Lab Assignments
MCA Sem –II, 2018-19
CBSE22: OOP in C++

Assignment I (Last Date: 08-02-2019)

Class, object, Function

1. Write an inline function to obtain largest of three numbers.
2. Write a function called hms_to_secs() that takes three int values—for hours, minutes, and seconds—as arguments, and returns the equivalent time in seconds (type long). Create a program that exercises this function by repeatedly obtaining a time value in hours, minutes, and seconds from the user (format 12:59:59), calling the function, and displaying the value of seconds it returns.
3. Define a class to represent a bank account. It contains

Data Members:

Name of the depositor

Account Number

Type of account

Balance

Member Functions:

To assign initial values

To deposit an amount

To withdraw an amount < amount available

Display the name and balance.

4. **Create a bank account by supplying a user id and password.**

Login using their id and password.

Quit the program.

Now if login was successful the user will be able to do the following:

Withdraw money.
Deposit money.
Request balance.

Quit the program.

If login was not successful (for example the id or password did not match) then the user will be taken back to the introduction menu.

5. Create a class to add Two times provided in hour minute format. Use functions

a)void input() to provide hour and minute.

b) void gettime(int ,int) to take hour and minute entered by user.

c) sum(time <oj>, time <ob>) to add minutes and hours. If minutes is >60 add 1 with hour.

d) void display() to display the result.

6. To write a C++ program to add two complex numbers using object as argument.

Algorithm:

class as complex.

data members as real and

img. member functions

void

getdata()

void show()

void sum(complex c1,complex c2)

getdata() method is used to get the values .

show() method is used to display the values.

sum() method is used to perform addition operation using object as argument.

7. **To write a C++ program to display the student details using class and array of object.**

Algorithm: class

as student.

data members: rollno, name, mark1, mark2, mark3, total and average.

member functions as getdata() and displaydata().getdata() method used to get the student details.

displaydata() method used to display the student details.

create an object array for the student class using the following syntax:

Get the number of students.

Enter student details display the

student details

8. **Re-write the time addition program using friend function.**

9. write C++ program to define matrix and vector class, to use function with default argument and to do matrix -vector multiplication using friend function.

Declare vector Class

Define matrix Class

Declare friend function multiply() inside the matrix class

Define vector Class

Declare friend function multiply(matrix &, vector &) inside the vector class Define getvector() function with for loop to get the elements for vector Define disvector() function with for loop to display the contents of vector Define getmatrix() function with nested for loops to get the matrix elements Define dismatrix() function with nested for loops to display the matrix Define the multiply() to multiply matrix and vector

a. No of columns in the matrix should be equal to no. of elements in the vector

b. Apply the matrix-vector multiplication mechanism:

c. For simplicity take the matrix as 3X3 and the vector as 1X3.

1,2,3,6, and 9 are of basic category and 4,5,7 and 8 are of intellectual category.

Assignment II (Last Date: 20-02-2019)

Constructor

1. Write a C++ program to add two complex numbers.

   i) The class Complex contains three constructors.

      a) One with no parameter. (Used for the object for storing result.)

      b) With one parameter(Same value for real and imaginary part)

      c) With two parameters.

   and

   ii) Two friend functions

      a) One to add two complex number by taking two reference variables of class complex and returning another reference.

      b) To display the result.

2. A Bank gives 4% interest on current account and 6% interest on savings account. An additional 3% interest is provided for savings duration of 5 years and above. Using dynamic initialization of constructor write banking program using C++.

Assignment III (Last Date: 05-3-2019)

Operator Overloading and Type Conversion

1. **Check whether a number is even or odd by overloading ! operator.**
2. Check whether a number is prime or not by overloading -- operator

   [Hint: Use the concept of overloading ! operator].
3. Add two complex number by overloading + operator

   a) Using Member function.

   b) **Using Friend Function.**
4. Class Distance consists of length in feet and inches. Class Distance contains

   i) one default constructor

   ii) one parameterized constructor

   iii) function getdata() to take the value of feet and inches.

   iv) function show() to display.

   a) Overload < operator to compare two distances.

   b) Overload += operator in the Distance class.
5. Concatenate two strings by overloading + operator.

   a) Overload ++ as prefix (++c1) and postfix (c1++) in some class.

   b) Overload == operator to compare two strings.
6. Write a program to convert a distance entered in Feet and Inches to Meter using class to basic data type conversion.
7. **Two classes one is Civil_Time and Another is Railway_Time. Enter hours and minutes in Railway time(24 hour format) and display the time in Civil time(12 hour format with a.m. and p.m.) using one class type to another class type conversion.**

Assignment IV (Last Date: 18-03-2019)

Inheritance

1. Class **student** contains roll number, name and course as data member and Input_student and display_student as member function. A derived class **exam** is created from the class student with **publicly inherited**. The derived class contains mark1, mark2, mark3 as marks of three subjects and input_marks and display_result as member function. Create an array of object of the exam class and display the result of 5 students.
2. Try the same program with privately inheritance.
3. **Write a program where derived class is a friend of base class.**
4. **Test whether the Base class be a friend of Derived class.**
5. Class user contains data member name and age. A constructor with two arguments is used to assign name and age.

   User are of two types a) Student and b) Teacher.

   class Student contains data member i)course ii) Roll Number and iii)Marks and method display() to display data related to student.

   class Teacher contains data member i) subject_assigned (May take this as an array) ii) contact_hour and method display() to display data related to teacher.

   Implement this program using base class constructor in derived class.

6. **Base class 'count' contains a variable c. It contains a no argument constructor, one argument constructor, a method to return c and a operator overloading function for ++.**

   Derived class 'counter' access the value of c from base class constructor through its constructor and a operator overloading function for --.

7. Class Student contains data member Name, roll as protected.

   Method get() to name & roll and display() to display name and roll.

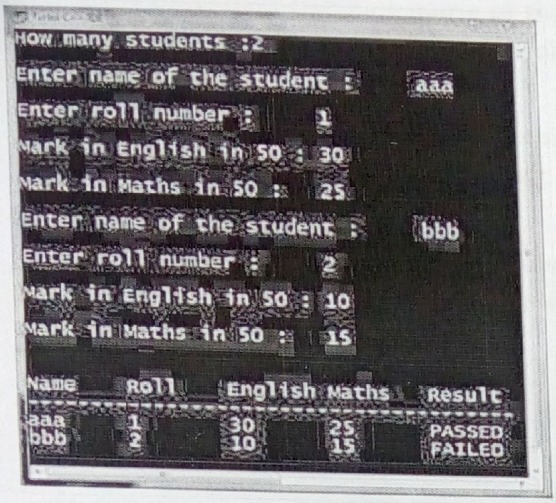
   Class Mark is publicly inherited from Student.

   It contains protected data member mark1,mark2 i.e. marks of two subjects & get_marks() and display_marks() as public.

   Class Result is publicly inherited from Mark.

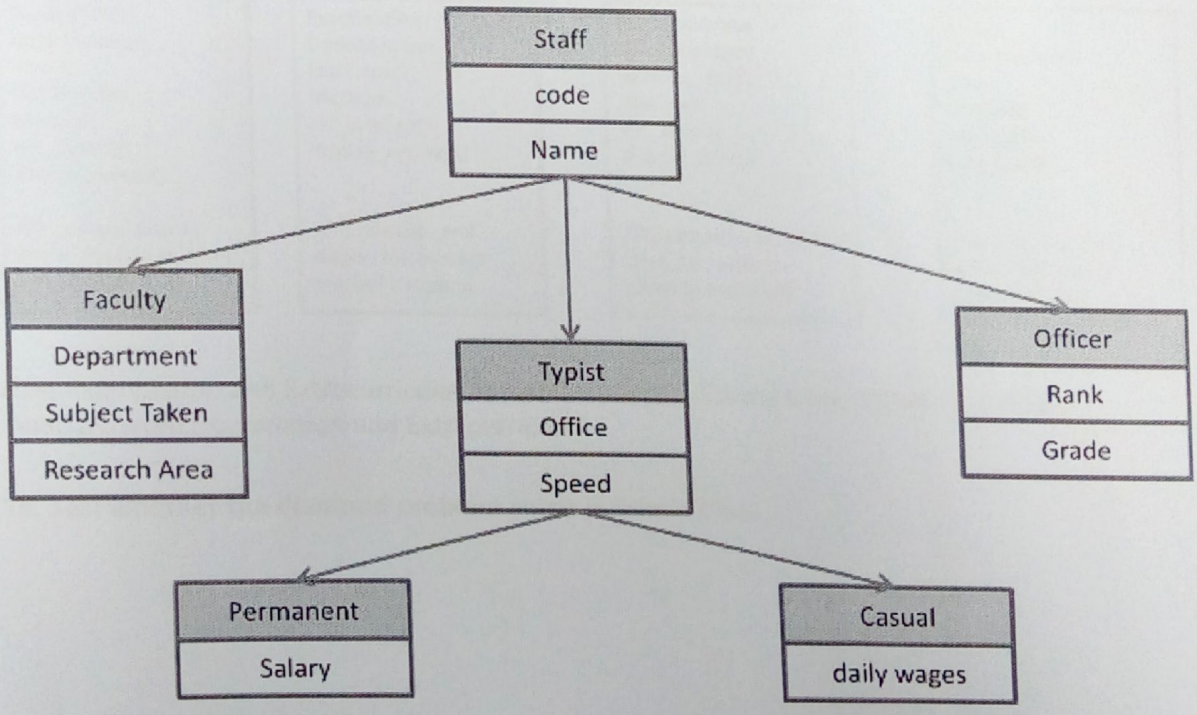
   It contains private data member total and two public method cal_result( ) to calculate total and display_result() with comment whether the student has passed or not.

Write a C++ program to display result in the following format



8. Rewrite the program in 7 with method overriding. Take the methods in all classes are get() and display().

9. . Write a C++ program to implement the following level of inheritance.



10. **A University and a Company have jointly taken a project.**

Class University contains name of the university, department to which the project is assigned, person to whom the project is assigned. A function display is there to display the information.

Class Company contains name of the company, Number of Engineers assigned, amount invested to do the project. A function display is there to display the information.

Class Project is inherited from University and Company. It contains type of project, duration of project, amount granted to complete the project. A function display displays the related information.

Write a C++ program to implement this and display all information except amount invested by company from Project class.

11. Base1 and Base2 contains a public, protected and private data member. Base1 is a friend of Base2. class Derived is inherited from Base1 a Base2. Write a C++ program to check the accessibility of the data members of Base1 and Base2 from Derived.
12. Result of a student is dependent on his examination mark and extracurricular marks. create four classes Student, Examination, Extracurricular, Result. The data members and methods of different classes are given below.

Student Class	Examination	Extracurricular	Result
Data Member:	**Data Member:**	**Data Member:**	**Data Member:**
Name	test1, test2	painting, music	total
Roll Number	**Method:**	**Method:**	**Method:**
Method:	cal_average()	get_score()	cal_total()
get_details()	display_average()	display_total()	comment()
display_details()			
//To get and display Name and Roll Number of a student	//To calculate and display the average mark of a student	//To get and and display the total marks in painting and music	//To calculate total marks and display comment whether the student have passed or not

class Examination and Extracurricular are inherited from Student and Result is multiply inherited from Examination and Extracurricular.

13. **Test whether the diamond problem exists is Friend Class.**

Assignment V (Last Date: 28-03-2019)

Pointer, Virtual Function and Polymorphism

1. Write a program using this pointer to find out the least number obtained among three subjects. Use ternary operator.

2. Class **polygon** contains data member width and height and public method set_value() to assign values to width and height.

   class **Rectangle** and **Triangle** are inherited from **polygon** class. Both the classes contain public method calculate_area() to calculate the area of Rectangle and Triangle. Use base class pointer to access the derived class object and show the area calculated.

3. Write a program to create a class shape with functions to find area of and display the name of the shape and other essential component of the class. Create derived classes circle, rectangle and trapezoid each having overridden functions area and display. Write a suitable program to illustrate virtual functions.

4. Write a program with Student as abstract class and create derive classes Engineering, Medicine and Science from base class Student. Create the objects of the derived classes and process them and access them using array of pointer of type base class Student.

Assignment VI (Last Date: 05-04-2019)

Exception Handling

1. Two integers are taken from keyboard. Then perform division operation.
   a) A try block to throw an exception when a wrong type of data is keyed.
   b) When division by zero occurs.
   write appropriate catch block to handle the exception thrown.

2. Design stack and queue classes with necessary exception handling.

Assignment VII (Last Date: 15-04-2019)

Template

1. **Design a class Template to find the largest among three numbers using ternary operator.**
2. Design a class Template to implement stack.
3. Write a template to sort an array by ascending order.
4. Design a template to find the largest among three numbers of different data types.
5. **Design a template for calculating x^y where x may be integer or float (not char or string) and y must be integer. Put appropriate alert for wrong data type.**
6. **Design a template to show that integer/integer is integer by if any one of them is float it returns float.**

Note : **Assignments in Bold are in intellectual category.**
