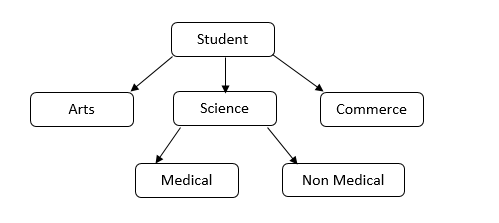
**Concept of Inheritance (Extending Class) in C++**

**For Late Bloomers**

1. What do you understand by Inheritance?
2. What is Base class and derived class?
3. What is difference between Multiple Inheritance and Multilevel Inheritance?
4. What is difference between public access specifier and private access specifier?
5. Which type of Inheritance is depicted below?



1. Consider the following code and answer the questions below:

class employee

{ int emp\_no;

char emp\_name[25], emp\_addr[30], emp\_dept[10];

public:

void emp\_input(void);

void emp\_print(void);

};

class manager: public employee

{ int no\_of\_emp;

public:

void input(void);

void print(void);

};

1. Which type of inheritance is shown in the above code?
2. Name the base class and the derived class
3. Name all the private data members of class employee
4. Name all public member functions of class manager?
5. Consider the following code and answer the questions below:

class Student

{ int Roll\_No;

char s\_name[25], s\_addr[30];

public:

void s\_input();

void s\_output();

};

class School: private Student

{

char class\_stu[10];

public:

void getdata();

void putdata();

};

1. Which type of inheritance is shown in the above code?
2. Name the base class and the derived class
3. Name all the private data members of class Student
4. Can we inherit data member ‘Roll\_No’ from class Student to class School?
5. Consider the following code and answer the questions below:

class School

{ int A;

protected:

int B, C;

public:

void input(int);

void output();

};

class Dept: protected School

{ int X, Y;

protected:

void in(int, int);

public:

void out();

};

class Teacher: public Dept

{ int P;

void disp();

public:

void Enter();

};

1. Which type of inheritance is shown in the above code?
2. Name the base class and the derived class of class ‘*Dept’*
3. Name the private member function(s) of class Teacher.
4. Can we Inherit data member ‘A’ of class School to class Dept?
5. Consider the following code and answer the questions below:

class A

{

protected:

int y;

private:

void processval();

public:

void getval(int);

void putval();

};

class B

{

int x;

protected:

int z;

public:

void getdata(int, int);

void showdata();

};

class C: public A, private B

{

int data;

public:

void showvalue();

};

1. Which type of inheritance is shown in the above code?
2. Name the member functions inherited by class C.
3. Name the public member function(s) of class B.
4. Can we Inherit data member ‘x’ of class B to class C?
5. Consider the following code and answer the questions below:

class WORLD

{

int H;

protected:

int S;

public:

void INPUT(int);

void OUTPUT();

};

class COUNTRY: private WORLD

{

int T;

protected:

int U;

public:

void INDATA(int, int);

void OUTDATA();

};

class STATE: public COUNTRY

{

int M;

public:

void DISPLAY(void);

};

1. Name the inheritance shown in the above code?
2. Name the base class and derived class of class COUNTRY
3. Name all the data members inherited by class STATE
4. Name all private member functions of class COUNTRY

**For Average Students**

1. What is difference between protected access specifier and private access specifier?
2. What is difference between Public Viability mode and Private Visibility mode?
3. What is Hybrid Inheritance?
4. What is Containership?
5. Consider the following code and answer the questions below:

class Book

{

char title[20];

char author[20];

int no\_of\_pages;

public:

void read( );

void show( );

};

class TextBook : private Book

{

int no\_of\_chapters, no\_of\_assignments;

protected:

int standard;

public:

void readtextbook( );

void showtextbook( );

};

class PhysicsBook : public TextBook

{

char topic[20];

public:

void readphysicsbook( );

void showphysicsbook( );

};

1. Name the members, which can be accessed from the member functions of class PhysicsBook.
2. Name the members, which can be accessed by an object of class TextBook.
3. Name the members which can be accessed by an object of class Physicsbook.
4. What will be the size of an object (in bytes) of class Physicsbook?

Answer: (i) no\_of\_chapters, no\_of\_assignments, standard, topic, readtextbook(), showtextbook(), readphysicsbook() and showphysicsbook()

(ii) read(), show(), readtextbook(), showtextbook()

(iii) readtextbook(), showtextbook(), readphysicsbook() and showphysicsbook()

(iv)20 + 20 + 2 + 2 + 2 + 2 + 20 = 68 bytes.

1. Consider the following code and answer the questions below:

class Peronal

{

int class, rno;

char section;

protected:

char name[20];

public:

Personal();

void pEntry();

void pDisplay();

};

class Marks : private Personal

{

float m[5];

protected:

char grade[5];

public:

Marks();

void mEntry();

void mDisplay();

};

class Result : public Marks

{

float total, agg;

public:

char finalGrade, comments[20];

Result();

void rCalculate();

void rDisplay();

};

1. Which type of inheritance is shown in the above code?
2. Write the name of those data members which can be directly accessed from the objects of class Result.
3. Write the names of those member functions, which can be directly accessed from the objects of class Result.
4. Write the names of those data members, which can be directly accessed from mEntry( ) function of class Marks.

Answer: (i) Multilevel Inheritance

(ii) finalGrade, comments

(iii) rCalculate(), rDisplay(), mentry(), mDisplay()

(iv) m, grade, name

1. Consider the following code and answer the questions below:

class Magazine

{

char MCode[10];

protected:

char MName[20];

public:

Book();

void MEnter();

void MDisplay();

};

class Member

{

char MCode[10];

protected:

char MName[25];

public:

Member();

void MEnter();

void MDisplay();

};

class Library : private Magazine, public Member

{

char LName[15];

float Charge;

public:

Library();

void LEnter();

void LDisplay();

};

1. Which type of inheritance is shown in the above code?
2. Write the names of all the members, which are accessible from LEnter( ) functions of class Library?
3. Write name of all the members accessible through an object of class Library
4. What shall be the order of execution for the constructors Magazine(), Members() and Library(), when object of class Library is declared?

Answer:

(i) Multiple Inheritance

(ii) LDisplay(), Member::MEnter(), Member::MDisplay(), Magazine::MEnter(), Magazine::MDisplay(), LName, Charge, Member::MName, Magazine::MName

(iii)No Data member, Functions: LEnter(), LDisplay, Member::MEnter() and Member::MDisplay()

(iv) Order of constructors execution is: Magazine(), Mameber(), Library()

1. Consider the following code and answer the questions below:

class Drug

{

char category[10];

char date\_of\_manufacture[10];

char company[20];

public:

Drug();

void enterdrugdetails();

void showdrugdetails();

};

class Tablet : public Drug

{

protected:

char tablet\_name[30];

char volume\_label[20];

public:

float price;

Tablet();

void entertabletdetails();

void showtabletdetails ();

};

class PainReliever : public Tablet

{

int dosage\_units;

char side\_effects[20];

int use\_within\_days;

public:

PainReliever();

void enterdetails();

void showdetails();

};

1. How many bytes will be required by an object of class Drug and an object of class PainReliever respectively ?
2. Write names of all the data members which are accessible from the object of class PainReliever.
3. Write names of all the members accessible from member functions of class Tablet.
4. Write names of all the member functions which are accessible from objects of class PainReliever.

Answers:

i.

Size of Drug's object - 40 bytes

Size of PainReliever's object - 118

ii. price

iii.

Data Members :

tablet\_name, volume\_label, price

Member Functions :

enterdrugdetails(), showdrugdetails(),

entertabletdetails(), showtabletdetails()

iv.

enterdrugdetails(),showdrugdetails(), entertabletdetails(),

showtabletdetails (), enterdetails(), showdetails()

1. Consider the following code and answer the questions below:

class Publisher

{

char pub[12];

double turnover;

protected:

void register();

public:

Publisher();

void enter();

void display();

};

class Branch

{

char city[20];

protected:

float employees;

public:

Branch();

void haveit();

void giveit();

};

class Author : private Branch, public Publisher

{

int acode;

char aname[20];

float amount;

public:

Author();

void start();

void show();

};

1. Write the names of data members, which are accessible from objects belonging to class Author.
2. Write the names of all the member functions which are accessible from objects belonging to class Branch.
3. Write the names of all the members which are accessible from member functions of class Author.
4. How many bytes will be required by an object belonging to class Author?

Answers:

1. *None*
2. *haveit() giveit()*

*iii.*

*member functions :register(), enter(), display(), haveit(), giveit(), start(), show()*

*data members : employees, acode, aname, amount*

*iv. 70*

1. Consider the following code and answer the questions below:

class Vehicle

{

private:

int wheels;

protected :

int passenger:

public :

void inputdata(int, int);

void outputdata();

};

class Heavyvehicle : protected Vehicle

{

int diesel\_petrol;

protected :

int load;

public:

void readdata(int, int);

void writedata();

};

class Bus : private Heavyvehicle

{

char make[20];

public :

void fetchdata(char);

void displaydata();

};

(i) Name the base class and derived class of the class Heavyvehicle.

(ii) Name the data member(s) that can be accessed from function displaydata().

(iii) Name the data member's that can be accessed by an object of Bus class.

(iv) Is the member function outputdata() accessible to the objects of Heavyvehicle class.

Answers:

1. base class – Vehicle   
   derived class - Bus
2. passenger, load, make
3. None
4. No

**For Bright Students**

1. How does the visibility modes control the access of members in the derived class? Give example.

If a base class and a derived class each include a member function with the same name and arguments, which member function will be called by the object of the derived class if the scope operator is not used?

Answer: Function of the derived class.

1. Consider the following code:

class livingbeing

{

char specification[20];

public:

void read();

void show();

};

class human: livingbeing

{};

What is the access level for the member function “read()” in the class “human”?

Answer: Private

1. What is code reusability? How can we achieve it and what is its advantage?

Answer:   
Code reusability means once a code is written, it can be reused in other parts of the program in which new classes are created from existing classes by inheriting their attributed and behaviors and overriding or embellishing these with capabilities the new classes require.

The advantage is that, when creating a new class, instead of writing completely new data members and member functions, the programmer can designate that the new class is to inherit the data members and member functions of a previously defined base class.

1. Answer the questions to based on the following code:

class Employee

{

int id;

protected:

char name[20];

char doj[20];

public:

Employee();

~Employee();

void get();

void show();

};

class Daily\_wager: protected Employee

{

int wphour;

protected: int nofhworked;

public:

void getd();

void showd();

};

class Payment: private Daily\_wager

{

char date[10];

protected:

int amount;

public:

Payment();

~Payment();

void show();

};

1. Name the type of Inheritance depicted in the above code.
2. Name the member functions accessible through the object of class Payment.
3. From the following, identify the member function(s) that can be called directly from the object of class Daily\_wager class  
   show()  
   getd()  
   get()
4. Name the base and derived class of Daily\_wager class.

Answers:

1. Multilevel Inheritance
2. Show()
3. Getd()
4. Base Class: Employee, Derived Class: Payment
5. Answer the questions to based on the following code:

class furniture

{

char Type;

char Mode[10];

public:

furniture( );

void Read\_fur\_details();

void Disp\_fur\_details();

};

class sofa: public furniture

{

int no\_of\_seats;

float cost\_sofa;

public:

void Read\_sofa\_details();

void Disp\_sofa\_details();

};

class office: public sofa

{

int no\_of\_pieces;

char delivery\_date[10];

public:

void Read\_office\_details();

void Didp\_office\_details();

};

void main()

{

office MyFurniture;

}

1. Mention the member names which accessible by Myfurniture declared in main() function.
2. What is the size of Myfurniture in bytes?
3. Mention the names of functions accessible from the member function Read\_office\_details() of class office.
4. Which type of Inheritance is depicted in the above code?

Answer:

1. Data Members:   
   No data member can be called from Myfurniture object.   
   Member Functions:  
   Read\_fur\_details(), Disp\_fur\_details(), Read\_sofa\_details(), Disp\_sofa\_details(), Read\_office\_details(), Didp\_office\_details()
2. 29 bytes
3. Read\_fur\_details( ), Disp\_fur\_details( ), Read\_sofa\_details( ), Disp\_sofa\_details( ), Disp\_office\_details( )
4. Multilevel Inheritance
5. Answer the questions to based on the following code:

class Medicine

{

char Category[10];

char Date\_of\_manufacture[10];

char Company[20];

public:

Medicine();

void entermedicinedetails();

void showmedicinedetails();

};

class capsule: public Medicine

{

protected:

char capsule\_name[30];

char volume\_lable[20];

public:

float Price;

capsules();

void entercapsuledetails();

void showcapsuledetails();

};

class Antibiotics: public Capsule

{

int Dosage\_units;

char side\_effects[20];

int Use\_within\_days;

public:

Antibiotics();

void enterdetails();

void showdetails();

};

1. How many bytes will be required by an object of class Medicines and an object of class Antibiotics respectively?
2. Write the names of all the member functions accessible from the object of class Antibiotics.
3. Write the names of all the members accessible from member functions of class capsules.
4. Write names of all the data members which are accessible from objects of class antibiotics.

Answers:

1. Medicine – 40 Bytes   
   Antibiotics Object – 118 Bytes
2. entermedicinedetails(), showmedicinedetails(), entercapsuledetails(), showcapsuledetails(), enterdetails(), showdetails()
3. Data Members:  
   capsule\_name[30], volume\_lable[20], Price  
   Member Funcitons:  
   entermedicinedetails(), showmedicinedetails(), entercapsuledetails(), showcapsuledetails()
4. Price
5. Answer the questions to based on the following code:

class University

{ char name [20];

protected :

char vc[20];

public :

void estd();

void inputdata();

void outputdata();

}

class College : protected University

{ int regno;

protected

char principal()

public :

int no\_of\_students;

void readdata();

void dispdata();

};

class Department : public College

{ char name[20];

char HOD[20];

public :

void fetchdata(int);

void displaydata( );};

1. Name the base class and derived class of college.
2. Name the data member(s) that can be accessed from function displaydata()
3. What type of inheritance is depicted in the above class definition?
4. What will be the size of an object (in bytes) of class Department?

Answers:

1. Base class: University   
   Derived class: Department
2. name[20], HOD[20], principal(), no\_of\_students, vc[20]
3. Multilevel Inheritance
4. 85 bytes
5. Answer the questions to based on the following code:

class Exterior

{

int OrderId;

char Address[20];

protected:

float Advance;

public:

Exterior();

void Book();

void View();

};class Paint: public Exterior{

int WallArea,ColorCode;

protected:

char Type;

public:

Paint() ;

void PBook();

void PView();

};

class Bill:public Paint

{

float Charges;

void Calculate();

public:

Bill() ;

void Billing() ;

void Print() ;

};

1. Which type of Inheritance out of the following is illustrated in the above example?
2. Write the names of all the data members, which are directly accessible from the member functions of class Paint.
3. Write the names of all the member functions, which are directly accessible from an object of class Bill.
4. What will be the order of execution of the constructors, when an object of class Bill is declared?

Answers:

1. Multi Level Inheritance
2. WallArea, ColorCode,Type, Advance
3. Billing(), Print(), PBook(), PView(), Book(), View()
4. Exterior(), Paint(), Bill()
5. Answer the questions to based on the following code:

class Student

{

int Rno;

char Name[20];

float Marks;

protected:

void result( );

public:

Student ( );

void Register ( );

void Display( );

};

class Faculty

{

long FCode;

char FName [20];

protected:

float Pay;

public:

Faculty ( );

void Enter( );

void Show( );

};

class Course: public Student, private Faculty

{

long CCode [10];

char CourseName [50];

char StartDate [8], EndDate [8];

public:

Course( );

void Commence ( );

void CDetail ( );

};

1. Which type of inheritance is illustrated in the above C++ code?
2. Write the names of all the data members, which is /are accessible from member function Commence of class Course.
3. Write the names of member functions, which are accessible from objects of  
   class Course.
4. Write the names of all the members, which are accessible from objects of  
   class faculty.

Answers:

1. Multiple Inheritance
2. CCode, CourseName, StartDate, EndDate, Pay
3. Commence( ), CDetail( ), Register( ), Display( )
4. Enter( ), Show( )