

ii) Declare a public constructor that takes one parameter (init_balance) that populates the balance attribute. [3 Marks]

iii) Declare a public method getBalance that retrieves the current balance. [1 Mark]

iv) Declare a public method deposit that adds the amount parameter to the current balance. [2 Mark]

v) Declare a public method withdraw that removes the amount parameter from the current balance. [2 Mark]