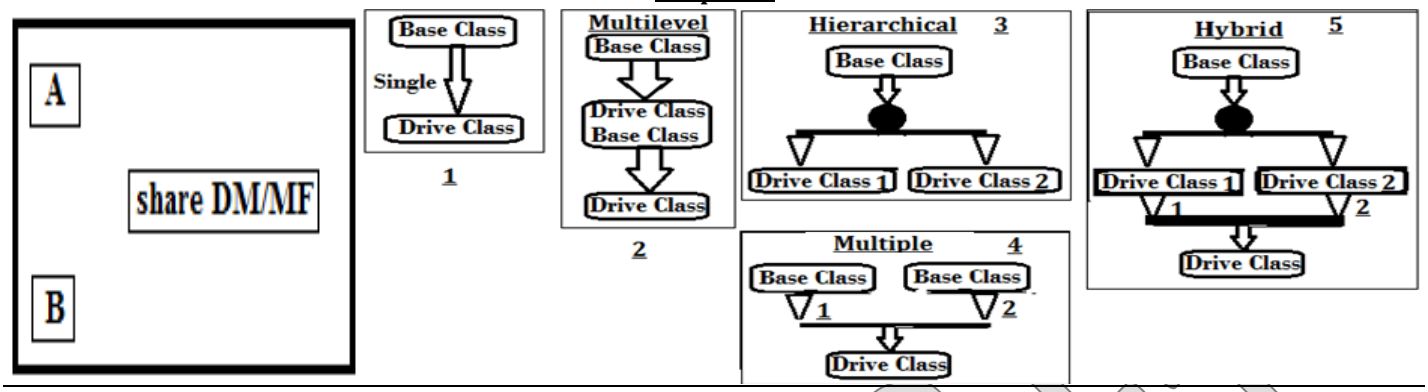
Inheritance

(Reusability(reuse) /Sharing Property of one Class to Another Class)

Chapter 6



Important Points (topics) with example:

1. Public DM and MF are called by Object and Member function of another class.
2. Protected DM and MF are called by only Member function of another class.
3. Private DM and MF never called by Object or Member function of another class and **not shared**.
4. **Number of byte or size of object are calculated by all DM.**
5. Scope of Data Member and Member Function of a class access by another class:
6. ***Calling***
   a. ***By Object*** **:** *[Only public DM/MF/Members of Same Class or Own Class]*
   b. ***By Member Function*** *:[only Private DM/MF/Members own class] [Only Protected/public DM/MF/Members same and Other class]*

```
class Stu
{
int Rollno,Age;
char Name[30];
float Fee;
public:
void getInfo();
void putInfo();
};

class Result :          Stu
{
int sub[5],total_Marks;
float per;
char Grad;
void calTotPer();
public:
void Displat_Result();
};
```

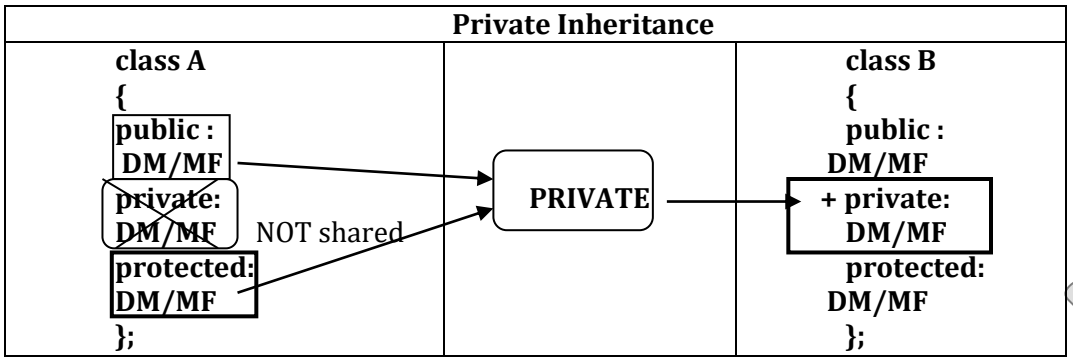
Public Inheritance

class A		class B
{		**{**
public : DM/MF	→ **PUBLIC** →	**public : + DM/MF**
private: DM/MF NOT shared		**private: DM/MF**
protected: DM/MF	→	**protected: + DM/MF**
};		**};**

Example:

```
class A
{
public :
int a;
private:
int b;
protected:
int c;
};
class B: public A
{
public :
int a1; + A a
void Dis1()
{
cout<<a1<<a;}
private:
int b1;
protected:
int c1; + A c
void Dis2()
{
cout<<c1<<c;
}
};
void main()
{B x;
x.a=4;  //valid to access
x.b=14;  //invalid to access
x.c=24; //invalid to access only by MF of class B
x.a1=4; //valid to access
x.b1=6; //invalid to access
x.c1=2; //invalid to access only by MF of class B
x.Dis1();//valid to access
x.Dis2();//invalid to access By object of class
 }
```

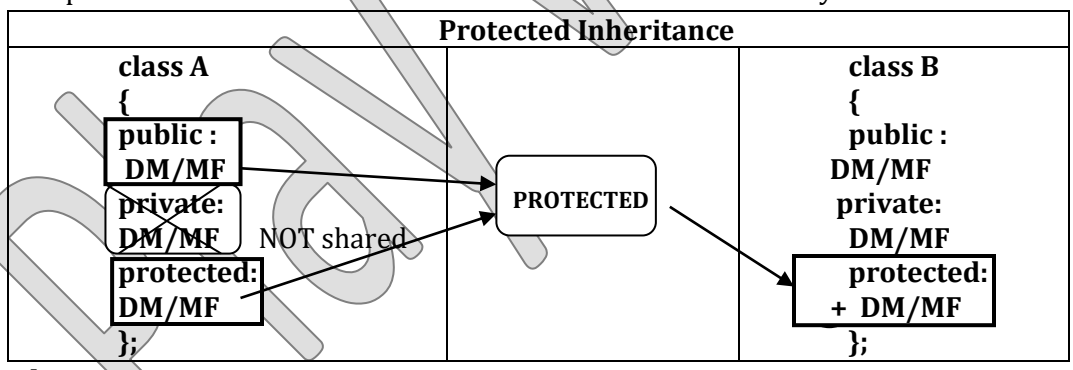
7. Scope of Data Member and Member Function of a class access by another class:



Example:

```
class A
{
public :
int a;
private:
int b;
protected:
int c;
};
class B: private A
{
private:
int b1; + A a |c
protected:
int c1;
public :
int a1;
void Dis1()
{
cout<<a1<<a<<b1<<c2<<c1; //b not allow
}
};
void main()
{
B x;
x.a=4;  //invalid to access
x.b=14;  //invalid to access
x.c=24; //invalid to access only by MF of class B
x.a1=4; //valid to access
x.b1=6; //invalid to access
x.c1=2; //invalid to access only by MF of class B
x.Dis1();//valid to access
}
```

8. Scope of Data Member and Member Function of a class access by another class:



Example:

```
class A
{
public :
int a;
private:
int b;
protected:
int c;
};
class B: protected A
{
public :
int a1;
private:
int b1;
protected:
int c1; + A a|c
    void Dis1()
    {
    cout<<a1<<a<<b1<<c2<<c1; //b not allow
}
};
```

```
void main()
{
B x;
x.a=4;   //invalid to access
x.b=14;  // invalid to access only by MF of class B
x.c=24; //invalid to access only by MF of class B
x.a1=4; // valid to access only by Object and MF of class B
x.b1=6; // invalid to access only by MF of class B
x.c1=2; //invalid to access only by MF of class B
x.Dis1();//invalid to access Protected
}
```

1. **Constructor & destructor invocation in Inheritance**:
   - **a.** Calling of constructor:
   - **i. Base class Constructor**
   - **ii. Drive class Constructor**

Example :

```
class A
{
public :
A(){cout<< "A Constructor";}
~A(){cout<< "A Destructor";}
};
class B:public A
{
public :
B(){cout<< " B Constructor";}
~B(){cout<< "B Destructor";}
};
void main()
{
B x;
}
```

Output :

```
A Constructor
B Constructor
B Destructor
A Destructor
```

b. Assigned Value to parameterize constructor in inheritance:

Example :

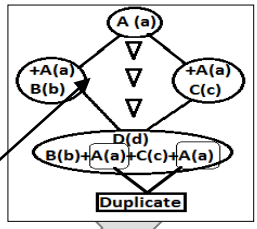
```
class A
{
public :
A()
{
cout<< "A Constructor";
}
A(int a)
{
cout<< "A P. Constructor :"<< a;
}
~A()
{
cout<< "A Destructor";
}
};
class B:public A
{
public :
B()
{
cout<< " B Constructor";
}
B(int x,int y):A(x)
{
cout<< "B P. Constructor : "<< x<< ": "<<y;
}
~A()
{
cout<< "B Destructor";
}
};
void main()
{
B obj1,obj2(4,5);
}
```

Output :

```
A Constructor  //obj1
B Constructor   //obj1
A P. Constructor : 4   //obj2
B P. Constructor : 4:5  //obj2
B Destructor   // Automatically
A Destructor  // Automatically
B Destructor   // Automatically
A Destructor  // Automatically
```

2. Overriding :**Same name function in both class base and drive:**
   Example:

```
class A
{
public :
void dis()
{
cout<< "Base Class";
}
};
class B:public A
{
public :
void dis()
{
A::dis();// base class
cout<< "Drive Class";
}
};
void main()
{
B x;
x.dis();
//Run time error, duplicity of  Member Functions
// cal drive class
}
```



3. Virtual Base class: **virtual Keyword to solve this problem**

4. Sharing (By Nesting and by Inheritance) both are working

Sharing By Objet(Nesting)

```
class A
{
public :
void Dis1()
{
cout << "Base class Member Function";
}
};
class B:public A
{
public :
A x;
void Dis2()
{
x.Dis1();
cout << "Drive class Member Function";
}
};
void main()
{
B obj1;
Obj1.Dis2();
}
```

Output :

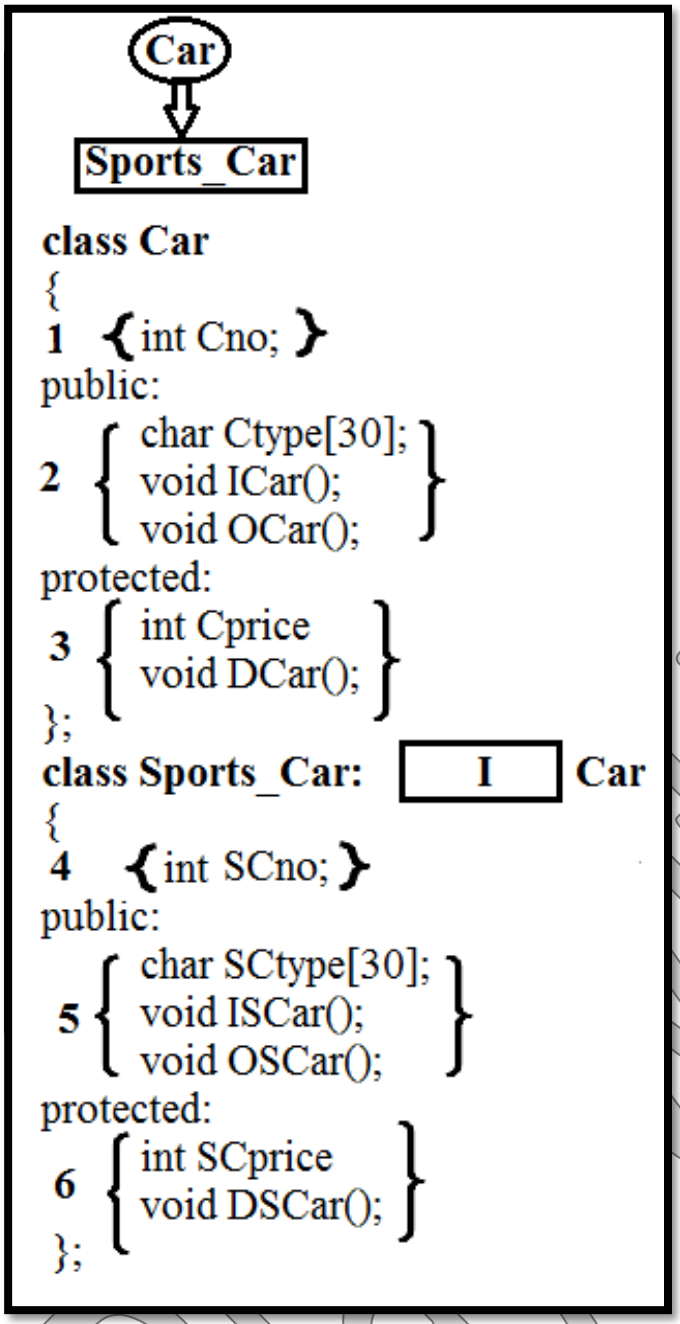
Base class Member Function
Drive class Member Function

Sharing By Objet(Inheritance)

```
class A
{
public :
void Dis1()
{
cout << "Base class Member Function";
}
};
class B:public A
{
public :
void Dis2()
{
cout << "Drive class Member Function";
}
};
void main()
{
B obj1;
obj1.Dis1();
obj1.Dis2()
}
```

Output :

Base class Member Function
Drive class Member Function



I: (public)

By Object of class Sports_Car : **2, 5**

DM: Ctype[30], SCtype[30];

MF: ICar(), OCar(),ISCar(),OSCar();

By MF of class Sports_Car :**2,3 + 4,5,6**

DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice

MF: ICar(), OCar(),ISCar(),OSCar(),DCar(),DSCar();

I: (private)

By Object of class Sports_Car : **5**

DM: SCtype[30];

MF: ISCar(),OSCar();

By MF of class Sports_Car :**2,3 + 4,5,6**

DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice

MF: ICar(), OCar(),ISCar(),OSCar(),DCar(),DSCar();

I: (protected)

By Object of class Sports_Car : **5**

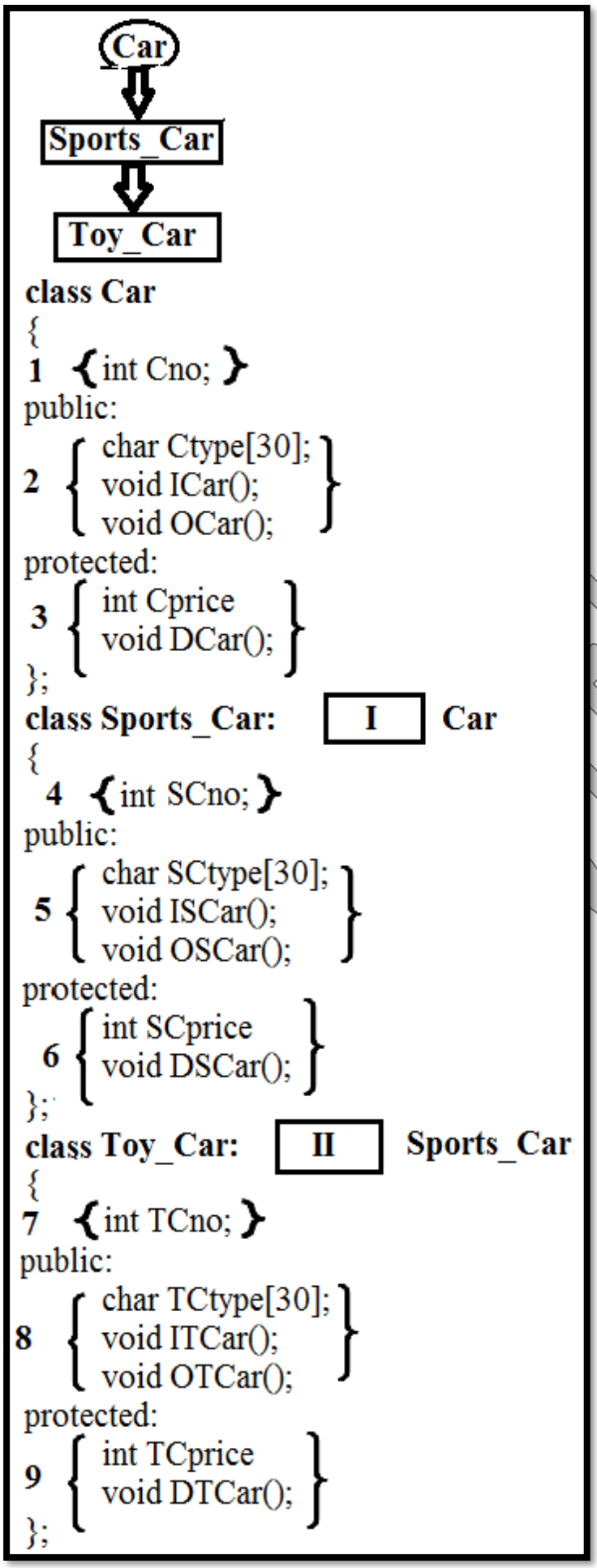
DM: SCtype[30];

MF: ISCar(),OSCar();

By MF of class Sports_Car :**2,3 + 4,5,6**

DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice

MF: ICar(), OCar(),ISCar(),OSCar(),DCar(),DSCar();



Set A

I/II: (public)
By Object of class Toy_Car : **2,5, 8**
DM: Ctype[30], SCtype[30],TCtype[30];
MF: ICar(),
OCar(),ISCar(),OSCar(),ITCar(),OTCar();
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**
DM: Ctype[30],Cprice,SCType[30],
SCprice,TCno, TCprice, TCtype[30],
MF: ICar(), OCar(),ISCar(),OSCar(),
DSCare(),ITCar(),OTCar(),DCar(),DTCar();

I/II: (private)
By Object of class Toy_Car : **8**
DM: TCtype[30];
MF: ITCar(),OTCar();
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**
DM: Ctype[30],Cprice,SCType[30],
SCprice,TCno, TCprice, TCtype[30],
MF: ICar(), OCar(),ISCar(),OSCar(),
DSCare(),ITCar(),OTCar(),DCar(),
DTCar();

I/II: (protected)
By Object of class Toy_Car : **8**
DM: TCtype[30];
MF: ITCar(),OTCar();
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**
DM: Ctype[30],Cprice,SCType[30],
SCprice,TCno, TCprice, TCtype[30],
MF: ICar(), OCar(),ISCar(),OSCar(),
DSCare(),ITCar(),OTCar(),DCar(),DTCar();

Set B

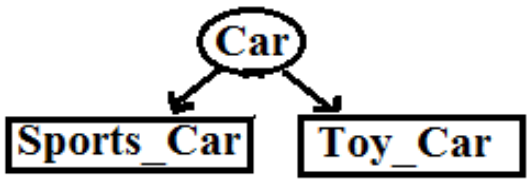
I (public) / II: (private)
By Object of class Toy_Car : **8**
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (private) / II: (private)
By Object of class Toy_Car : **8**
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (protected) / II: (public)
By Object of class Toy_Car : **5,8**
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (private) / II: (public)
By Object of class Toy_Car : **5,8**

I (protected) / II: (protected)
By Object of class Toy_Car : **8**
By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**




```
class Car
{
1   {int Cno; }
public:
2   { char Ctype[30];
      void ICar();
      void OCar(); }
protected:
3   { int Cprice
      void DCar(); }
};
class Sports_Car:   I   Car
{
 4  {int SCno; }
public:
5   { char SCtype[30];
      void ISCar();
      void OSCar(); }
protected:
 6  { int SCprice
      void DSCar(); }
};
class Toy_Car:   II   Car
{
7   {int TCno; }
public:
8   { char TCtype[30];
      void ITCar();
      void OTCar(); }
protected:
9   { int TCprice
      void DTCar(); }
};
```

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I: (public)

By Object of class Sports_Car : **2, 5**
DM: Ctype[30], SCtype[30];
MF: ICar(), OCar(),ISCar(),OSCar();
By MF of class Sports_Car :**2,3 + 4,5,6**
DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice
MF: ICar(),
OCar(),ISCar(),OSCar(),DCar(),DSCar();

I: (private)

By Object of class Sports_Car : **5**
DM: SCtype[30]; **MF:** ISCar(),OSCar();
By MF of class Sports_Car :**2,3 + 4,5,6**
DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice
MF: ICar(),
OCar(),ISCar(),OSCar(),DCar(),DSCar();

I: (protected)

By Object of class Sports_Car : **5**
DM: SCtype[30]; **MF:** ISCar(),OSCar();
By MF of class Sports_Car :**2,3 + 4,5,6**
DM: Ctype[30], SCtype[30],Cprice,SCno,SCprice
MF: ICar(),
OCar(),ISCar(),OSCar(),DCar(),DSCar();

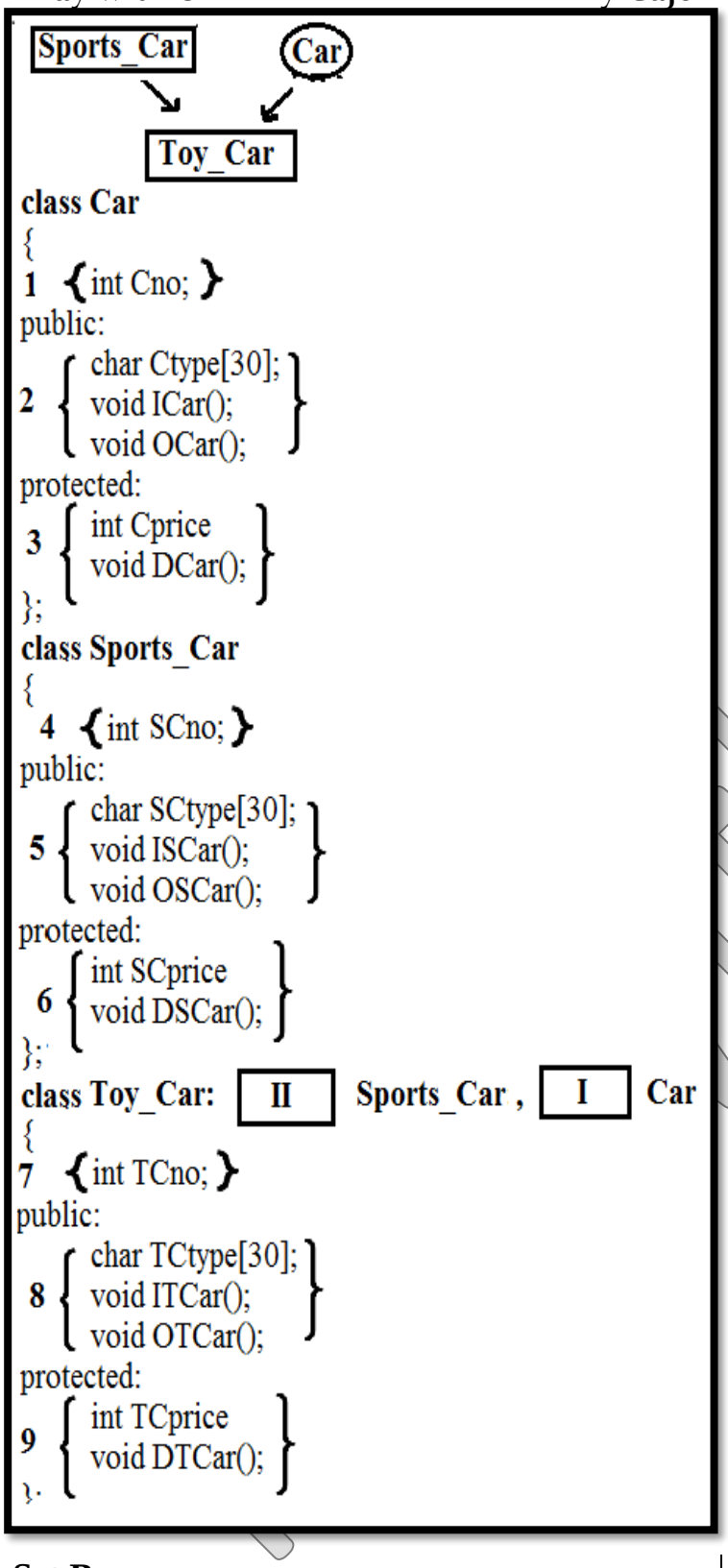
II: (public)

By Object of class Toy_Car : **2, 8**
DM: Ctype[30], TCtype[30];
MF: ICar(), OCar(),ITCar(),OTCar();
By MF of class Toy_Car :**2,3 + 7,8,9**
DM: Ctype[30],
TCtype[30],Cprice,TCno,TCprice
MF: ICar(),
OCar(),ITCar(),OTCar(),DCar(),DTCar();

II: (private)

By Object of class Toy_Car : **8**
DM: TCtype[30]; **MF:** ITCar(),OTCar();
By MF of class Toy_Car : **2,3 + 7,8,9**
DM: Ctype[30],
TCtype[30],Cprice,TCno,TCprice
MF: ICar(),
OCar(),ITCar(),OTCar(),DCar(),DTCar();

II: (protected)



Set B

I (public) / II: (private)

By Object of class Toy_Car : **2, 8**

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (private) / II: (private)

By Object of class Toy_Car : **8**

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (protected) / II: (public)

By Object of class Toy_Car : **8**

DM: TCtype[30]; **MF:** ITCar(),OTCar();

By MF of class Toy_Car : **2,3 + 7,8,9**

DM: Ctype[30], TCtype[30],Cprice,TCno,TCprice

MF: ICar(), OCar(),ITCar(),OTCar(),DCar(),DTCar();

Set A

I/II: (public)

By Object of class Toy_Car : **2,5, 8**

DM: Ctype[30], SCtype[30],TCtype[30];

MF: ICar(), OCar(),ISCar(),OSCar(),ITCar(),OTCar();

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

DM: Ctype[30],Cprice,SCType[30], SCprice,TCno, TCprice, TCtype[30],

MF: ICar(), OCar(),ISCar(),OSCar(), DSCare(),ITCar(),OTCar(),DCar(),DTCar();

I/II: (private)

By Object of class Toy_Car : **8**

DM: TCtype[30];

MF: ITCar(),OTCar();

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

DM: Ctype[30],Cprice,SCType[30], SCprice,TCno, TCprice, TCtype[30],

MF: ICar(), OCar(),ISCar(),OSCar(), DSCare(),ITCar(),OTCar(),DCar(), DTCar();

I/II: (protected)

By Object of class Toy_Car : **8**

DM: TCtype[30];

MF: ITCar(),OTCar();

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

DM: Ctype[30],Cprice,SCType[30], SCprice,TCno, TCprice, TCtype[30],

MF: ICar(), OCar(),ISCar(),OSCar(), DSCare(),ITCar(),OTCar(),DCar(),DTCar();

By Object of class Toy_Car : **5,8**

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

I (private) / II: (public)

By Object of class Toy_Car : **5,8**

I (protected) / II: (protected)

By Object of class Toy_Car : **8**

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

By MF of class Toy_Car :**2,3 +5,6+ 7,8,9**

By Object : *[Only public DM/MF/Members of Same Class / Own Class]*

By Member Function: *[only Private DM/MF/Members own class] [Only Protected/public DM/MF/Members same and Other class]*

QUESTIONS

Q1. Answer the question (i) to (iv) based on the following

```
class PUBLISHER
{       char Pub[12];
        long 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(); };
```

(i) Write the names of data members, which are accessible from objects belonging to class AUTHOR.

(ii) Write the names of all the members functions which are accessible from objects belonging to class BRANCH.

(iii) Write the names of all the members which are accessible from member functions of class AUTHOR.

(iv) How many bytes will be required by an object belonging to class AUTHOR?

(v) Is enter() is accessible through the object of Author

(vi) Name the type of Inheritance used in the above example.

(vii) Name all the protected members of class Author.

(viii) If the BRANCH class is inherited by using public visibility mode then, name the members which are accessible through the object of class AUTHOR.

(ix) Which class constructor will be called first at the time of declaration of an object of class AUTHOR.

(x) From the following, which can be called directly from the object of class AUTHOR : Show(); HaveIt();Register();

Ans:

1) Nil

2) Haveit(), Giveit().

3) DM: Acode, Aname, Amount, <u>Employees</u>,
MF: Start(),Show(),Haveit(),Giveit(),Enter(),Display(),
<u>Register()</u>

4) 72

5) Yes <u>(public sharing and public access)</u>

6) <u>Multiple</u>

7) Register(),Employees

8) <u>Employees.</u>By object->MF: Start(),Show(),Haveit(), Giveit(), Enter(),Display()

9) <u>BRANCH()</u>

10) <u>Show(), HaceIt()</u>

Q2. Answer the questions (i) to (iv) based on the following code:

```
class vehicle
{
int wheels;
  protected:
  int passenger;
  public:
  void inputdata();
  void outputdata();};
class heavyvehicle : public
vehicle
{
int diesel_petrol;
protected:
 int load;
 public:
 void readdata(int, int);
 void writedata();      };
class bus : private
heavyvehicle
{       char make[20];
    public:
    void fetchdata();
    void displaydata();};
```

i) Name the base class and derived class of **heavyvehicle** class.

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

iii) How many bytes will be required by an object of vehicle and bus classes respectively?

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

Ans:

1) vehicle and bus

2) diesel_petrol, load

3) 28

4) Yes <u>(public sharing and public access)</u>

Q3 Answer the questions (i) to (iv) 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 mployee
{       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(); };
```

(i) Name the type of Inheritance depicted in the above example.

(ii) Name the **member functions** accessible through the object of class **<u>Payment</u>**.

(iii) From the following, Identify the **member function(s)** that can be called directly from the **object** of **class Daily_wager**
class show() , getd(), get()

(iv) Name the base & derived class of Daily_wager class.

Ans:

1) Multilevel
2) show()
3) getd(),showd();
4) **Base:** Employee, **Derived:** Payment

Q4. Answer the questions (i) to (iv) based on the following:

```
class CUSTOMER
{
int Cust_no;
char Cust_Name[20];
protected: void Register();
public: CUSTOMER();
 void Status();
};
class SALESMAN
{
 int Salesman_no;
 char Salesman_Name[20];
protected: float Salary;
public:
 SALESMAN();
 void Enter();
 void Show();
};
class SHOP : private
CUSTOMER ,public SALESMAN
{
char Voucher_No[10];
 char Sales_Date[8];
public:
 SHOP();
 void Sales_Entry();
 void Sales_Detail();};
```

(i) Write the names of data members which are accessible from objects belonging to class CUSTOMER.

(ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.

(iii) Write the names of all the members which are accessible from member functions of class SHOP.

(iv) How many bytes will be required by an object belonging to class SHOP?

Ans:

1) Nil
2) Enter(), Show()
3) **DM:**Voucher_No[10];Sales_Date[8];, **MF:**Show();Enter();Salary;Register();Status();Sales_Entry();Sales_Detail();
4) **66**

Q5. Answer the question (i) to (iv) ased on the following

```
class Book
{
char Title[20];
char Author[20];
int noofpages;
public:
void read();
void show(); };
class TextBook: private
Book
{
int noofchap,
noofassignments;
protected:
int standard;
public:
void readtextbook();
void showtextbook();}
class Physicsbook:public
Textbook
{
char Topic[20];
public :
void readphysicsbook();
void showphysicsbook();};
```

(i) Names the members, which are accessible from the member of class Physicsbook.

(ii) Write the names of members, which are accessible by an object of class Textbook.

(iii) Write the names of all members, which are accessible by an object of class Physicsbook.

(iv) How many bytes will be required by an object belonging to class Physicsbook.

Ans:

1) **DM:** standard;, **MF:** readphysicsbook(); ,showphysicsbook();, showtextbook(); ,readtextbook();,read();,show();
2) readtextbook(); showtextbook();
3) readphysicsbook(); showphysicsbook(); showtextbook(); readtextbook
4) **68**

Q6. Answer the questions (i) to (iv) based on the following class declaration:

```
class Medicine
 {
char category[10];
char
Date_of_Manufacture[10];
 char Date_Of_Expiry[10];
 protected: char
 company[20];
 public:
  int x,y;
 Medicine();
  void Enter();
  void Show();  };
class Tablet :protected
Medicine
        {
 protected:
  char tablet_name[30];
  char volume_label[20];
  void disprin();
        public:
         float price;
        Tablet();
 void enterdet();
 void showdet(); };
 class PainReliver : public
 Tablet
      {
 int Dosage_units;
long int  tab;
char effects[20];
 protected:
 int use_within_Days;
 public :
 PainReliver()
 void enterpr();
 void  showpr();  };
```

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

Ans:

1) **Tablet : 108 , PainReliver: 136**
2) nil
3) enterpr(); showpr(); enterdet(); showdet();
4) **nil**

Questions with Answer

Answer the questions based on the following code:

```
class Student
{ char fname[20];
float marks;
int rno;
int getrno();
protected:
long admno;
void sprocess();
public:
Student();
void stake();
void sdisplay();};
class Teacher:public
Student
{ char tname[30];
float salary;
int tid;
void TTest();
protected:
char Tqua[10];
void Tprocess();
public:
Teacher( );
void Ttake( );
void Tdisplay();
~Teacher( );};
class HM:public Teacher
{ char hmname[25];
float hmsalary;
int hmrno();
protected:
char hmplace[35];
int noofsubjects;
void hmprocess( );
public:
HM( );
void hmtake( );
void hmdisplay()( );
~HM();};
```

a) Which type of inheritance is depicted by above example?

A)Multi level inheritance

b) How many bytes will be required by an object of class Student, Teacher, HM?

A) Student Object – 30, Teacher Object – 66, HM object - 132

c) Write the names of all members accessible from objects of class HM.

A) Member Functions: hmtake( ),hmdisplay( ), Ttake(),Tdisplay(),sTake( ),sdisplay( ) Data Members: NIL

d) Write the names of data members accessible from objects of class HM.

A. e) Write the names of member functions accessible from objects of class HM.

A. f) Write the names of all members accessible from member functions of class HM.

A) Member Functions: hmtake( ),hmdisplay( ), hmprocess(),hmrno( ),Ttake( ),Tdisplay( ),Tprocess( ),Stake( ), sdisplay(), sprocess( ) Data Members: hmname, hmsalary, hmplace, noofsubjects, Tqua, admno;

g) Write the names of data members accessible from member functions of class HM.

A. h) Write the names of all member functions accessible from member functions of class HM.

A. i) Write the names of all members which are accessible from objects of class Teacher.

A) Member functions : Ttake( ), Tdisplay( ), stake( ), sdisplay () Data Members: NIL

j) Write the names of members which are accessible from member functions of class Teacher.

A) Member functions: Ttake( ), Tdisplay( ), TProcess(),TTest(),stake( ),sdisplay( ),sprocess( );
Data Members: Tqua, tname, salary, tid, admno;

k) What is the base class and derived class of 'Teacher'?

A)base class of Teacher – Student Derived class of Teacher - HM

l) If HM class derived privately from class Teacher, Write the names of all members which are accessible from objects of class HM.

A)Member Functions: hmtake( ), hmdisplay( );Data Members: NIL

1) Answer the questions (i) to (iv) based on the following:

```
class indoor_sports
{
int i_id;
char i_name[20];
char i_coach[20];
protected:
int i_rank,i_fee;
void get_ifee();
public:
indoor_sports();
void iEntry();
void ishow();};
class outdoor_sports
{
int o_id;
char o_name[20];
char o_coach[20];
protected:
int orank,ofee;
void get_ofee();
public:
outdoor_sports();
void oEntry();
void oshow();};
class sports:public
indoor_sports,protected
outdoor_sports
{
char rules[20];
public:
sports();
void registration();
void showdata();};
```

(i) Name the type of inheritance illustrated in the above C++ code.

Ans. Multiple Inheritance

(ii) Write the names of all the members, which are accessible from the objects belonging to class outdoor_sports.

Ans Data Members: None Member Functions: oEntry(), oShow() (Note:No marks to be awarded for any partial or additional answer(s))

(iii) Write the names of all the member functions, which are accessible from the member function of class sports.

Ans registration(), showdata(), oEntry(), oShow(), get_ofee(), iEntry(), iShow(), get_ifee()

(iv) What will be the size of the object belonging to class indoor_sports? **Ans** 46 Bytes

2) Answer the questions (i) to (iv) based on the following:

```
class ITEM
{
int Id;
char IName[20];
```

```
protected:
float Qty;
public:
ITEM();
void Enter(); void View();};
class TRADER
{
int DCode;
protected:
char Manager[20];
public:
TRADER();
void Enter();
void View();};
class SALEPOINT : public
ITEM,private TRADER
{
char Name[20],Location[20];
public :
SALEPOINT();
void EnterAll();
void ViewAll();};
```

(i) Which type of Inheritance out of the following is illustrated in the above example?
- Single Level Inheritance, - Multi Level Inheritance, - Multiple Inheritance

Ans Multiple Inheritance

(ii) Write the names of all the data members, which are directly accessible from the member functions of class SALEPOINT.

Ans Name, Location, Manager, Qty

(iii) Write the names of all the member functions, which are directly accessible by an object of class SALEPOINT.

Ans EnterAll(), ViewAll(), Enter(), View()

(iv) What will be the order of execution of the constructors, when an object of class SALEPOINT is declared?

Ans (i) ITEM() (ii) TRADER() (iii) SALEPOINT()

3) Answer the questions (i) to (iv) based on the following:

```
class Interior
{
int OrderId;
char Address[20];
protected:
float Advance;
public:
Interior();
void Book(); void View();};
class Painting:public
Interior
{
int WallArea,ColorCode;
protected:
char Type;
public:
Painting();
void PBook();
void PView();};
class Billing:public
Painting
{
float Charges;
void Calculate();
public:
Billing();
void Bill();
void BillPrint();};
```

(i) Which type of Inheritance out of the following is illustrated in the above example?
-Single Level Inheritance, -Multi Level Inheritance, -Multiple Inheritance

Ans Multi Level Inheritance

(ii) Write the names of all the data members, which are directly accessible from the member functions of class Painting.

Ans WallArea, ColorCode,Type, Advance

(iii) Write the names of all the member functions, which are directly accessible from an object of class Billing.

Ans Bill(), BillPrint(), PBook(), PView(), Book(), View() • *Constructors can be ignored*

(iv) What will be the order of execution of the constructors, when an object of class Billing is declared?

Ans Interior, Painting, Billing

4) Consider the following C++ code and answer the question from (i) to (iv).

```
class University
{ long Id;
char City[20];
protected:
char Country[20];
public:
Universitye( );
void Register( );
void Display( );
};
class Department: private
University
{
long DCode[10];
char HOD[20];
double Budget;
public:
Department( );
void Enter( );
void Show( );};
class Student:public
Department
{ long RollNo;
char Name[20];
public:
Student( );
void Enroll( );void View( );};
```

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

A) Multi-level inheritance is shown in the above example.

(ii) Write the names of those member functions, which are directly accessed from the objects of class Student;

A) Member functions: void Enroll( ); void View( ); void Enter( );void Show( );

(iii) Write the anem of those data members , which can be directly accessible from the member functions of class student.

A) Data Members: long Rollno;char Name[20];double Budget;

(iv) Is it possible to directly call function Display ( ) of class university from an object of class Department? (Answer as YES or NO).

A) No, it is not possible because Display( ) function of Campus becomes private for the object of Department class.

5) Consider the following C++ code and answer the questions from (i) to (iv).

```
class Personal
{
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:                    class Result:public Marks    char                      void Rdisplay( );};
Marks( );                  {                            FinalGrade,comments[20];
void Mentery( );           float Total,Avg;             Result( );
void Mdisplay( );};        public:                      void Rcalculate( );
```

(i) Which type of inheritance is shown in the above example?
A) Multilevel Inheritance
(ii) Write the names of those data members, which can be directly accessed from the objects of class Result.
A)FinalGrame, comments
(iii) Write the names of those member functions which can be directly accessed from the objects of class Result.
A)Rcalculate( );Rdisplay( ),Mentry( ),Mdisplay( );
(iv) Write names of those data members, which can be directly accessed from the Mentry( ) function of class Marks.
A) Name[20], M[5], Grade[5];

6) Answer the questions (i) to (iv) based on the following:

```
class COMPANY              void Register();             double Salary ;              {
{                          void Show() ;} ;             void Computer() ;            char Location[20] ;
char Location[20] ;        class FACTORY:public         public:                      float Area;
double Budget, Income ;    COMPANY                      FACTORY () ;                 double Sale;
protected:                 {                            void Enter () ;              public:
void Accounts () ;         char Location[20] ;          void Show() ;} ;             SHOP () ; void Input( ) ;
public:                    int Workers;                 class SHOP:private           void Output ( ) ;} ;
COMPANY () ;               protected:                   COMPANY
```

(i) Name the type of inheritance illustrated in the above C++ code.
Ans Hierarchical Inheritance
(ii) Write the name of data members, which are accessible from member functions of class SHOP.
Ans Location, Area, Sale
(iii) Write the names of all the member functions, which are accessible from objects belonging to class FACTORY.
Ans Enter ( ), FACTORY::Show ( ), Register ( ), COMPANY::Show ( ) OR
Enter ( ), Show ( ), Register ( ) // Show function may be presenttwice OR
Enter, Show, Register
(iv) Write the names of all the members, which are accessible from objects of class SHOP
Ans Input ( ), Output ( )

7) Answer the questions (i) to (iv) based on the following:

```
class Student              Student ( ) ;                float Salary;                long CCode [10]; char
{                          void Enroll ( ) ;            public:                      CourseName [50];
int Rollno:                void Display ( ) ;} ;        Teacher ( );                 char StartDate [8] ,
char SName[20];            class Teacher                void Enter ( ) ;             EndDate [8];
float Marksl;              {                            void Show ( ) ;} ;           public:
protected:                 long TCode;                  class Course: public         Course ( ) ;
void Result ( ) ;          char TName [20];             Student, private Teacher     void Commence ( );
public:                    protected:                   {                            void CDetail ( ) ;} ;
```

(i) Write the names of member functions, which are accessible from objects of class Course
Ans Commence( ), CDetail( ), Enroll( ),Display( )
Note: No marks to be awarded for a partially correct answer Constructor functions to be ignored
ii) Write the names of all the data members, which is/are accessible from member function Commence of class Course
Ans CCode, CourseName, StartDate, EndDate, Salary
iii) Write the names of all the-members, which are accessible from objects of class Teacher. **Ans** Enter( ), Show( )
iv) Which type of Inheritance is illustrated in the above C++ code? **Ans** Multiple Inheritance

8) Answer the questions (i) to (iv) based on the following:

```
class Chairperson          void Allocate();             {                            Director();
{ long CID; //Chairperson  public:                      int DID; //Director ID       void Input();
Identification Number      Chairperson();               char Dname[20];              void output();};
char CName[20];            void Assign();               protected:                   class Company:private
protected:                 void Show();};               char Profile[30];            Chairperson, public
char Description [40];     class Director               public:                      Director
```

```
{ int CID; //Company ID
char City[20], Country[20];
public:
Company();
void Enter();
void Display();};
```

(i) Which type of inheritance out of the following is specifically is illustrated in the above C++ code?
(a) Single Level Inheritance(b) Multi Level Inheritance(c) Multiple Inheritance
Ans.(c) Multiple Inheritance **(ii)** Write the names of data members, which are accessible by objects of class type Company. **Ans** None
(iii) Write the names of all member functions, which are accessible by objects of class type Company.
Ans. Enter(), Display(), Input(), output()
(iv) Write the names of all members, which are accessible from member functions of class Director.
Ans. Input(), output(), Profile, Dname, DID

9) Answer the questions (i) to (iv) based on the following:

```
class Director
{
long DID;
char Name[20];
protected:
char Description[40];
void Allocate () ;
public:
Director() ;
void Assign () ;
void Show () ;} ;
class Ractory:public
Director
{
int FID;
char Address[20];
protected:
int NOE; public:
Factory();
void Input ();
void Output ();};
class ShowRoom:private
Factory
{
int SID;
char City[20];
public:
ShowRoom();
void Enter ();
void Display ();};
```

(i) Which type of inheritance out of the following is illustrated in the above C++ code?
(a) Single Level Inheritance (b) Multi Level Inheritance (c) Multiple Inheritance
Ans.(b) Multilevel Inheritance
(ii) Write the names of data members, which are accessible by objects of class type ShowRoom.
Ans. None
(iii) Write the names of all member functions which are accessible by objects of class type ShowRoom.
Ans. Enter(), Display()
(iv) Write the names of all members, which are accessible from member functions of class Factory.
Ans. FID, Address, NOE, Description, Input(), Output(), Assign(), Show(), Allocate()

10) Answer the questions (i) to (iv) based on the following:

```
class FaceToFace
{
char CenterCode [10] ;
public:
void Input ( ) ;
void Output ( ) ;} ;
class Online
{ char website [50] ;
public:
void SiteIn ( ) ;
void SiteOut ( ) ;} ;
class Training: public
FaceToFace, private
Online
{ long Tcode ;
float charge;
int period;
public:
void Register ( ) ;
void Show ( ) ;} ;
```

(i) Which type of Inheritance is shown in the above example? **Ans** Multiple Inheritance
ii) Write names of all the member functions accessible from Show( ) function of class Training. **Ans** Register( ) Siteln( ). SiteOut( ). Input( ), Output( )
iii) Wr i t e name of all the members accessible through an object of class Training. **Ans** Register( ), Show( ),Input( ), Output( )
iv) Is the function Output( ) accessible inside the function SiteOut( )? Justify your answer.
Ans No, function Output( ) is not accessible inside the function SiteOut( ), because Output( ) is a member of class FaceToFace and SiteOut( ) is a member of class Online. and the classes FaceToFace and Online are two independent classes.

11) Answer the questions (i) to (iv)based on the following:

```
class Regular
{
char SchoolCode[10];
public:
void InRegular( );
void OutRegular( );} ;
```

```
class Distance
{
char StudyCentreCode [5] ;
public:
void InDistance( );
void OutDistance( );} ;
```

```
class Course: public Regular, private Distance
{
char Code [ 5] ;
float Fees;
int Duration;
public:
void InCourse( );
void OutCourse( );} ;
```

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

(ii) Write names of all the member functions accessible from OutCourse function of class Course.

Ans InCourse( ), InDistance( ), OutDistance( ), InRegular( ), OutRegular( )

(iii) Write name of all the .:members accessible througb an object of class Course.

Ans InCourse( ), OutCourse( ), InRegular( ), OutRegular( )

(iv) Is the function InRegular( ) accessible inside the function InDistance( )? Justify your answer.

Ans. No, function InRegular( ) is not accessible inside the function InDistance( ), because InRegular( ) is a member of class Regular and InDistance( ) is a member of class Distance, and the classes Regular and Distance are two independent classes.

12) 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( )

14) Answer the questions (i) to(iv) based on the following code:

```
class Trainer
{
char
TNo[5],Tname[20],speci
alization[10];
int Days;
protected :
float Remuneratoin;
void AssignRem(float);
public:
Trainer();
void TEntry();
void TDisplay();};
class Learner
{
char
Regno[10],LName[20],P
rogram[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 andprivately from class Trainer, then name the member function(s)that could be accessed through Objects of classInstitute.

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

15) 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( )

16) 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( );};
```

(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( )

17)Answer the questions (i) to(iv) 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();};
```

(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( )

18) Answer the questions (i) to(iv) 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();};
```

(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

19) Answer the questions (i) to(iv) based on the followingcode:

```
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

20) 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.

21)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

22)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.

23)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.

24) 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.

25)Answer the questions (i) to (iv) based on the following:

```
class PUBLISHER                PUBLISHER();                public:                     { int Acode;
{                              void Enter();               BRANCH();                   char Aname[20];
char Pub[12];                  void Display();};           void Haveit();              float Amount;
double Turnover;               class BRANCH                void Giveit();};            public:
protected:                     { char CITY[20];            class AUTHOR:private        AUTHOR();
void Register();               protected:                  BRANCH,public               void Start();
public:                        float Employees;            PUBLISHER                   void Show();};
```

(i) Write the names of data members, which are accessible from objects belonging to class AUTHOR.
(ii) Write the names of all the member functions, which are accessible from objects belonging to class BRANCH.
(iii) Write the names of all the members which are accessible from member functions of class AUTHOR.
(iv) How many bytes will be required by an object belonging to class AUTHOR?
Answer:
(i) None of data members are accessible from objects belonging to class AUTHOR.
(ii) Haveit(), Giveit()
(iii) **Data members:** Employee, Acode, Aname, Amount
Member function: Register(), Enter(), Display(), Haveit(), Giveit(), Start(), Show(),
(iv) 70

26) Answer the questions (i) to (iv) based on the following:

```
class CUSTOMER                 void Status();};            SALESMAN();                 char Voucher_No[10];
{ int Cust_no;                 class SALESMAN              void Enter();               char Sales_Date[8];
char Cust_Name[20];            { int Salesman_no;          void Show();};              public:
protected:                     char Salesman_Name[20];     class SHOP : private        SHOP();
void Register();               protected:                  CUSTOMER , public           void Sales_Entry();
public:                        float Salary;               SALESMAN                    void Sales_Detail();};
CUSTOMER();                    public:                     {
```

i)Write the names of data members which are accessible from objects belonging to class CUSTOMER.
Ans: None of data members are accessible from objects belonging to class CUSTOMER.
ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.
Ans: Enter(), Show()
iii) Write the names of all the members which are accessible from member functions of class SHOP.
Ans: Data members: Voucher_No, Sales_Date, Salary
Member functions:Sales_Entry( ), Sales_Details( ), Enter (), Show( ),Register( ), Status( ).
iv) How many bytes will be required by an object belonging to class SHOP?
Answer: 66

27) Answer the questions (i) to (iv) based on the following:

```
class PUBLISHER                void Enter();               BRANCH();                   char Aname[20];
{                              void Display(); };          void Haveit();              float Amount;
char Pub[12];                  class BRANCH                void Giveit(); };           public:
double Turnover;               {                           class AUTHOR : private      AUTHOR();
protected:                     char CITY[20];              BRANCH , public             void Start();
void Register();               protected:                  PUBLISHER                   void Show();};
public:                        float Employees;            {
PUBLISHER();                   public:                     int Acode;
```

(i) Write the names of data members, which are accessible from objects belong-ing to class AUTHOR.
Ans) None of data members are accessible from objects belonging to class AUTHOR.
(ii) Write the names of all the member functions which are accessible from ob-jects belonging to class BRANCH.
Ans) Haveit( ), Giveit( )

(iii) Write the names of all the members which are accessible from member func-tions of class AUTHOR.
Ans) Data members: Employees, Acode, Aname, Amount
Member function: Register(), Enter(), Display(), Haveit(), Giveit(), Start(), Show(),
(iv) How many bytes will be required by an object belonging to class AUTHOR?
Ans) 70

28) Answer the questions (i) to (iv) based on the following:

```
class CUSTOMER
{ int Cust_no;
char Cust_Name[20];
protected:
void Register();
public:
CUSTOMER();
void Status(); };
class SALESMAN
{ int Salesman_no;
char Salesman_Name[20];
protected:
float Salary;
public:
SALESMAN();
void Enter();
void Show();};
class SHOP : private
CUSTOMER , public
SALESMAN
{
char Voucher_No[10];
char Sales_Date[8];
public:
SHOP();
void Sales_Entry();
void Sales_Detail();};
```

(i) Write the names of data members which are accessible from objects belonging to class CUSTOMER.
Ans) None of data members are accessible from objects belonging to class AUTHOR.
(ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.
Ans) Enter(), Show()
(iii) Write the names of all the members which are accessible from member functions of class SHOP.
Ans) Data members: Voucher_No, Sales_Date, Salary
Member function : Sales_Entry(), Sales_Detail(), Enter(), Show(),Register(), Status()
(iv) How many bytes will be required by an object belonging to class SHOP?
Ans) 66