
OBJECT ORIENTED PROGRAMMING
IN
C++

ASSIGNMENT (OLD QUESTION AND IMPORTANT QUESTIONS
COLLECTIONS) BE SECOND SEMESTER

COMPILED BY

ER. RUDRA NEPAL

*Nepal College Of Information Technology
Lalitpur, Nepal*

\mathcal{PL}

2023

SUBMISSION BEFORE FINAL EXAM

ASSIGNMENT 1ST

- 1) What is object orientation? Explain the difference between structured and Object oriented Programming approach.[PU:2006 spring]**
- 2) Why OOP is known as a new paradigm? Illustrate with certain examples. [PU:2005 fall]**
- 3) What is class? Explain the different types of classes.[PU:2005 fall]**
- 4) Describe Object Oriented Programming as a new paradigm in Computer programming field.[PU:2015 Spring]**
- 5) What makes OOP a new paradigm? Explain your answer with suitable points. [PU:2010 fall]**
- 6) What influence is an object oriented approach said to have on software system design? What is your own opinion ?Justify through example.[PU:2009 fall]**
- 7) Explain the advantages of object oriented paradigm.**
- 8) What are the Critical issues that are to be considered while designing the large Programming?Why? [PU:2009 spring]**
- 9) Why Object oriented Programming is Superior than Procedural-Oriented Programming. Explain.[PU:2016 fall]**
- 10) What are the main features of Object Oriented Programming . [PU:2013 fall]**
- 11) What are the mechanism of data abstraction? Explain the difference between structured and Object Oriented Programming Approach?[PU:2013 fall]**
- 12) What is the significance of forming abstractions while designing an object oriented system? In case of object oriented Programming, Explain how do we have view that computation is simulation? [PU:2013 spring]**
- 13) What makes OOP better than POP. Explain with features of OOP. [PU:2014 fall]**
- 14) With the help of object oriented Programming, explain how can object oriented Programming cope in solving complex problem. Explain computation as simulation. [PU: 2014 spring][PU: 2018 fall]**
- 15) How does making use of abstraction help in designing of an object oriented System. Explain with an example.[PU:2015 fall]**
- 16) What is the use of abstraction mechanism in C++?Explain with example.[PU: 2019 fall]**
- 17) Describe how object oriented Programming models the real word object problem with reference of agents , method, behavior and responsibilities.[PU:2017 fall]**
- 18) What are the shortcoming of procedural Programming? Explain the notation of “Everything is an object” in an object oriented programming. [PU:2017 spring]**

19) Explain the encapsulation and data abstraction.

20) Write a short notes on:

Abstraction [PU:2006 spring]

Non-linear behavior of Complexity [PU :2014 fall] [PU:2015 spring] [PU:2009 spring]

ASSIGNMENT 2ND

1) Declare a C++ structure (Program) to contain the following piece of information about cars on a used car lot: [PU:2013 spring]

i. Manufacturer of the car

ii. Model name of the car

iii. The asking price for the car

iv. The number of miles on odometer

2) Differentiate between class and structure. Explain them with example.[PU:2010 spring]

3) What sorts of shortcomings of structure are addressed by classes? Explain giving appropriate example.[PU:2014 fall]

4) Differentiate between structure and class. Why Class is preferred over structure?

Support your answer with suitable examples.[PU:2016 fall]

5) Explain the various access specifiers used in C++ with an example.

[PU:2010 fall][PU:2016 spring]

6) What is information hiding? What are the access mode available in C++ to implement different levels of visibility? Explain through example.[PU:2014 spring][PU:2016 fall]

7) What is data hiding? How do you achieve data hiding in C++? Explain with suitable program.[PU:2019 fall]

8) What is encapsulation? How can encapsulation enforced in C++? Explain with suitable example code. [PU:2017 spring]

9) What are the common typed of function available in C++? Define the 3 common types of functions in C++ with a program. [PU:2015 spring]

10) What is a function? Discuss the use of friend function taking into consideration the concept of data hiding in object oriented programming.[PU:2009 spring]

11) Does friend function violate the data hiding? Explain briefly.[PU:2017 fall]

12) “Friend function breaches the encapsulation.” Justify. Also mention the use of friend function. [PU:2015 spring]

13) Where do you use friend function? [PU:2014 spring]

14) What are the merits and demerits of friend function? [PU:2009 fall]

- 15) Private data and function of a class cannot be accessed from outside function. Explain how is it possible to access them with reference of an example. [PU:2018 fall]
- 16) What are the advantages of using friend function? List different types of classes and explain any two. [PU:2010 spring]
- 17) What are the advantages and disadvantages of using friend function? Explain with example program.[PU:2018 fall]
- 18) What is inline function? Explain its importance with the help of example program. [PU:2015 fall]
- 19) What is the role of static data in C++ classes? Give example.[PU:2006 spring]
- 20) What do you mean by static member of a class ?Explain the characteristic of static data member.[PU:2013 fall][PU:2017 fall]
- 21) When and how do we make use of static data members of a class? Differentiate between virtual functions, friend functions and static member functions.[PU:2013 spring]
- 22) What are the static data member and static member functions? Show their significance giving examples.[PU:2014 fall]
- 23) Write short notes on:
- Friend function[PU:2006 spring][PU:2013 spring] [PU:2017 spring][PU:2005 fall]
 - Inline function[PU:2009 fall][PU:2010 spring][PU:2013 spring]
 - Reference variable
 - Default argument

ASSIGNMENT 3RD

1. Declare a C++ structure (Program) to contain the following piece of information about cars on used car lot. [PU:2013 spring]
- Manufacturer of the car
 - Model name of the car
 - The asking price of car
 - The number of miles on odometer
2. Create a class called Employee with three data members (empno , name, address), a function called readdata() to take in the details of the employee from the user, and a function called displaydata() to display the details of the employee. In main, create two objects of the class Employee and for each object call the readdata() and the displaydata() functions. [PU:2005 fall]

3. Create a class called student with three data members (stdnt_name[20],faculty[20],roll_no), a function called readdata() to take the details of the students from the user and a function called displaydata() to display the details the of the students. In main, create two objects of the class student and for each object call both of the functions. [PU:2010 fall]
4. Modify the Que.no 2 for 20 students using array of object.
5. WAP to perform the addition of time in hours, minutes and seconds format.
6. WAP to perform the addition of time using the concept of returning object as argument.
7. WAP to create two distance objects with data members feet, inches and a function call by one object passing second object as function argument and return third object adding two objects. Hint:d3=d1.adddistance(d2);
8. Create a class called Rational having data members nume and deno and using friend function find which one is greater.
9. WAP to add the private data of three different classes using friend function.
10. Write a program to find the largest of four integers .your program should have three classes and each classes have one integer number.[PU:2014 spring]
11. WAP to swap the contents of two variables of 2 different classes using friend function.
12. WAP to add two complex numbers of two different classes using friend function.
13. WAP to add complex numbers of two different classes using friend class.
14. Using class write a program that receives inputs principle amount, time and rate. Keeping rate 8% as the default argument, calculate simple interest for three customers.[PU:2019 fall]
15. Create a new class named City that will have two member variables CityName (char[20]),and DistFromKtm (float).Add member functions to set and retrieve the CityName andDistanceFromKtm separately. Add new member function AddDistance that takes two arguments of class City and returns the sum of DistFromKtm of two arguments. In the main function, Initialize three city objects .Set the first and second City to be pokhara and Dhangadi. Display the sum ofDistFromKtm of Pokhara and Dhangadi calling AddDistance function of third City object. [PU: 2010 Spring]
16. Create a class called Volume that uses three Variables (length, width, height) of type distance (feet and inches) to model the volume of a room. Read the three dimensions of the room and calculate the volume it represent, and print out the result .The volume should be in (feet3) form ie. you will have to convert each dimension into the feet and fraction of foot. For instance , the length 12 feet 6 inches will be 12.5 ft)

[PU: 2009 spring]

17. WAP to read two complex numbers and a function that calls by passing references of two objects rather than values of objects and add into third object and returns that object.

ASSIGNMENT 4TH

- 1) What is message passing? Describe with example.[PU:2014 fall]**
- 2) What is the difference between message passing and function call? Explain the basic message formalization. [PU:2006 spring]**
- 3) Differentiate message passing and procedure call with suitable example. What are the possible memory errors in programming.[PU:2014 spring]**
- 4) Explain the following term with suitable examples. Agents ,Responsibility, Messages and methods.[PU:2009 fall]**
- 5) Explain message passing formalism with syntax in C++.What is stack Vs heap memory allocation? [PU:2016 spring]**
- 6) What does constructor mean? Explain different types of constructor with suitable examples. [PU:2005 fall]**
- 7) What is constructor? Explain copy constructor with suitable examples.[PU:2009 fall]**
- 8) What is constructor? Write an example of Copy constructor and explain each line of code. [PU:2017 spring]**
- 9) “A constructor is a special member function that automatically initializes the objects of its class”, support this statement with a program of all types of constructors. Also enlist the characters of constructors. [PU:2015 spring]**
- 10) What is constructor? Is it mandatory to use constructor in class. Explain [PU:2006 spring]**
- 11) Differentiate between constructor and destructor. Can there be more than one destructor in a program for destroying a same object. Illustrate you answer.[PU:2010 fall]**
- 12) What are constructors and destructors? Explain their types and uses with good illustrative example? What difference would be experienced if the features of constructors and destructors were not available in C++. [PU:2009 spring]**
- 13) What is de-structor? can you have two destructors in a class? Give example to support your reason.[PU:2014 spring]**
- 14) Discuss the various situations when a Copy constructor is automatically invoked. How a default constructor can be equivalent to a constructor having default**

arguments. [PU:2013 spring]

15) Can we have more than one destructor in a class? Write a Program to add two complex numbers using the concept of constructor. [PU:2015 spring]

16) What do you mean by dynamic constructor? Explain its application by a program to compute complex numbers. [PU:2016 fall]

17) Differentiate methods of argument passing in constructor and destructor.[PU:2017 fall]

18) Why destructor function is required in class? Can a destructor accept arguments? [PU:2017 spring]

19) What is constructor? Can constructor can be overloaded? If yes how that is possible with reference of an example? [PU:2018-fall][PU:2017 fall]

20) Discuss about stack vs heap storage allocation. [2010 spring]

21) What do you mean by stack vs Heap? Explain the memory recovery. Explain the use of new and delete operator. [PU:2009 spring]

22) Explain and contrast memory recovery, stack and heap with suitable example.[PU:2013 fall]

23) What are the advantages of dynamic memory allocation? Explain with suitable example. [PU:2016 spring]

24) What is memory recovery? How does stack differ from heap memory allocation. [PU:2005 fall]

25) Write a short notes on:

Copy constructor[PU:2014 spring]

Stack vs Heap based Allocation

Memory Recovery[PU:2015 spring]

ASSIGNMENT 5TH

1. "Inheritance allows us to create a hierarchy of classes. Justify this statement. Discuss private and public inheritance.[PU:2016 spring]

2. How does visibility mode control the access of members in the derived class? Explain with an example.[PU 2017 spring]

3. Explain hybrid inheritance with example.[2009 spring]

4. What is hybrid Inheritance. Explain any three pros and three cons of inheritance. [PU: 2010 fall]

5. How inheritance support reusability features of OOP? Explain with example.[PU:2010 spring]

6. When base class and derived class have the same function name what happens when

derived class object calls the function?[PU 2017 fall]

7. Explain how inheritance support Reusability? Describe the syntax of multiple and multilevel inheritance?[PU:2015 fall]

8. Inheritance supports characteristic of OOP. Justify your answer. Explain ambiguity that occurs in multiple inheritance.[PU:2017 spring]

9. “Ambiguity is essential evil” ,Explain by example how it can effectively solve in complex programming?[PU: 2015 spring]

10. Explain why multiple inheritance is dangerous?

11. During the time of hybrid inheritance when there is hierarchical inheritance at the upper level and multiple inheritance at lower level, ambiguity occurs due to the duplication of data from multiple path at the grand child class. How this kind of ambiguity is resolved? Explain with suitable example?

12. Does ambiguity occurs in hybrid inheritance? If yes, how can you remove this? Explain with an example.[PU 2018 fall]

13. Under what condition virtual base class is created? Explain with suitable example.[PU:2017 fall,2019 fall,2014 fall]

14. How are arguments are sent to base constructors in multiple inheritance ?Who is responsibility of it.[PU:2013 spring]

15. How does inheritance influence working of constructors and destructors? Class ‘Y’ has been derived from class ‘X’ .The class ‘Y’ does not contain any data members of its own. Does the class ‘Y’ require constructors? If yes why.[PU:2013 spring]

16. What is containership? How does it differ from inheritance, describe how an object of a class that contain object of another classes are created.[PU:2013 fall]

17. How composition differs from inheritance?

18. Explain how composition provide reusability?[PU:2018 fall]

19. Compare and contrast composition and inheritance?[PU:2015 fall]

20. Distinguish between subclass and subtype in light of principle of substitutability. Support your answer with suitable example.[PU:2006 spring,2016 spring]

21. Differentiate between

1. subclass and subtype.

2. Is a rule and has a rule

22. State principle of substitutability .Explain sub-classing for specialization, generalization. List out disadvantages of inheritance.[PU:2016 fall]

23. What is inheritance? What are the different forms of inheritance?

[PU: 2016 spring,PU:2015 spring]

24. Differentiate between is a rule and has a rule with suitable example.

[PU:2015 fall,2014 spring]

25. Write a short notes on:

Containership[PU:2010 fall]

Subclass-subtype

Software reusability[PU:2005 fall]

Is a rule and has a rule[PU:2009 fall,2016 fall, 2016 spring,2015 spring]

Hybrid inheritance[PU:2006 spring]

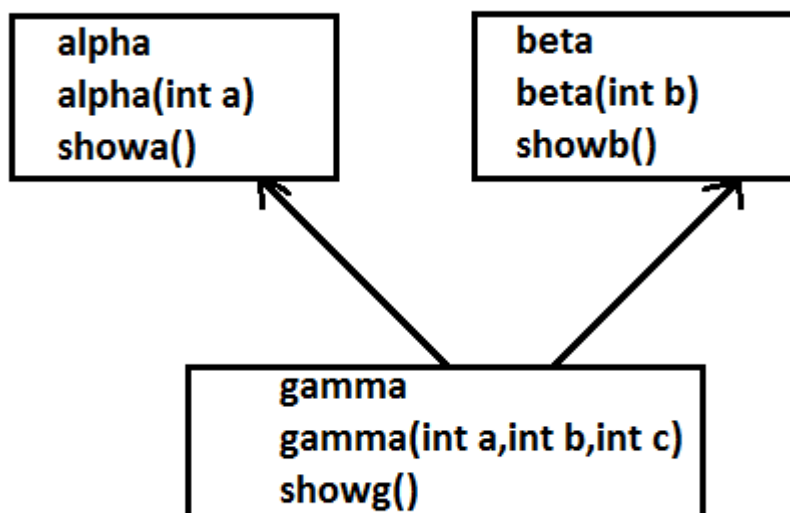
Inheritance and substitutability

Generalization[PU:2013 spring]

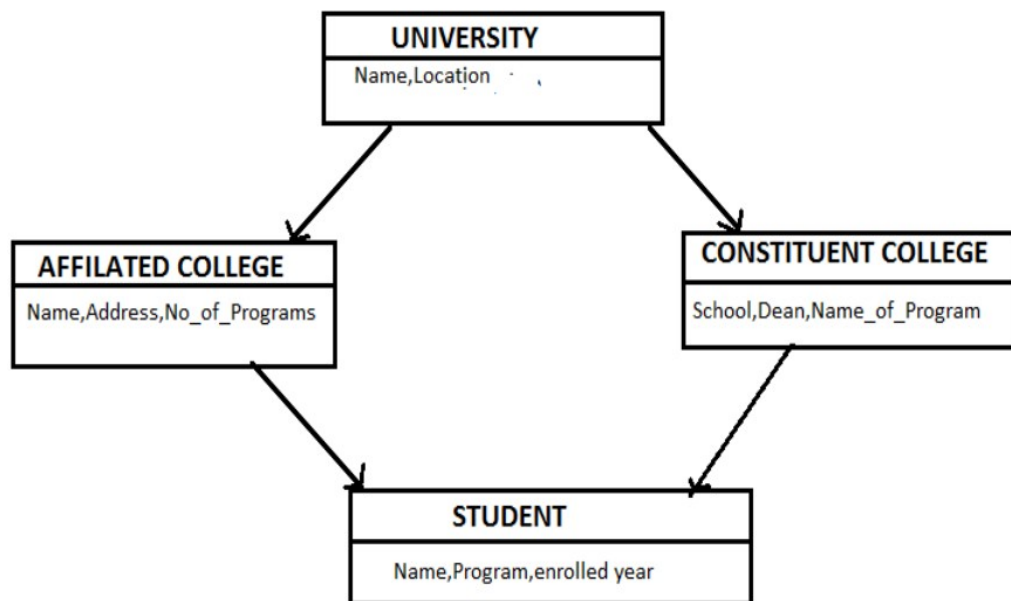
ASSIGNMENT 6TH

1) WAP to enter information of n students and then display is using the concept multiple inheritance,[PU: 2015 fall]

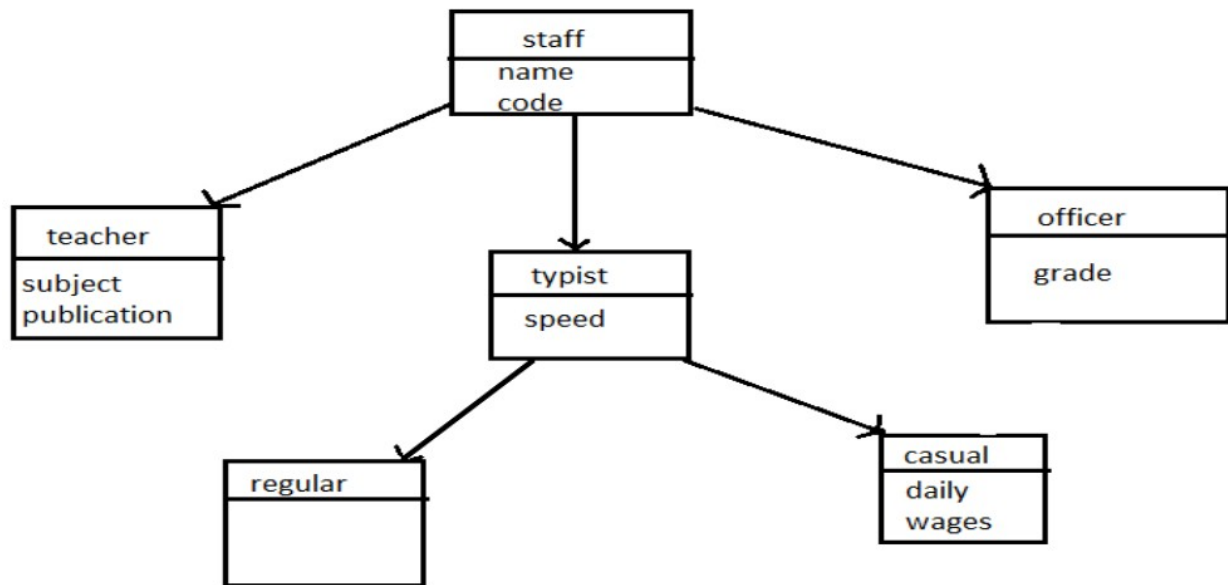
2) Write a complete program with reference to the given figure.



3) The following figure shows the minimum information required for each class. Write a program by realizing the necessary member functions to read and display information of individual object. Every class should contain at least one constructor and should be inherited from other classes as well.[PU:2019 fall]

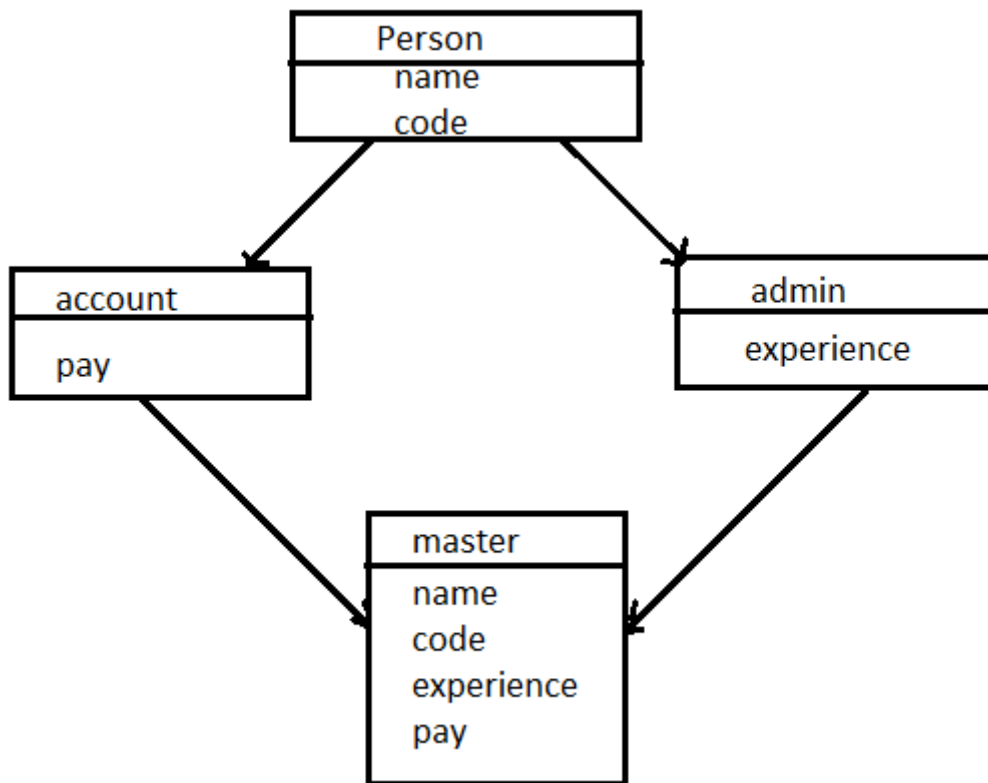


4) An educational institution wishes to maintain a database of its employees. The database is divided into a number of classes whose hierarchical relationship are shown below. The figure also shows minimum information requires for each class. Specify all the classes and define functions to create database and retrieve individual information when required.



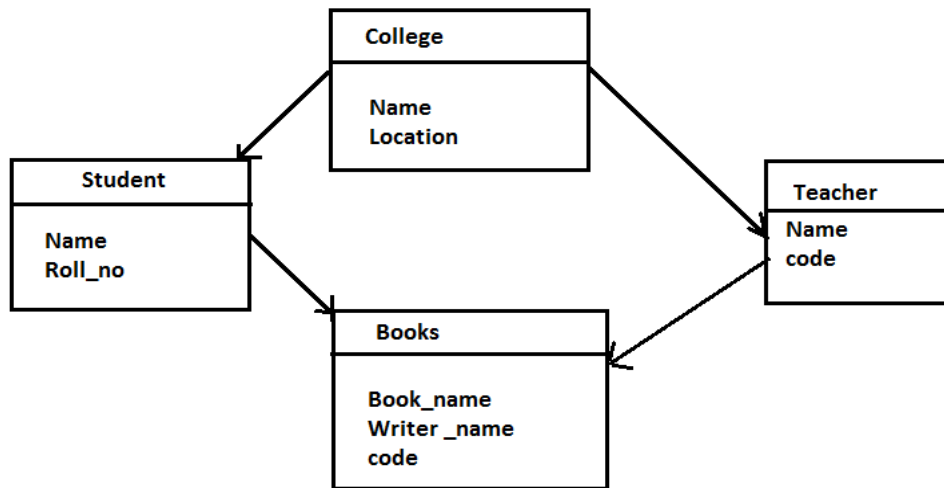
5) The following figure shows minimum information required for each class.

I) Write a Program to realize the above program with necessary member functions to create the database and retrieve individual information

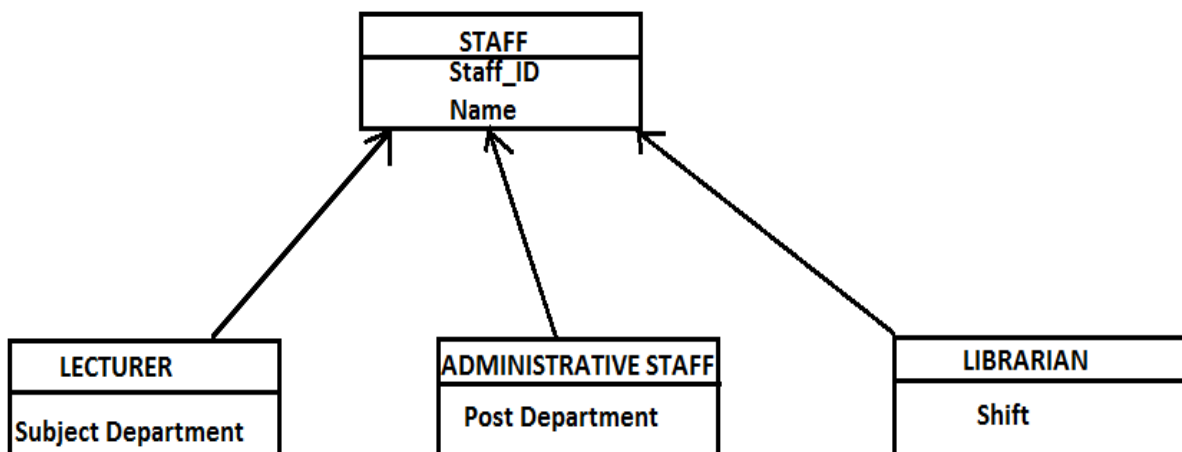


ii) Rewrite the above program using constructor on each class to initialize the data members.

7) The following figure shows the minimum information required for each class. Write a program to realize the above program with necessary member functions to create the database and retrieve individual information .Every class should contain at least one constructor and should be inherited to other classes as well.[PU:2010 spring][PU 2009 fall]



8) Develop a complete program for an institution, which wishes to maintain a database of its staff. The database is divided into number of classes whose hierarchical relationship is shown in the following diagram. specify all classes and define constructors and functions to create database and retrieve the individual information as per requirements.



ASSIGNMENT 6TH

- 1) What is polymorphism? Differentiate between compile time and runtime polymorphism with program in each.
- 2) How can polymorphism be achieved during compile time and during runtime? Explain with examples in C++.[PU:2013 spring]
- 3) What are the advantages of using runtime polymorphism over compile time polymorphism. How does overloading differ from overriding. Explain. [PU:2014 spring]
- 4) Explain importance of polymorphism with a suitable example.[PU:2009 fall]

- 5) What is the difference between static binding and runtime binding? Explain with suitable code.[PU:2013 fall]
- 6) How can you use operator overloading in C++? Give syntax
- 7) What do you mean by operator overloading? How do you overload the + operator in main program (c3=c1+c2).so that c3 can store a complex number obtained by adding c2 and c2.[PU: 2006 spring]
- 8) What is polymorphism? How operator overloading is used to support polymorphism. Explain it by overloading '+' operator to concatenate two strings.[PU:2017 fall]
- 9) What is type casting?[PU:2018 fall]
- 10) Define type conversion .Explain with example conversion from one class type to another class type.[PU:2016 fall]
- 11) Can you derive a pointer from base class? Explain with suitable example.[PU:2014 spring]
- 12) How does polymorphism play constructive role in application development? Which type of polymorphism is essential for the computation of distance among two cities from the specific location. The unit of measurements are feet and inch.(Also use standard unit if essential) [PU:2015 spring]
- 13) What is pure virtual function? What is the difference between compile time and runtime polymorphism? Which is best and why?
- 14) What is virtual function? When do we make a function virtual and when we make function pure virtual ? Explain with suitable example.[PU:2010 spring]
- 15) What is compile time and runtime polymorphism? How can you achieve runtime polymorphism in C++?Explain deferred methods.
- 16) When do you use virtual function? How does it provides runtime polymorphism. Explain with suitable example.[PU:2016 fall]
- 17) Discuss the role of virtual function in c++ to cause dynamic polymorphism. Show with example the how it is different from the compile time polymorphism.[PU:2006 spring]
- 18) What is virtual function? When do we make a function virtual? Explain with suitable example.[PU: 2014 spring]
- 19) How can you define pure virtual function in C++? The pure virtual function do nothing but it is defined in base class why?[PU:2015 spring]
- 20) What is an abstract class? How does it differ from virtual base class? Explain .[PU:2006 spring]
- 21) When base class and derived class have same function name ,what happens when the

derived class object class the functions? Differentiate overloading and overriding.[PU:2017 fall]

22) Describe overriding. How do you differentiate function overloading from function overriding. Explain with suitable example.[PU:2016 spring]

23) Why is 'this' Pointer is widely used than object pointer? Write a program to implement pure polymorphism.[PU:2019 fall]

24) Define role of this pointer and pure abstract class in object oriented programming to create multiple object with suitable program.[PU:2015 spring]

Write a short notes on:

Virtual function vs friend function[PU:2016 spring]

Virtual function vs pure virtual function[PU:2016 spring]

Deferred methods[PU:2006 spring]

Virtual functions[2015 fall]

Operator overloading [PU:2016 fall]

Pure polymorphism[Pu: 2017 spring]

Overriding [PU:2018 fall]

Virtual Destructor[PU:2013 fall]

ASSIGNMENT 7TH

1. Write a program to generate Fibonacci series using operator overloading of ++ operator. Which type of overloading is it.[PU:2009 fall]

2. Write a program to add two complex number using operator overloading.
[PU:2010 spring]

3. Write a program to add two complex number using binary operator overloading.[PU:2013 fall]

4. Write a program with class fibo to realize the following code snippet.

```
fibo f=1;
for (i=1;i<=10;i++)
{
  ++f;
  f.display();
}
```

[Hint: overload ++ operator and conversion technique.] [PU: 2014 fall]

5. Design a soccer player class that includes three integer fields: a player's jersey number, number of goals, number of assists and necessary constructors to initialize the

data members.Overload the > operator (Greater than) .One player is considered greater than another if the sum of goals plus assists is greater than that of others.Create an array of 11 soccer players,then use the overloaded > operator to find the greater total of goal plus assists.[PU:2015 fall]

6. Write a simple program to overload unary ++ operator.[PU: 2016 spring]

7. Make a class called memory with member data to represent bytes, kilobytes and megabytes.Read the value of memory in bytes from the user as basic types and display the result in user defined memory type. Like for m (basic type) = 108766, your program should display as: 1 megabyte 38 kilobytes 177 bytes. [Hint: Use basic to user defined data conversion method.

8. Write a program that converts object that represents 24 hrs times to 12 hrs times and vice versa.

9. Write a program to create a class age with attributes YY, MM, DD and convert the object of class age to basic data type int days.

10. Write a program finding area of square ,rectangle, triangle. Use function overloading technique.

11. Write a program to implement vector addition using operator overloading

i.Using Friend Function

ii. Without using Friend Function(using member function)

12. A bookshop sells both books and video tapes. Create an abstract class known as media that stores the title and price of a publication. Create two child classes one for storing the number of pages in a book and another for storing the playing time of a tape. A function display is used in all the classes to display the class contents.

Create necessary constructors in the child classes to store the information. In the main display the information regarding the book and tape using the base pointer (an object pointer of the class media).

13. Create a base class student. Use the class to store name, dob, rollno and includes the member function getdata(),discount().Derive two classes PG and UG from student. make dispresult() as virtual function in the derived class to suit the requirement.

14. Define two class names ‘Polar’ and ‘Rectangle’ to represent points in polar and Rectangle systems. Use conversion Routines to convert from one system to another system.

15. Write a complete program to convert the polar coordinates into rectangular coordinates.

16. (hint: polar-coordinates(radius,angle) and rectangular co-ordinates (x,y) where $x=r*\cos(\text{angle})$ and $y=r*\sin(\text{angle})$)
17. Write a program to read a height of person in feet and inches and convert it into meter using user defined to class type conversion method. 1 meter=3.28084 feet, 1 foot=12 inch[PU:2018 fall]
18. Define two classes named 'Polar' and 'Rectangle' to represent points in polar and rectangle systems. Use conversion routines to convert from one system to another system.[PU:2005 fall]
19. Create a class Rectangle with xco and yco as data members and use appropriate function to initialize then and display them. Now create another class polar with radius and angle as data members and member functions to initialize them and display the data. Now use conversion function in source class to convert rectangular object to polar object and vice-versa.
20. Create a abstract class shape with two members base and height, a member function for initialization and a pure virtual function to compute area(). Derive two specific classes ,Triangle and Rectangle which override the function area ().use these classes in main function and display the area of triangle and rectangle.[PU:2009 spring]

ASSIGNMENT 8TH

- 1) What is generic programming? How would you convert rectangular classes into templates.[PU:2006 spring]
- 2) What do you mean by generic programming? Illustrate with the example of function template.[PU:2015 spring]
- 3) What are the advantages of Generic programming? Explain with suitable example.
- 4) What is function template?
- 5) What is template? List merit and demerit of using template in C++.
- 6) What is generic and templates. [PU:2016 spring]
- 7) What is template ?List the merit and demerit of using a template in C++.[PU:2013 fall]
- 8) What is template ?Explain different types of template used in C++.[PU:2014 spring]
- 9) What are the advantages of using template functions. Write a program to illustrate a template function with two arguments.[PU:2017 fall]
- 10) With an example explain the concept of generic programming.
- 11) What is exception handling? Discuss briefly.[PU:2005 fall]
- 12) What is exception? Explain the method of exception handling in C++?

- 13) What is exception? Define the type of exceptions. Explain about Exception handling mechanism in C++.[PU:2013 spring]
- 14) What is exception? What is the syntax for exception handling in C++.Write a program that catches multiple exceptions.[PU:2016 spring]
- 15) Write a short notes on:
- Templates[PU:2010 fall]
 - Container classes[PU:2005 fall]
 - Exception handling[PU:2009 spring][PU:2014 spring][PU:2014 fall] [2018 fall]
 - Exception mechanism[PU:2017 spring]
 - Standard Template Library(STL)

Programs

1. Write a program using template to add two integers, two floats and one integer and one float numbers respectively. Display the final result in float.[PU:2005 fall]
2. Write a function template to calculate the sum and average of numbers.[PU:2009 fall]
3. Create a template function to swap two values.[PU:2018 fall]
4. Write a function template to calculate the average and multiplication of numbers.
5. Create a templates to find the sum of two integers and floats.[PU:2014 fall] .[PU:2016 spring] .[PU:2017 spring]
6. Create a template class stack to show push and pop operation on stack.[PU:2010 spring]
7. Define a class called stack and implement generic methods to push and pop the elements from the stack.[PU:2015 fall]
8. Define class called stack and implement generic methods to push and pop the elements from stack.[PU:2015 fall]
9. Write a program to illustrate the template class with two generic types.
10. Write a program to illustrate the overloading of template functions.
11. Define two classes named 'Polar' and 'rectangle' to represent points in polar and rectangle systems. Use conversion routines to convert from one system to another system using template.[PU:2013 fall]
12. How can we compute the roots of quadratic equations by using function template? Explain with examples.