INHERITANCE SOLVED

**DELHI 2008:**

**2.d)** Answer the questions (i) to(iv) based on the following code :

class Dolls  
{ char Dcode[5];  
protected:  
float Price;  
void CalcPrice(float);  
public:  
Dolls();  
void DInput();  
void DShow();  
};  
class SoftDolls:public Dolls  
{ char SDName[20];  
float Weight;  
public:  
SoftDolls();  
void SDInput();  
void DShow();  
};  
class ElectronicDolls:public Dolls  
{ char EDName[20];  
char BatteryType[10];  
int Batteries;  
public:  
ElecronicDolls();  
void EDInput();  
void EDShow();  
};

**(i)** Which type of Inheritance is shown in the above example?

**Ans:** Hierarchical Inheritance. Since the sub classes are derived from a single base class(Dolls).

**(ii)**How many bytes will be required by an object of the class ElectronicDolls ?

**Ans:**41 Bytes (Explonation: The memory will be reserved as follows:

char Dcode[5]; //5 Bytes  
float Price; //4 Bytes  
char EDName[20]; //20 Bytes  
char BatteryType[10]; //10 Bytes  
int Batteries; //2 Bytes  
Total = 41 Bytes )

iii**)** Write name of all data members accessible from member function of the class SoftDolls.

**Ans:** Dolls::Price, SoftDolls:: SDName, SoftDolls::Weight

**(iv)**Write name of member functions accessible an object of the class ElectronicDolls?

**Ans:** ElectronicDolls::EDInput( ), ElectronicDolls::EDShow( ), Dolls::DInput( ), Dolls::DShow( )

**OUTSIDE DELHI 2008:**

**2.d)**Answer the questions (i) to(iv) based on the following code :

class Toys  
{ char Tcode[5];  
protected:  
float Price;  
void Assign(float);  
public:  
Toys();  
void Tentry();  
void Tdisplay();  
};  
class SoftToys:public Toys  
{ char STName[20];  
float Weight;  
public:  
SoftToys();  
void STentry();  
void STDisplay();  
};  
class ElectronicToys:public Toys  
{ char ETName[20];  
int No\_of\_Batteries;  
public:  
ElecronicToys();  
void ETEntry();  
void ETDisplay();  
};

**(i)** Which type of Inheritance is shown in the above example?

**Ans:** Hierarchical Inheritance. Since the sub classes are derived from a single base class(Dolls).

**(ii)**How many bytes will be required by an object of the class SoftToys ?

**Ans:**33 Bytes(Explonation: The memory will be reserved as follows:

char Tcode[5]; //5 Bytes  
float Price; //4 Bytes  
char STName[20]; //20 Bytesfloat Weight; // 4 Bytes Total = 33 Bytes)

**(iii)** Write name of all data members accessible from member function of the class SoftToys.

**Ans:**

Toys::Price,  
SoftToys::STName,  
SoftToys::Weight

**(iv)**Write name of member functions accessible an object of the class ElectronicToys ?

**Ans:**

ElectronicToys::ETEntry( ),  
Electronic Toys::ETDisplay( ),  
Toys::TEntry( ),  
Toys::TDisplay( )

**DELHI 2007:**

**2.d)**Answer the questions (i) to(iv) based on the following code:

4

class Trainer  
{ char TNo[5],Tname[20],specialization[10];  
int Days;  
protected :  
float Remuneratoin;  
void AssignRem(float);  
public:  
Trainer();  
void TEntry();  
void TDisplay();  
};  
class Learner  
{  
char Regno[10],LName[20],Program[10];  
protected:  
int Attendance,grade;  
public:  
Learner();  
void LEntry();  
void LDisplay();  
};  
class Institute:public Learner,public Trainer  
{ char ICode[10],IName[20];  
public:  
Institute();  
void IEntry();  
void IDisplay();  
};

**(i)**Which type of inheritance is depicted by above example ?

**Ans:** Multiple Inheritance. Since here the class Institute is deriving from the classes Learner and Trainer.

**(ii)**Identify the member function(s) that cannot be called directly from the objects of class Institute from the following

TEntry()  
LDisplay()  
IEntry()

**Ans:**All the above 3 member functions can be called directly from the objects of class Institute.

**(iii)** Write name of all member(s) accessible from member functions of class institute.

**Ans:**

**Data Members –**Trainer::Remuneration,  
Learner::Attendance,  
Learner::Grade,  
Institute::ICode,  
Institute::IName

**Member functions –** Trianer::AssignRem( ),  
Trainer::TEntry( ),  
Trainer::TDisplay( ),  
Learner:: LEntry( ),  
Learner::LDisplay( ),  
Institute::IEntry ( )  
(LDisplay can call IEntry( ))  
Institute::LDisplay( )  
(IEntry can call LDisplay( ))

**(iv)**If class institute was derived privately from class Learner and privately from class Trainer, then name the member function(s)that could be accessed through Objects of class Institute.

**Ans:**

Institute::IEntry( ),  
Institute:: IDisplay( )

**OUT SIDE DELHI 2007:**

**2.a)** Differentiate between Protected and Private members of a class in context of inheritance using C++.

2

**Ans:** Protected members will be inherited into the derived class (they are accessible from the derived class). But Private members cannot be accessed from the derived class.

(Remember that the memory will be reserved for private as well as protected members for the derived class object)

**2.d)** Answer the questions (i) to(iv) based on the following code:

class Teacher  
{ char TNo[5],Tname[20],Dept[10];  
int Workload;  
protected :  
float Salary;  
void AssignSal(float);  
public:  
Teacher();  
void TEntry();  
void TDisplay();  
};  
class Student  
{ char  
Admno[10],SName[20],Stream[10];  
protected:  
int Attendance,Totmarks;  
public:  
Student();  
void SEntry();  
void SDisplay();  
};  
class School:public Student,public  
Teacher  
{ char SCode[10],SName[20];  
public:  
School( );  
void SchEntry();  
void SchDisplay(); };

**(i)**Which type of inheritance is depicted by above example?

**Ans:** Multiplel Inheritance.

**(ii)**Identify the member function(s) that cannot be called directly from the objects of class School from the following

TEntry()  
SDisplay()  
SchEntry()

**Ans:**All the above three member function(s) can be called from the objects of class School.

**(iii)**Write name of all member(s) accessible from member functions of class School.

**Ans:**

Data Members : Teacher::Salary  
Student::Attendance  
Student::Totmarks  
School::SCode  
School::SName  
Member Funcions:Teacher::AssignSal( )  
Teacher::TEntry( )  
Teacher::TDisplay( )  
Student::Sentry( )  
Student::SDisplay( )  
School::SChEntry( )  
School::SChDisplay( )

**(iv)** If class School was derived privately from class Learner and privately from class Trainer,then name the member function(s)that could be accessed through Objects of class School.

**Ans:**

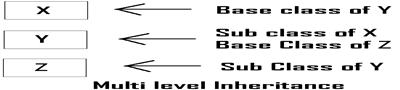
School::SChEntry( )  
School::SChDisplay( )

**DELHI 2006:**

**2.a)** Define Multilevel and Multiple inheritance in context of Object Oriented Programming. Give suitable example to illustrate the same.

2

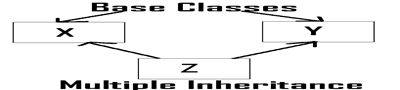
**Ans:**  
**Multilevel Inheritance:**When a subclass inherits from a class that itself inherits from another class, it is known as multilevel inheritance.



**Eg:**(for Multi Level Inheritance)

class A  
{  
-----  
------  
}  
class B:public class A  
{  
-----  
-----  
}  
class C:protected B  
{  
-----  
-----  
}

**Multiple Inheritance:**When a sub class inherits from multiple base classes, it is known as multiple inheritance.



**Eg:**(for Multiple Inheritance)  
class A  
{  
-----  
------  
}  
class B  
{  
-----  
-----  
}  
class C:public A,protected B  
{  
-----  
-----  
}

**2.d)** Answer the questions (i) to(iv) based on the following code.

class stationary  
{ char Type;  
char Manufacture[10];  
public:  
stationary( );  
void Read\_sta\_details( );  
void Disp\_sta\_details( );  
};  
class office:public stationary  
{ int no\_of\_types;  
float cost\_of\_sta;  
public:  
void Read\_off\_details( );  
void Disp\_off\_details( );  
};  
class printer:private office  
{ int no\_of\_users;  
char delivery\_date[10];  
public:  
void Read\_pri\_details( );  
void Disp\_pri\_details( );  
};  
void main( )  
{ printer MyPrinter;  
}

**(i)** Mention the member names which are accessible by MyPrinter declared in main() function.

**Ans:**

printer::Read\_pri\_details( );  
printer::Disp\_pri\_details( );

**(ii)** What is the size of MyPrinter in bytes?

**Ans:**29 Bytes

**(iii)** Mention the names of functions accessible from the member function Read\_pri\_details() of class printer.

**Ans:**

stationary::Read\_sta\_details( )  
stationary::Disp\_sta\_details( )  
office::Read\_off\_details( )  
office::Disp\_off\_details( )  
printer::Disp\_pri\_details( )

**OUT SIDE DELHI 2006:**

**2.d)** Answer the questions (i) to(iv) based on the following code:

4

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;  
}

**(i)**Mention the member names which accessible by Myfurniture declared in main() function.

**Ans:**

Data Members: No data member can be called from Myfurniture object. Member Functions:  
Furniture::Read\_fur\_details()  
Furniture::Disp\_fur\_details()  
Sofa::Read\_sofa\_details()  
Sofa::Disp\_sofa\_details()  
Office::Read\_office\_details()  
Office::Didp\_office\_details()

**(ii)**what is the size of Myfurniture in bytes?

**Ans:** 29 Bytes

**(iii)** Mention the names of functions accessible from the member function Read\_office\_details() of class office.

**Ans:**

Furniture::Read\_fur\_details( )  
Furniture::Disp\_fur\_details( )  
Sofa::Read\_sofa\_details( )  
Sofa::Disp\_sofa\_details( )  
Office::Disp\_office\_details( )

**DELHI 2005:**

**2.d)**Answer the questions (i) to(iv) based on the following code:

4

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();  
};

**(i)** How many bytes will be required by an object of class Medicines and an object of class Antibiotics respectively?

**Ans:**Medicine – 40 Bytes Antibiotics Object – 118 Bytes

**(ii)** Write the names of all the member functions accessible from the object of class Antibiotics.

**Ans:**

Medicine::entermedicinedetails()  
Medicine::showmedicinedetails()  
Capsules::entercapsuledetails()  
Capsules::showcapsuledetails()  
Antibiotics::enterdetails()  
Antibiotics::showdetails()

**(iii)** Write the names of all the members accessible from member functions of class capsules.

**Ans:**

Data Members:  
Capsule::capsule\_name[30]  
Capsule::volume\_lable[20]  
Capsule::Price  
Member Funcitons:  
Medicine::entermedicinedetails()  
Medicine::showmedicinedetails()  
Capsule::entercapsuledetails()Capsule::showcapsuledetails()

**(iv)** Write names of all the data members which are accessible from objects of class antibiotics.

Data members:  
Capsule::Price

**OUTSIDE DELHI 2005:**

**2.d)** Answer the questions (i) to(iv) based on the following code:

class Drug  
{ char Category[10];  
char Date\_of\_manufacture[10];  
char Company[20];  
public:  
Medicines();  
void enterdrugdetails();  
void showdrugdetails();  
};  
class tablet:public Drug  
{  
protected:  
char tablet\_name[30];  
char volume\_lable[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();  
};

**(i)** How many bytes will be required by an object of class Drug and an object of class PainReliever respectively?

**Ans:**

Drug Object - 40 Bytes  
Pain Reliever – 118 Bytes

**(ii)** Write the names of all the member functions accessible from the object of class PainReliever.

**Ans:**

Drug::enterdrugdetails()  
Drug::void showdrugdetails()  
Tablet::entertabletdetails()  
Tablet::showtabletdetails()  
PainReliever::enterdetails()  
PainReliever::showdetails()

**(iii)** Write the names of all the members accessible from member functions of class Tablet.

**Ans:**

Data Members:  
Tablet::tablet\_name[30];  
Tablet::volume\_lable[20];  
Tablet::Price;  
Member Functions:  
Drug::enterdrugdetails()  
Drug::showdrugdetails()  
Tablet::entertabletdetails()  
Tablet::showtabletdetails()

**(iv)** Write names of all the data members which are accessible from objects of class PainReliever.

**Ans:** Data Members: Tablet::Price

**DELHI 2004:**

**2.c)**Given the following definitions answer the following:

class livingbeing  
{ char specification[20];  
int average;  
public:  
void read();  
void show();  
};  
class ape: private livingbeing  
{ int no\_of\_organs,no\_of\_bones;  
protected:  
int iq\_level;  
public:  
void readape();  
void showape();  
};  
class human:public ape  
{ char race[20];  
char habitation[30];  
public:  
void readhuman();  
};

**(i)** Name the members, which can be accessed from the member functions of class human.

**Ans:**

Data Members - ape::iq\_level  
human::race  
human::habitation  
Member Function – ape::readape( )  
ape::showape( )

**(ii)** Name the members, which can be accessed by an object of class human.

**Ans:**Data Members - No data members can be accessed.

Member Functions: ape::readape();  
ape::showape();  
human::readhuman();

**(iii)** What will be the size of an object of the (in bytes) of class human?

**Ans:** 78 Bytes.

**DELHI 2003:**

**2.c)**Consider the following and answer the questions given below.

class MNC  
{ char Cname[25];  
//Company name  
protected:  
char Hoffice[25]; //Head office  
public:  
MNC( );  
char Country[25];  
void EnterData( );  
void DisplayData( );  
};  
class Branch:public MNC  
{ long NOE; //Number of Employees  
char Ctry[25]; //Country  
protected:  
void Association( );  
public:  
Branch( );  
void Add( );  
void Show( );  
};  
class Outlet:public Branch  
{  
char State[25];  
public:  
Outlet( );  
void Enter( );  
void Output( );  
};

**Ans: i)** Which class constructor can be called first at the time of declaration of an object of class Outlet?

**Ans:**MNC class constructor can be called first at the time of declaration of an object of class Outlet.(When an object of the derived class is declared, in order to create it, firstly the constructor of the base class is invoked an then, the constructor of the derived class is invoked. On the other hand, when an object of the derived class is destroyed, first the destructor of the derived class is invoked followed by the destructor of the base class).

**ii)**How many bytes does an object belonging to class Outlet require?

**Ans:** 133 Bytes

**iii)**Name the member function(s) which are accessed from the object(s) of class Outlet.

**Ans:**

Outlet::Enter( )  
Outlet::Output( )  
MNC::EnterData( )  
MNC::DisplayData( )  
Branch::Add( )  
Branch::Show( )

**iv)** Name the data member(s), which are accessible from the object(s) of class Branch.

**Ans:** MNC::Country

**DELHI 2002:**

**1.a)**Illustrate the concept of Inheritance with the help of an example.

2

**Ans:**The capability of one class to inherit propertied from another class, is called as inheritance. The most important advantage of inheritance is code reusability.

There are 5 types of inheritance:

1. Single Inheritance): When a sub class inherits only from one baseclass, it is known as single inheritance.
2. Multiple Inheritance: When a sub class inherits from multiple base classes, it is known as multiple inheritance.
3. Hierarchical Inheritance: When many sub classes inherit from a single base class, it is known as hierarchical inheritance.
4. Multilevel Inheritance: When a subclass inherits from a class that itself inherits from another class, it is known as multilevel inheritance.
5. Hybrid Inheritance: Hybrid inheritance combines two or more forms of inheritance.

**2001:**

**1.a)**Reusability of classes is one of the major properties of OOP. How is it implemented in C++.

2

**Ans:**Resuability of classes can be implemented through Inheritance. Ie After developing a class, if you want a class which consists the features of this class( ie members) and the other features also, then instead of developing a class which consists all these features, you can inherited the existing features (members) and you can develop new class consists the remaining features using  
inheritance (in Object Oriented Programming ie in C++.)

**DELHI 2000:**

**2.c)** Consider the following and answer the questions given 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 DISPLAY(void);  
public:  
void ENTER();  
};

**(i)**Name the base class and derived class of the class Dept.

**Ans:**Base class of Dept - School Derived class of Dept - Teacher

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

**Ans:**

Dept::X Dept::Y  
School::B  
School::C

**(iii)**Name the private member function(s) of class Teacher.

**Ans:** Teacher::Display( )

**(iv)**Is the member function OUT() accessible the objects of Dept?

**Ans:**Yes. Since it is public member function.

**DELHI 1999:**

**2.a)** What do you understand by visibility modes in class derivations? What are these modes?

2

**Ans:**It is given in chapter 4, classes and object as two answers. Ie Difference between private and protected, private and public.

**2.c)** Consider the following declarations and answer the questions below:

class vehicle  
{ int wheels;  
protected:  
int passenger;  
void inputdata(int,int);  
void outputdata();  
};  
class heavy\_vehicle:protected vehicle  
{  
int diesel\_petrol;  
protected:  
int load:  
public:  
void readdata(int,int);  
void writedata();  
};  
class bus:private heavy\_vehicle  
{  
char make[20];  
public:  
void fetchdata(char);  
void displaydata();  
};

**(i)**Name the base class and derived class of the class heavy\_vehicle.

**Ans:**

Base class of heavy\_vehicle – vehicle  
Derived class of heavy\_vehincle – bus

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

**Ans:**

bus::make  
heavy\_vehicle::load  
vehicle::passenger

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

**Ans:** No data member can be accessed by an object of bus class.

**(iv)**Is the member function outputdata accessible to the objects of heavy\_vehicle class?

**Ans:**No.

**DELHI 1998:**

**2.c)** Consider the following declarations and answer the questions below:

class PPP  
{ int H;  
protected:  
int S;  
public:  
void INPUT(int);  
void OUT();  
};  
class QQQ:private PPP  
{ int T;  
protected:  
int U;  
public:  
void INDATA(int,int);  
void OUTPUT();  
};  
class RRR:public QQQ  
{ int M;  
public:  
void DISP(void);  
};

**(i)** Name the base class and derived class of the class QQQ.

**Ans:** Base class of QQQ – PPP Derived class of QQQ – RRR

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

**Ans:**QQQ::U , RRR::M

**(iii)** Name the member function(s) , which can be accessed from the object of class RRR.

**Ans:**

QQQ::INDATA( )  
QQQ::OUTPUT( ) RRR::DISP( )

**(iv)** Is the member function OUT() accessible by the objects of the class QQQ?

**Ans:** No.