

1. C++ REVISION TOUR

2010 Delhi:

1. (a) What is the difference between automatic type conversion and type casting? Also, give a suitable C++ code to illustrate both. 2

Ans. Automatic Type Conversion: it is an implicit process of conversion of a data from one type to another.

For example

```
int N = 65;
char C = N; // Automatic type conversion
cout<<C;
```

OUTPUT:

A

Type Casting: It is an explicit process of conversion of a data from one type to another.

For example

```
int A=1, B=2;
float C = (float)A/B; //Type Casting
cout<<C;
```

OUTPUT:

0.5

(b) Which C++ header file(s) will be essentially required to be included to run/ execute the following C++ code? 1

```
void main( )
{
int Eno=123, char Ename[ ]="Rehan Swamp";
cout<<setw(5)<<Eno<<setw(25)<<Ename<<endl;
}
```

Ans. (i) iostream.h (ii) iomanip.h

(d) Find the output of the following program : 3

```
#include <iostream.h>
struct POINT
{
int X, Y, Z;
};
void StepIn(POINT & P, int Step=1)
{
P.X+=Step;
P.Y-=Step;
P.Z+=Step;
}
void StepOut(POINT & P, int Step=1)
{
P.X-=Step;
P.Y+=Step;
P.Z-=Step;
}
void main ( )
{
```

```
POINT P1={15, 25, 5}, P2={10, 30, 20};
StepIn(P1);
StepOut(P2,4);
cout<<P1.X<<" "<<P1.Y<<" "<<P1.Z<<endl;
cout<<P2.X<<" "<<P2.Y<<" "<<P2.Z<<endl;
StepIn(P2,12);
cout<<P2.X<<" "<<P2.Y<<" "<<P2.Z<<endl;
}
```

Ans.

**16, 24, 6
6, 34, 16
18, 22, 28**

(e) Find the output of the following program : 2

```
#include <iostream.h>
#include <ctype.h>
void ChangeIt(char Text[ ], char C)
{
for (int K=0;Text[K]!='\0';K++)
{
if (Text[K]>='F' && Text[K]<='L')
Text[K]=tolower (Text[K]);
else
if (Text[K]='E' || Text[K]=='e')
Text[K]=C;
else
if (K%2==0)
Text[K]=toupper(Text[K]);
else
Text[K]=Text[K-1];
}
}
void main ( )
{
char OldText[ ]="pOwERALone";
ChangeIt(OldText,'%');
cout<<"New TEXT:"<<OldText<<endl;
}
```

Ans.

New TEXT : PPW % RR11N%

(f) The following code is from a game, which generates a set of 4 random numbers. Yallav is playing this game, help him to identify the correct option(s) out of the four choices given below as the possible set of such numbers generated from the program code so that he wins the game. Justify your answer. 2

```
#include <iostream.h>
#include <stdlib.h>
const int LOW=15;
void main ( )
{
randomize( );
int POINT=5, Number;
for (int I=1;I<=4;I++)
{
```

```

    Number=LOW+random(POINT) ;
    cout<<Number<<" ";
    POINT--;
}
}

```

- (i) 19:16:15:18:
(ii) 14:18:15:16:
(iii) 19:16:14:18
(iv) 19:16:15:16:

Ans.

(iv) 19:16:15:16:

Justification is as follows:

I	POINT	Number	Minimum	Maximum
1	5	15	19	
2	4	15	18	
3	3	15	17	
4	2	15	16	

The only option that satisfies these values is option (iv).

2010 Outside Delhi:

1. (a) What is the difference between call by value and call by reference? Also, give a suitable C++ code to illustrate both. **2**

Ans.

Call by value: The formal parameter makes a copy of actual parameter. It does not make the changes in actual parameter. If the changes are done in formal parameters.

Call by reference: The formal parameter is an alias of actual parameter. The changes made in the formal parameter are reflected in actual parameter. It is preceded by &.

```

void Caloulato(int A,int & B)// A is oall by value,
{ // B is call by roforonco
A++;
a+=A;
}

```

- (b) Which C++ header file(s) will be essentially required to be included to run/execute the following C++ code: **1**

```

void main()
{
int Rno=24; char Name [] =" Amen Singhania";
cout<<setw(10)<<Rno<<setw(20)<<Name<<endl;
}

```

Ans.

iostream.h
iomanip.h

- (d) Find the output of the following program: **3**

```

#include <iostream.h>
struct THREE_D
{ int X,Y,Z;
};

```

Prepared By: Mr.M.Ravi Kiran.

```

void MoveIn(THREE_D &T, int Step=1)
{
    T.X+=Step;
    T.Y-=Step;
    T.Z+=Step;
}
void MoveOut(THREE_D &T, int Step=1)
{
    T.X-=Step;
    T.Y+=Step;
    T.Z-=Step;
}
void main ()
{
    THREE_D T1={10,20,5},T2={30,10,40};
    MoveIn(T1);
    MoveOut(T2,5);
    cout<<T1.X<<" "<<T1.Y<<" "<<T1.Z<<endl;
    cout<<T2.X<<" "<<T2.Y<<" "<<T2.Z<<endl;
    MoveIn(T2,10);
    cout<<T2.X<<" "<<T2.y<<" "<<T2.Z<<endl;
}

```

Ans.

**11, 19, 6
25, 15, 35
35, 5, 45**

- (e) Find. the output of the following program: **2**

```

#include <iostream.h>
#include <ctype.h>
void MyCode (char Msg [], char CH)
{
    for (int (Cnt=0;Msg[Cnt]!='\0';Cnt++)
    {
        if (Msg[Cnt]>='B' && Msg[Cnt]<='G')
            Msg[Cnt]=tolower(Msg[Cnt]);
        else
            if (Msg[Cnt]=='A' || Msg[Cnt]=='a')
                Msg[Cnt]=CH;
            else
                if (Cnt%2==0)
                    Msg[Cnt]=toupper(Msg[Cnt]);
                else
                    Msg[Cnt]=Msg[Cnt-1];
    }
}
void main ()
{
    char MyText [] =" ApEACeDriVE";
    MyCode(MyText,'@');
    cout<<"NEW TEXT:"<<MyText<<endl;
}

```

Ans.

NEW TEXT :@@@e@ccddIle

(f) The following code is from a game, which generates a set of 4 random numbers. Praful is playing this game, help him to identify the correct option(s) out of the four choices given below as the possible set of such numbers generated from the program code so that he wins the game. Justify your answer. 2

```
#include <iostream.h>
#include <stdlib.h>
const int LOW=25;
void main ()
{
    randomize();
    int POINT=5,Number;
    for (int I=1;I<=4;I++)
    {
        Number=LOW+random(POINT);
        cout<<Number<<“.”;
        POINT--;
    }
}
```

- (i) 29:26:25:28:
- (ii) 24:28:25:26:
- (iii) 29:26:24:28:
- (iv) 29:26:25:26:

Ans.

(iv) 29:26:25:26:

Justification is as follows:

I	POINT	Number	
		Minimum	Maximum
1	5	25	29
2	4	25	28
3	3	25	27
4	2	25	26

The only option that satisfies these values is option (iv).

2009 Delhi:

1. (a) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both. 2

Ans

Call by value is used to create a temporary copy of the data coming from the actual parameter into the formal parameter. The changes done in the function in formal parameter are not reflected back in the calling environment. It does not use ‘&’ sign.

Call by reference is used to share the same memory location for actual and formal parameters and so changes done in the function are reflected back in the calling environment. It uses ‘&’ sign.

```
void Compute(int A, int &B)
{
```

```
    A++;
```

```
    B++;
    cout<<“In the function”<<endl;
    cout<<“A=”<<A<<“&”<<“B=”<<B<<endl;
}
void main ()
{
    int I=50,J=25;
    cout<<“Before function call “<<endl;
    cout<<“I=”<<I<<“&”<<“J=”<<J <<endl;
    Compute (I,J) ;
    cout<<“After function call “<<endl;
    cout<<I=”<<I<<“&”<<“J=”<<J <<endl;
}
```

OUTPUT

Before function call

I=50&J=25

In the function

A=51&B=26

After function call

I=50&J=26

1(b) Write the names of the header files to which the following belong: 1

(i) puts () (ii) sin ()

Ans (i) stdio.h (ii) math. h

1.(e) Find the output of the following program:2

```
#include <iostream.h>
#include <ctype.h>
void Encode (char Info [ ], int N) ;
void main ( )
{
    char Memo [ ] = “Justnow” ;
    Encode (Memo, 2) ;
    cout<<Memo<<endl ;
}
void Encode (char Info [ ], int N)
{
    for (int I = 0 ; Info[I] !=‘\0’ ; I++)
        if (I%2= =0)
            Info[I] = Info[I] -N ;
        else if (islower(Info[I]))
            Info[I] = toupper(Info[I]) ;
        else
            Info[I] = Info[I] +N ;
}
```

Ans

HuqTlOu

(f) Study the following program and select the possible output from it : 2

```
#include <iostream.h>
#include <stdlib.h>
const int LIMIT = 4 ;
void main ( )
{
    randomize ( ) ;
```

```
int Points;
Points = 100 + random(LIMIT);
for (int P=Points; P>=100; P--)
    cout<<P<<"#";
cout<<endl;
```

- (i) 103#102#101#100#
 (ii) 100#101#102#103#
 (iii) 100#101#102#103#104#
 (iv) 104#103#102#101#100#

Ans

(i) 103#102#101#100#

2009 Outside Delhi:

1. (a) What is the difference between Actual Parameter and Formal Parameter? Give an example in C++ to illustrate both types of parameters. 2

Ans A parameter used in the function call is known as Actual Parameter. It is used to send the data to function. A parameter used in the function definition is known as Formal Parameter, It is used to accept the data from actual parameter.

```
void Seventimes(int A)//A is formal parameter
{
    cout<<7*A;
}
void main ()
{
    int P=6;
    Seventimes(P);//p is actual parameter
}
```

Other answer for the same question

Ans) The parameters in the function call statement (or calling function) are called as Actual Parameters.

The parameters in the function definition (or called function) are called as Formal Parameters.

Eg:

```
void manip(int x, int y)
{ ---
  ---
}
void main()
{
  int a,b;
  ----
  manip(a,b);
}
```

Here a,b are Actual Parameters and x,y are Formal Parameters.

1.(b) Write the names of the header files to which the following belong: 1

(i) **setw()** (ii) **sqrt()**
Ans

(i) iomanip.h (ii) math.h

1.(e) Find the output of the following program:2

```
#include <iostream.h>
#include <ctype.h>
void Secret (char Mig[ ], int N);
void main ( )
{ char SMS[ ] = "rEPorTmE" ;
  Secret{SMS,2);
  cout<<SMS<<endl;
}
void Secret(char Msg[ ], int N)
{
  for (int C=0; Msg[C] !=' \0' ;C++)
  if (C%2==0)
    Msg[C] = Msg[C]+N;
  else if (isupper(Msg[C]))
    Msg[C] = tolower(Msg[C]);
  else
    Msg[C] = Msg[C]-N;
}
```

Ans

teRmttoe

(f) Study the following program and select the possible output from it : 2

```
#include <iostream.h>
#include <stdlib.h>
const int MAX=3 ;
void main ( )
{
  randomize ( ) ;
  int Number ;
  Number = 50 + random{MAX} ;
  for (int P=Number; P>=50; P-- )
    cout<<p<<"#";
  cout<<endl;
}
```

(i) 53#52#51#50#

(ii) 50#51#52#

(iii) 50#51#

(iv) 51#50#

Ans

(iv) 51#50#

(Solution: MAX value is 3

That's why random(MAX) can produce 0 or 1 or 2. (random(N) will produce no. between 1 to n-1)

The Number value may be 50 or 51 or 52.

The P value starts from Number, upto 50, each time decreases by 1.

So Possible outputs are as follows:

52#51#50#

51#50#

50#

As the output 51#50# is available in given answers, so 51#50# is the answer.)

2008 Delhi:

1.b) Name the header files that shall be needed for the following code: 1

```
void main()
{ char String[ ] = "Peace";
  cout << setw(2)<<String;
}
```

Ans) iomanip.h, iostream.h

1. c) Rewrite the following program after removing the syntactical error(s) if any. Underline each correction. 2

```
#include<iostream.h>
void main( )
{ First = 10, Second = 20;
  Jumpto(First,Second);
  Jumpto(Second);
}
void Jumpto(int N1, int N2 = 20)
{ N1=N1+N2;
  count<<N1>>N2;
}
```

Ans) #include<iostream.h>

```
void Jumpto(int N1,int N2=20);
//Prototype missing
void main( )
{ int First = 10, Second = 20;
//Data type missing
  Jumpto(First,Second);
//Comma to come instead of ;
  Jumpto(Second);
}
void Jumpto(int N1, int N2)
{ N1=N1+N2;
  cout<<N1<<N2;
//Output operator << required
}
```

d) Find the output of the following program;3

```
#include<iostream.h>
#include<ctype.h>
void main( )
{ char Text[ ] = "Mind@work!";
  for(int I=0; Text[I]!='\0';I++)
  { if(!isalpha(Text[I]))
    Text[I]='*';
    else if(isupper(Text[I]))
    Text[I]=Text[I]+1;
    else
    Text[I] = Text[I+1];
  }
  cout<<Text;
}
```

Ans: Text[] =

Test[0]	Test[1]	Test[2]	Test[3]	Test[4]	Test[5]	Test[6]	Test[7]	Test[8]	Test[9]	Test[10]
M	i	n	d	@	W	o	r	k	!	\0

When I=0

Since Text[0] is 'M', Upper Case Letter, (isupper(Text[I]) will becomes true.

So Text[I] =Text[I]+1

So Text[0]=Text[0]+1

Text[0] =77(ASCII Value of M) + 1 = 78

=N(78 is ASCII Value of N)

Now the String Text[] =

Test[0]	Test[1]	Test[2]	Test[3]	Test[4]	Test[5]	Test[6]	Test[7]	Test[8]	Test[9]	Test[10]
N	i	n	d	@	W	o	r	k	!	\0

When I=1

Since Text[1] is 'i', Which is a character, but which is not Upper case,

else part will be executed.

Ie Text[I]=Text[I+1]

Here Text[1]=Text[1+1]

=Text[2]

Ie 'n' will be stored in place of 'i'

Now the String Text[] =

Test[0]	Test[1]	Test[2]	Test[3]	Test[4]	Test[5]	Test[6]	Test[7]	Test[8]	Test[9]	Test[10]
N	n	n	d	@	W	o	r	k	!	\0

When I=2

Since Text[2] is 'n', Which is a character, but which is not Upper case, else part will be executed.

Ie Text[I]=Text[I+1]

Here Text[2]=Text[2+1]

=Text[3]

Ie 'd' will be stored in place of 'n'

Now the String Text[] =

Test[0]	Test[1]	Test[2]	Test[3]	Test[4]	Test[5]	Test[6]	Test[7]	Test[8]	Test[9]	Test[10]
N	n	d	d	@	W	o	r	k	!	\0

When I=3

Since Text[3] is 'd', Which is a character, but which is not Upper case, else part will be executed.

Ie Text[I]=Text[I+1]

Here Text[3]=Text[3+1]

=Text[4]

Ie '@' will be stored in place of 'd'

Now the String Text[] =

Test[0]	Test[1]	Test[2]	Test[3]	Test[4]	Test[5]	Test[6]	Test[7]	Test[8]	Test[9]	Test[10]
N	n	d	@	@	W	o	r	k	!	\0

When I=4

Since Text[4] is '@', Since which is not an alphabet,

(!isalpha(Text[I])) will becomes true.

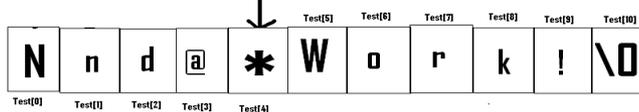
Ie if(!isalpha(Text[I]))

Text[I]='*';

Ie Text[4]='*'

Ie '*' will be stored in place of '@'

Now the String Text[] =



When I=5

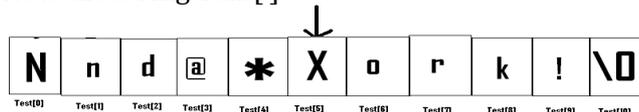
Since Text[5] is 'W', Upper Case Letter, (isupper(Text[I]) will becomes true.

So Text[I] =Text[I+1]

So Text[5]=Text[5+1]

Text[5] =87(ASCII Value of W) + 1 = 88
=X(88 is ASCII Value of X)

Now the String Text[] =



When I=6

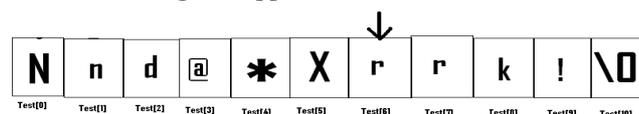
Since Text[6] is 'o', Which is a character, but which is not Upper case, else part will be executed.

Ie Text[I]=Text[I+1]

Here Text[6]=Text[6+1]
=Text[7]

Ie 'r' will be stored in place of 'o'

Now the String Text[] =



When I=7

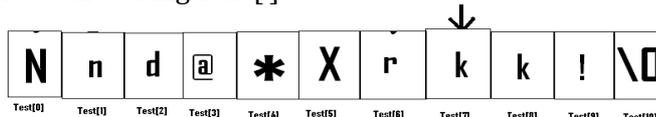
Since Text[7] is 'r', Which is a character, but which is not Upper case, else part will be executed.

Ie Text[I]=Text[I+1]

Here Text[7]=Text[7+1]=Text[8]

Ie 'k' will be stored in place of 'r'

Now the String Text[] =



When I=8

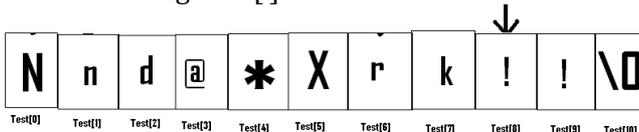
Since Text[8] is 'k', Which is a character, but which is not Upper case, else part will be executed. Ie Text[I]=Text[I+1]

Here Text[8]=Text[8+1]

=Text[9]

Ie '!' will be stored in place of 'k'

Now the String Text[] =



When I=9

Since Text[9] is '!', Since which is not an alphabet, (!isalpha(Text[I])) will becomes true.

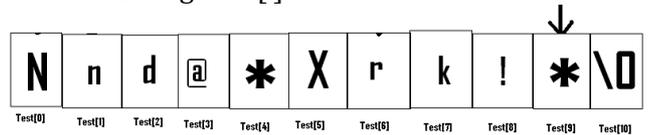
Ie **if(!isalpha(Text[I]))**
Text[I]='*';

Ie Text[9]='*'

Ie '*' will be stored in place of '!'

Prepared By: Mr.M.Ravi Kiran.

Now the String Text[] =



Output: **Nnd@*Xrk!***

e) Find the output of the following program: 2

```
#include<iostream.h>
void main()
{ int U=10,V=20;
  for(int I=1;I<=2;I++)
  { cout<<"[1]"<<U++<<"&"<<V - 5 <<endl;
    cout<<"[2]"<<V++<<"&"<<U + 2 <<endl;
  }
}A
```

ns: Output:

[1]10&15
[2]21&13
[1]11&16
[2]22&14

f) In the following program, find the correct possible output(s) from the options: 2

```
#include<stdlib.h>
#include<iostream.h>
void main()
{ randomize();
  char City[][10]=
  {"DEL","CHN","KOL","BOM","BNG"};
  int Fly;
  for(int I=0; I<3;I++)
  { Fly=random(2) + 1;
    cout<<City[Fly]<<":";
  }
}
```

Outputs:

- (i) DEL : CHN : KOL:
- (i) CHN: KOL : CHN:
- (ii) KOL : BOM : BNG:
- (iii) KOL : CHN : KOL:

Ans) Since random(2) gives either 0 or 1, Fly value will be either 1 or 2. (random(n) gives you any number between 0 to n-1)

City[1] is "CHN". City[2] is "KOL".

Since I value from 0 to 2 (ie<3), 3 iterations will takes place.

So the possible output consists 3 strings separated by :, each of them may be either "CHN" or "KOL".

So the possible output will be

- (ii) CHN : KOL : CHN:**
- (iv) KOL :CHN : KOL:**

1.a) What is the difference between #define and const? Explain with suitable example.

2

Ans: While they both serve a similar purpose, #define and const act differently. When using #define the identifier gets replaced by the specified value by the compiler, before the code is turned into binary. This means that the compiler makes the substitution when you compile the application.

Eg: #define number 100

In this case every instance of "number" will be replaced by the actual number 100 in your code, and this means the final compiled program will have the number 100 (in binary).

#define with different types of data:

- The #define preprocessor allows us to define symbolic names and constants.
Eg: #define PI 3.14159
- The #define allows you to make text substitutions before compiling the program.
Eg: #define MAX 70
Before compilation, if the C++ preprocessor finds MAX as one word, in the source code, it replaces it with the number 70.
- The #define preprocessor can be used in the creation of macros (code substitution).
Eg: #define SQUARE(x) x*x

Before compilation, if the C++ preprocessor finds SQUARE(x), where x is any value in the source code, it replaces it with its square (ie x*x). Here a macro substitutes text only; It does not check for data types.

On the other hand, when we use **const** and the application runs, memory is allocated for the constant and the value gets replaced when the application is run.

Syntax: const type variable_name=value;

Eg: const int a=10;

The value of a constant is fixed and in the above example, the value for a in entire program is 10 only. You cannot change the value of a, since it is declared as constant.

Difference between #define and const in declaration:

1.#define: #define symbolic_constant value.

Eg: #define number 100 //No semicolon ,no equal to symbol.

2.const: const type variable_name=value;

Eg: const number=100; //Semicolon, equal to symbol.

2008 Outside Delhi:

1.b) Name the header files that shall be needed for the following code: 1

```
void main( )
{
    char word[]="Exam";
    cout<<setw(20)<<word;
}
```

Ans: iostream.h, iomanip.h

1.c) Rewrite the following program after removing the syntax error(s) if any. Underline each correction. 2

```
#include<iostream.h>
void main( )
{
    One=10,Two=20;
    Callme(One;Two);
    Callme(Two);
}
void Callme(int Arg1,int Arg2)
{
    Arg1=Arg1+Arg2;
    Count<<Arg1>>Arg2;
}
```

Ans:

```
void Callme(int Arg1,int Arg2=20);
#include<iostream.h>
void main( )
{
    int One=10,Two=20;
    Callme(One,Two); //Given ; instead of ,
    Callme(Two);
}
void Callme(int Arg1,int Arg2)
{
    Arg1=Arg1+Arg2;
    cout<<Arg1<<Arg2;
}
```

1.d) Find the output of the following program:3

```
#include<iostream.h>
#include<ctype.h>
void main( )
{
    char Mystring[ ] = "what@OUTPUT!";
    for(int I=0; Mystring[I]!='\0';I++)
    { if(!isalpha(Mystring[I]))
        Mystring[I]='*';
        else if(isupper(Mystring[I]))
            Mystring[I]=Mystring[I]+1;
        else
            Mystring[I] =Mystring[I]+1;
    }
    cout<<Mystring;}
}
```

Ans: Output: **hat@*PVUQVU***

e) Find the output of the following program: 2

```
#include<iostream.h>
void main( )
{ int A=5,B=10;
  for(int I=1;I<=2;I++)
  { cout<<"Line1"<<A++<<"&"<<B-2 <<endl;
    cout<<"Line2"<<A++<<"&"<<A +3 <<endl;
  }
}
```

Ans: Output:

Line15&8
Line211&9
Line16&9
Line212&10

f) In the following program, find the correct possible output(s) from the options: 2

```
#include<stdlib.h>
#include<iostream.h>
void main( )
{
  randomize( );
  char Area[ ][10]
    ={"NORTH","SOUTH","EAST","WEST"};
  int ToGo;
  for(int I=0; I<3;I++)
  {
    ToGo=random(2) + 1;
    cout<<Area[ToGo]<<": ";
  }
}
```

Ans: Outputs:

- (i) SOUTH : EAST : SOUTH :
- (ii) NORTH : SOUTH : EAST :
- (iii) SOUTH : EAST : WEST :
- (iv) SOUTH : EAST : EAST :

Ans) Since random(2) gives either 0 or 1, ToGo value will be either 1 or 2. (random(n) gives you any number between 0 to n-1)

Area[1] is "SOUTH". Area[2] is "EAST".

Since I value from 0 to 2 (ie<3), 3 iterations will take place.

So the possible output consists 3 strings separated by ;, each of them may be either "SOUTH" or "EAST".

So the possible output will be

- (i) SOUTH : EAST : SOUTH :
- (iv) SOUTH : EAST : EAST :

1.a) What is the purpose of using a typedef command in C++? Explain with suitable example 2

Ans: C++ allows you to define explicitly new data type names by using the keyword typedef. Using typedef does not actually create a new data class, rather it defines a new name for an

existing type. This can increase the portability of a program as only the typedef statements would have to be changed. Typedef makes your code easier to read and understand. Using typedef can also aid in self documenting your code by allowing descriptive names for the standard data types.

The syntax of the typedef statement is

typedef type name;

Where type is any C++ data type and name is the new name for this type. This defines another name for the standard type of C++. For example, you could create a new name for float values by using the following statement:

typedef float amount;

This statement tells the compiler to recognize amount as an alternative name for float. Now you could create float variables using amount.

amount loan, saving, installment;

Using typedef does not replace the standard C++ data type name with the new name, rather the new name is in addition to the existing name. You still can create float variables using float. Once a new name has been defined by typedef, it can be used as a type for another typedef also.

Eg: typedef amount money;

Now, this statement tells the compiler to recognize money as another name for amount, which itself is another name for float. Typedef does not create any new data types rather provides an alternative name for standard types. Reference provides an alias name for a variable and typedef provides an alias name for a data type.

2007 Delhi :

1.a) Differentiate between a Run Time Error and Syntax Error. Also give suitable examples of each in c++. 2

Ans: Run Time Errors: Errors that occur during the execution of a program are called as run time errors. It is caused of some illegal operation taking place or inavailability of desired or required conditions for the execution of the program. For instance, if a program is trying to open a file which does not exist or it could not be opened, it results into an execution error. Similarly, if enough memory is not available or an expression is trying to divide a number by zero are run-time errors.

Eg: Division by zero. c=a/b ;

User will give the values of a and b at the time of program execution.

If he give the value of b as '0', then division by zero, ie a run time error occurs.

Syntax Errors: Syntax errors occur when rules of a programming languages (syntax) is

misused. Ie when a grammatical rule of C++ is violated.

Eg (i) `c=a+b`

In this statement, since there is no semicolon at the end of the statement, there will occur a syntax error.

(ii) `cin<<a;`

In this statement, since stream insertion operator (`<<`) has given instead of stream extraction operation (`>>`), there will occur a syntax error.

1.b) Name the header file(s) that shall be needed for successful compilation of the following C++ code. 1

```
void main()
{ char String[20];
  gets(String);
  strcat(String,"CBSE");
  puts(String);
}
```

Ans) `stdio.h` `string.h`

1.c) Rewrite the following program after removing the syntactical error(s) if any. Underline each correction. 2

```
#include<iostream.h>
const int Max 10;
void main()
{ int Numbers[Max];
  Numbers = {20,50,10,30,40};
  for(Loc=Max-1;Loc>=0;Loc--)
    cout>>Numbers[Loc];
}
```

Ans)
`#include<iostream.h>`
`const int Max=10;`//Constant Variable 'Max'
//must be initialized.Declaration Syntax Error
`void main()`

```
{ int Numbers[Max]={20,50,10,30,40};
  for(Loc=Max-1;Loc>=0;Loc--)
    cout>>Numbers[Loc];
}
```

e) Find the output of the following program. 3

```
#include<iostream.h>
void Withdef(int HisNum=30)
{ for(int I=20;I<=HisNum;I+=5)
  cout<<I<<" ";
  cout<<endl;
}
void Control(int &MyNum)
{ MyNum+=10;
  Withdef(MyNum);
}
void main()
{ int YourNum=20;
  Control(YourNum);
```

```
Withdef();
cout<<"Number="<<YourNum<<endl;
}
```

Ans: Output:

**20,25,30,
20,25,30,
Number=30**

f) In the following C++ program what is the expected value of MyMarks from options (i) to (iv) given below. Justify answer. 2

```
#include<stdlib.h>
#include<iostream.h>
void main()
{
  randomize();
  int Marks[]={99,92,94,96,93,95},MyMarks;
  MyMarks = Marks [1+random(2)];
  cout<<MyMarks<<endl;
}
```

(i)99 (ii)94 (iii)96 (iv) None of the above.

Ans: Output:

(ii) 94

2007 Outside Delhi:

1.a) Differentiate between a Logical Error and Syntax Error. Also give suitable examples of each in C++. 2

Ans: Logical Error: A logical error is that error which causes a program to produce incorrect or undesired output.

An incorrectly implemented algorithm or use of a variable before its initialization, or unmarked end for a loop, or wrong parameters passed are causes logical errors. These must be handled carefully.

For instance, if we are trying to print the table of a number 5 and if we say

```
counter=1;
while(counter>8)
{ cout<<n*counter;
  counter=counter+1;
}
```

Here the loop would not be executed even once as the condition (`counter>8`) is not fulfilled at all. Therefore, no output will be produced. Such an error is logical error.

Syntax Error: Syntax errors occur when rules of a programming languages (syntax) is misused. Ie when a grammatical rule of C++ is violated.

Eg (i) `c=a+b`

In this statement, since there is no semicolon at the end of the statement, there will occur a syntax error.

(ii) `cin<<a;` In this statement, since stream insertion operator (`<<`) has given instead of

stream extraction operation(>>), there will occur a syntax error.

1.b) Name the header file(s) that shall be needed for successful compilation of the following C++ code.

```
void main()
{
    char Text[40];
    strcpy(Text,"AISSCE");
    puts(Text);
}
```

Ans:

string.h, stdio.h

1.c) Rewrite the following program after removing the syntactical error(s), if any. Underline each correction.

```
#include<iostream.h>
const int Size 5;
void main()
{
    int Array[Size];
    Array={50,40,30,20,10};
    for(Ctr=0;Ctr<Size;Ctr++)
        cout>>Array[Ctr];
}
```

Ans)

```
#include<iostream.h>
const int Size=5;
void main()
{
    int Array[Size];
    Array={50,40,30,20,10};
    for(Ctr=0;Ctr<Size;Ctr++)
        cout<<Array[Ctr];
}
```

1.e) Find the output of the following program

```
#include<iostream.h>
void Indirect(int Temp=20)
{
    for(int I=10;I<=Temp;I+=5)
        cout<<I<<" ";
    cout<<endl;
}
void Direct(int &Num)
{
    Num+=10;
    Indirect(Num);
}
void main()
{
    int Number=20;
    Direct(Number);
    Indirect();
    cout<<"Number ="<<Number<<endl;
}
```

Ans: Output:

10,15,20,25,30,

**10,15,20,
Number =30**

f) In the following C++ program what is the expected value of Mysore from options (i) to (iv) given below. Justify your answer.

```
#include<stdlib.h>
#include<iostream.h>
void main()
{
    randomize();
    int Score[ ] = {25,20,34,56,72,63},Myscore;
    cout<<Myscore<<endl;
}
```

(i) 25 (ii) 34 (iii) 20 (iv) None of the above.

Ans: Expected Output:

(i) None of the above.

2006 Delhi:

1.a) Name the header file to which the following belong:

(i) abs() (ii) isupper()

Ans) (i) abs() - math.h, stdlib.h, complex.h
(ii) isupper() - ctype.h

1.e) Find the output of the following program

```
#include<iostream.h>
void main()
{
    long NUM=1234543;
    int F=0,S=0;
    do
    {
        int R=NUM % 10;
        if (R % 2 != 0)
            F += R;
        else
            S += R;
        NUM /= 10;
    } while (NUM > 0);
    cout<<F-S;
}
```

Ans: Output: **2**

1.b) Illustrate the use of #define in C++ to define a macro.

Ans: The #define preprocessor can be used in the creation of macros (code substitution).

Eg: #define SQUARE(x) x*x

Before compilation, if the C++ preprocessor finds SQUARE(x),

where x is any value in the source code, it replaces it with its square (ie x*x). Here a macro substitutes text only; It does not check for data types.

1.C) Rewrite the following program after removing the syntactical error(s), if any. Underline each correction. 2

```
#include<iostream.h>
void main( )
{ struct STUDENT
  {
    char stu_name[20];
    char stu_sex;
    int stu_age=17;
  }student;
  gets(stu_name);
  gets(stu_sex);
}
```

Ans: #include<iostream.h>

#include<stdio.h>

```
void main( )
{ struct STUDENT
  { char stu_name[20];
    char stu_sex;
    int stu_age;
```

//Initialization of variables inside a structure is not allowed.

```
}student;
gets(student.stu_name);
cin>>student.stu_sex;
```

//A single character cannot be read using gets
}

1.f) What are Nested Structures? Give an example. 2

Ans: Nested structures are structures as member of another structure. For example, the date of birth is a structure within the structure of a student as shown below. These types of structures are known as nested structures.

Name	Roll	DOB			Marks
		DD	MM	YY	

Eg1:

```
struct date
{ int dd;
  int mm;
  int yy;
};
struct student
{ char name[20];
  int roll;
  date dob;
  int marks;
};
```

The member of a nested structure is referenced from the outermost to innermost with the help of dot operators.

student stud;

Then the members of the nested structure can be accessed as **stud.dob.mm=10;**

Eg2:

```
struct addr
{ int houseno;
  char area[26];
  char city[26];
  char state[26];
};
struct emp
{ int empno;
  char name[26];
  char design[16];
  addr address;
  float basic;
}worker;
```

2006 Outside Delhi:

1.a) Name the header file to which the following belong:

1

(i) pow () (ii) random ()

Ans:

(i) abs () - math.h, stdlib.h, complex.h

(ii) random () - stdlib.h

1.e) Find the output of the following program 2

```
#include<iostream.h>
void main( )
{ long Number=7583241;
  int First = 0, Second =0;
  do
  { int R=Number%10;
    if(R%2 ==0)
      First += R;
    else
      Second += R;
    Number /= 10;
  } while (Number > 0);
  cout<<First-Second;
}
```

Ans: Output -2

1.C) Rewrite the following program after removing the syntactical error(s), if any.

Underline each correction. 2

```
#include<iostream.h>
void main( )
{ struct movie
  { char movie_name[20];
    char movie_type;
    int ticket_cost=100;
  }MOVIE;
  gets(movie_name);
  gets(movie_type);
}
```

Ans:#include<iostream.h>

#include<stdio.h>

```
void main( )
{ struct movie
  { char movie_name[20];
```

```

char movie_type;
int ticket_cost;
//Initialization of variables inside a structure is not allowed.
}MOVIE;
gets(MOVIE.movie_name);
cin>>MOVIE.movie_type;
//A single character cannot be read using gets
}

```

2005 Delhi:

1.a) Differentiate between a Call by Value and Call by Reference, giving suitable examples of each. 2

Ans: Call by value: In call by value method, the called function creates a new set of variables and copies the values of arguments into them. The function does not have access to the original variables (actual parameters) and can only work on the copies of values it created. Passing arguments by value is useful when the original values are not to be modified.

In call by reference method, a reference to the actual argument (original variable) is passed to the called function. (Reference is an alias for a predefined variable. Ie the same variable value can be accessed by any of the two names: the original variable's name and the reference name.) Thus, in call by reference method, the changes are reflected back to the original values. The call by reference method is useful in situations where the values of the original variables are to be changed using a function.

Program to illustrate the call by value method of function invoking:

```

#include<iostream.h>
#include<conio.h>
int change(int);
void main( )
{ clrscr( );
int orig=10;
cout<<"\nThe original value
is"<<orig<<"\n";
cout<<"\nReturn value of function
change()is "<<change(orig)<<"\n";
cout<<"\nThe value after function change() is
over"<<orig<<"\n";
getch();
}
int change(int duplicate)
{ duplicate=20;
return duplicate;
}

```

Ans: Output:

The original value is 10
Return value of function change() is 20

The value after function change() is over 10

Program to illustrate the call by Reference method of function invoking:

```

#include<iostream.h>
#include<conio.h>
int change(int&);
void main( )
{ clrscr( );
int orig=10;
cout<<"\nThe original value is"<<orig<<"\n";
cout<<"\nReturn value of function
change()is "<<change(orig)<<"\n";
cout<<"\nThe value after function change() is
over"<<orig<<"\n";
getch();
}
int change(int &duplicate)
{ duplicate=20;
return duplicate;
}

```

Output:

The original value is 10
Return value of function change() is 20
The value after function change() is over 20

1. b) Name the header files to which the following belong: 1

(i) abs() (ii) strcmp()

Ans) (i) abs() - stdlib.h, math.h, complex.h
(ii) strcmp() - string.h

1. c) Rewrite the following program after removing the syntactical error(s), if any. Underline each correction. 2

```

#include<iostream.h>
const int Multiple 3;
void main( )
{
value = 15;
for(int Counter = 1;Counter = <5;Counter ++, Value -= 2)
if(Value%Multiple == 0)
cout<<Value * Multiple;
cout<<endl;
else
cout<<Value + Multiple <<endl; }

```

Answer:

```

#include<iostream.h>
const int Multiple=3;
void main( )
{
int Value = 15;
for(int Counter = 1;Counter <=5;Counter ++, Value -= 2)
if(Value%Multiple == 0)
{ cout<<Value * Multiple;
cout<<endl;
}
else

```

```
cout<<Value + Multiple <<endl;
}
```

1.e) Find the output of the following program 2

```
#include<iostream.h>
#include<string.h>
#include<ctype.h>
void Convert(char Str[ ],int Len)
{
    for(int Count=0;Count<Len;Count++)
    { if(isupper(Str[Count]))
        Str[Count]=tolower(Str[Count]);
      else if (islower(Str[Count]))
        Str[Count]=toupper(Str[Count]);
      else if(isdigit(Str[Count]))
        Str[Count]=Str[Count]+1;
      else Str[Count]='*';
    }
}
void main( )
{
    char Text[ ]="CBSE Exam 2005";
    int Size = strlen(Text);
    Convert(Text,Size);
    cout<<Text<<endl;
    for(int C=0,R=Size - 1;C<=Size/2;C++,R--)
    { char Temp=Text[C];
      Text[C]=Text[R];
      Text[R]=Temp;
    }
    cout<<Text<<endl;
}
```

Ans: Output:

**cbse*eXAM*3116
6113*MXAe*esbc**

1. f) Observe the following program SCORE.CPP carefully, if the value of Num entered by the user is 5, choose the correct possible output(s) from the options from (i) to (iv), and justify your option. 2

```
//Program: SCORE.CPP
#include<stdlib.h>
#include<iostream.h>
void main( )
{
    randomize( );
    int Num,Rndnum;
    cin>>Num;
    Rndnum = random(Num) + 5;
    for(int N = 1;N<=Rndnum;N++)
        cout<<N<<" ";
}
```

Output Options:

- (i) 1 2 3 4 (ii) 1 2
(iii) 1 2 3 4 5 6 7 8 9
(iv) 1 2 3

Ans: Expected Output:

(iii) 1 2 3 4 5 6 7 8 9

1.d) Find the output of the following program:

```
#include<iostream.h>
struct MyBox
{ int Length,Breadth,Height;
};
void Dimension(MyBox M)
{ cout<<M.Length<<"x"<<M.Breadth<<"x";
  cout<<M.Height<<endl;
}
void main( )
{ MyBox B1={10,15,5},B2,B3;
  ++B1.Height;
  Dimension(B1);
  B3=B1;
  ++B3.Length;
  B3.Breadth++;
  Dimension(B3);
  B2=B3;
  B2.Height+=5;
  B2.Length--;
  Dimension(B2);
}
```

Output:

**10x15x6
11x16x6
10x16x11**

2005 Outside Delhi :

1.b) Name the header files to which the following belong: 1

- (i) puts() (ii) isalnum()

Ans)(i) puts() - stdio.h
(ii) isalnum() - ctype.h

1.c) Rewrite the following program after removing the syntactical error(s), if any. Underline each correction. 2

```
#include<iostream.h>
const int divisor 5;
void main( )
{ Number = 15;
  for(int Count=1;Count<=5;Count++,Number -= 3)
  if(Number % divisor == 0)
    cout<<Number / Dividor;
    cout<<endl;
  else
    cout<<Number + Dividor <<endl;
}
```

Ans:
#include<iostream.h>
const int divisor= 5;
void main()
{
int Number = 15;
for(int Count=1;Count<=5;Count++,Number -= 3)
if(Number % divisor == 0)
{ cout<<Number / Dividor;
cout<<endl;

```

}
else
    cout<<Number + Dividor <<endl;
}

```

1.e) Find the output of the following program 2

```

#include<iostream.h>
#include<string.h>
#include<ctype.h>
void Change(char Msg[],int Len)
{ for(int Count=0;Count<Len;Count++)
  { if(islower(Msg[Count]))
    Msg[Count] = toupper(Msg[Count]);
    else if(isupper(Msg[Count]))
    Msg[Count] = tolower(Msg[Count]);
    else if (isdigit(Msg[Count]))
    Msg[Count]=Msg[Count]+1;
    else Msg[Count] = '*';
  }
}
void main( )
{ char Message[ ]="2005 Tests ahead";
  int Size=strlen(Message);
  Change(Message,Size);
  cout<<Message<<endl;
for(int C=0,R=Size - 1; C<=Size/2;C++,R--)
{ char Temp=Message[C];
  Message[C]=Message[R];
  Message[R]=Temp;
}
cout<<Message<<endl;
}

```

Ans: Output:

**3116*tESTS*AHEAD
DAEHA*SSTet*6113**

1.f) Observe the following program GAME.CPP carefully, if the value of Num entered by the user is 14, choose the correct possible output(s) from the options from (i) to (iv), and justify your option. 2

```

//Program:GAME.CPP
#include<stdlib.h>
#include<iostream.h>
void main( )
{ randomize( );
  int Num,Rndnum;
  cin>>Num;
  Rndnum=random(Num)+7;
  for(int N=1;N<=Rndnum;N++)
    cout<<N<<" ";
}

```

Output Options:

- (i) 1 2 3 (ii) 1 2 3 4 5 6 7 8 9 10 11
(iii) 1 2 3 4 5 (iv) 1 2 3 4

Ans: Expected Output

(ii) 1 2 3 4 5 6 7 8 9 10 11

1.d) Find the output of the following program:

```

#include<iostream.h>
struct Package
{ int Length,Breadth,Height;
};
void Occupies(Package M)
{ cout<<M.Length<<"x"<<M.Breadth<<"x";
  cout<<M.Height<<endl;
}
void main( )
{ Package P1={100,150,50},P2,P3;
  ++P1.Height;
  Occupies(P1);
  P3=P1;
  ++P3.Lengh;
  P3.Breadth++;
  Occupies(P3);
  P2=P3;
  P2.Height+=50;
  P2.Length--;
  Occupies(P2);
}

```

Output:

**100x150x51
101x151x51
100x151x101**

2004 Annual Paper:

1.b) Write the names of the header files to which the following belong:

- (i) gets() (ii) strcmp() (iii)abs() (iv)isalnum()

Ans: (i)gets() - stdio.h
(ii)strcmp() - string.h
(iii)abs() - math.h, stdlib.h,complex.h
(iv)isalnum() - ctype.h

1.e) What will be the output of the following program

```

#include<iostream.h>
void main( )
{ int var1=5,var2=10;
  for(int i=1,i<=2;i++)
  { cout<<var1++<<"\t"<< - - var2<<endl;
    cout<<var2- -<<"\t"<<+ + var1<<endl;
  }
}

```

Ans: Output:

5	9
9	7
7	7
7	9

f)Write definition for a function SumSequence() in C++ with two arguments/ parameters - double X and int n. The function should return a value of type double and it should perform sum of the following series.

$1/x - 3!/x^2 + 5!/x^3 - 7!/x^4 + 9!/x^5 - \dots$ upto n terms.

Note: The symbol ! represents Factorial of a number ie $5! = 1 \times 2 \times 3 \times 4 \times 5$.

```
#include<iostream.h>
#include<math.h>
#include<conio.h>
double SumSequence(int x1,int n1);
void main()
{ int x;
  int n;
  clrscr();
  cout<<"Enter the vaue of X and N";
  cin>>x>>n;
  cout<<"\nThe sum of the series =
    "<<SumSequence(x,n);
  getch();
}
double SumSequence(int x1,int n1)
{ double sum=0;
  int c=0;
  for(int i=1;i<=(2*n1);i=i+2)
  { int f=1;
    for(int j=1;j<=i;j++)
    { f=f*j;
    }
    c=c+1;
    if(c%2==1)
    { sum=sum+f/(pow(x1,c));
    }
    else
    { sum=sum-f/(pow(x1,c));
    }
  }
  return sum;
}
```

1.c) Rewrite the corrected code for the following program. Underline each correction if any.

```
#include<iostream.h>
structure Supergym
{ int member number;
  char membername[20];
  char membertype[]="HIG";
};
void main( )
{ Supergym person1,person2;
  cin>>"Member Number: ";
  cin>>person1.membhnumber;
  cout<<"Member Name: ";
  cin>>person1.membername;
  person1.member type = "MIG";
  person2=person1;
  cin>>"Member Number;"
  <<person2.membernumber;
  cin<<"Member Name"
  <<person2.membername;
```

```
cin<<"Member Number:"
  <<person2.membertype;
}
```

Ans:

```
#include<iostream.h>
#include<string.h>
struct Supergym
{ int membernumber;
  char membername[20];
  char membertype[4];
};
void main( )
{ Supergym person1,person2;
  cin>>"Member Number: ";
  cin>>person1.membernumber;
  cout<<"Member Name: ";
  cin>>person1.membername;
  strcpy(person1.membertype,"MIG");
  person2=person1;
  cin>>"Member Number;"
  >>person2.membernumber;
  cin>>"Member Name"
  >>person2.membername;
  cin>>"Member Number:"
  >>person2.membertype;
}
```

2003 Annual Paper:

1.a) What is the difference between global variables and local variables? Give an example to illustrate the same. 2

Ans: The local variables are the variables defined within any function (or block) and are hence accessible only within the block in which they are declared. In contrast to local variables, variables declared outside of all the functions in a program are called global variables. These variables are defined outside of any function, so they are accessible to all functions. These functions perform various operations on the data. They are also known as External Variables.

Eg: #include<iostream.h>

```
int a,b;
void main()
{ float f;
  ---;
  ---;
}
```

In the above program segment, a and b are global variables, we can access a and b from any function. f is local variable to function main(), we can access f from main() only.

1.b) Name the header file, to which the following built-in function belongs:

(i) strcmp() (ii) getc() 1

Ans: (i) strcmp() - string.h

(ii) getc() - stdio.h

1.c) Rewrite the following program after removing all the syntax error(s) if any.

```
#include<iostream.h>
void main( )
{ int P[ ]={90,10,24,15};Q,Number=4;
  Q=9;
  for[ int I=Number-1;I>=0,I--]
  switch(I)
  { case 0;
    case 3:cout>>P[I]*Q<<endl;break;
    case 1:
    case 2: cout<<P[I]+Q;
  }
}
```

Ans:

```
#include<iostream.h>
void main( )
{ int P[ ]={90,10,24,15},Q,Number=4;
  Q=9;
  for(int I=Number-1;I>=0;I--)
  switch(I)
  { case 0;
    case 3:cout<<P[I]*Q<<endl; break;
    case 1:
    case 2: cout<<P[I]+Q;
  }
}
```

1.e) Write the output of the following program:

```
#include<iostream.h>
int Execute(int M)
{ if(M%3==0)
  return M*3;
  else
  return M+10;
}
void Output(int B=2)
{ for(int T=0;T<B;T++)
  cout<<Execute(T)<<"*";
  cout<<endl;
}
void main( )
{ Output(4);
  Output( );
  Output(3);
}
```

Output:

```
0*11*12*9*
0*11*
0*11*12*
```

f) Write a C++ function SUMFUN() having two parameters Y(of type double) and m(of type integer) with a result type as double to find the sum of the series given below:

$$Y + Y^3 / 2! + Y^5 / 3! + \dots + Y^{2m-1} / m!$$

```
#include<iostream.h>
#include<math.h>
#include<conio.h>
```

```
double SUMFUN(int y1,int m1);
void main()
{ int y;
  int m;
  clrscr();
  cout<<"Enter the vaue of Y and M";
  cin>>y>>m;
  cout<<"\n\nThe sum of the series =
  "<<SUMFUN(y,m);
  getch();
}
double SUMFUN(int y1,int m1)
{ double sum=0;
  double upper;
  for(int i=1;i<=m1;i++)
  { int f=1;
    for(int j=1;j<=i;j++)
    { f=f*j;
    }
    upper=pow(y1,(i*2-1));
    sum=sum+upper/f;
  }
  return sum;
}
```

1.d) Give the output of the following program:

```
#include<iostream.h>
struct Pixel
{ int C,R;
};
void Display(Pixel P)
{ cout<<"col"<<P.C<<"Row"<<P.R<<endl;
}
void main( )
{ Pixel X={40,50},Y,Z;
  Z=X;
  X.C+=10;
  Y=X;
  Y.R+=20;
  Z.C-=15;
  Display(X);
  Display(Y);
  Display(Z);
}
```

Output:

```
col50Row50
col50Row70
col25Row50
```

2002:

1.b) Name the header files of C++ to which the following functions belong: 2

(i) get() (ii) open()
(iii) abs() (iv) strcat()

Ans: (i) get() - iostream.h
(ii) open() - fstream.h
(iii) abs() - math.h, stdlib.h
(iv) strcat() - string.h

1.c) Find the syntax error(s), if any, in the following program.

2

```
#include<iostream.h>
void main()
{ int x;
  cin>>x;
  for( int y=0,y<10,y++)
    cout<<x+y;
}
```

Ans:

```
#include<iostream.h>
void main()
{ int x;
  cin>>x;
  for( int y=0;y<10;y++)
    cout<<x+y;
}
```

1.d) Write the output of the following program

```
void main()
{ int x=5,y=5;
  cout<<x- -;
  cout<<" ";
  cout<<- - x;
  cout<<" ";
  cout<<y- -<<" "<<- - y;
}
```

Ans: Output:

5,3,4,4

1.e) Write the output of the following program

```
#include<iostream.h>
void X(int &A,int &B)
{   A=A+B;
    B=A-B;
    A=A-B;
}
void main()
{   int a=4,b=18;
    X(a,b);
    cout<<a<<" "<<b;
}
```

Ans: Output:

18,4

f) Write a function called zero_Small() that has two integer arguments being passed by reference and sets the smaller of the two numbers to 0. Write the main program to access this function.

4

```
#include<iostream.h>
#include<conio.h>
void zero_Small(int &A,int &B)
{   if(A<B)
        A=0;
    else
```

```
        B=0;
}
void main()
{ clrscr();
  int a,b;
  cout<<"Enter any two values...";
  cin>>a>>b;
  cout<<"Initial values of a and b are ";
  cout<<a<<" "<<b<<endl;
  zero_Small(a,b);
  cout<<endl<<"The final values of a and b are ";
  cout<<a<<" "<<b;
  cout<<endl;
  cout<<"\nPress any key to continue...";
  getch();
}
```

2001:

1.b) Name the header file to be included for the use of the following built in functions:

(i) getc() (ii) strcat() 1

Ans:

(i) getc() - stdio.h
(ii) strcat() - string.h

1.e) Give the output of the following program:

```
#include<iostream.h>
#include<conio.h>
int g=20;
void func(int &x,int y)
{   x=x-y;
    y=x*10;
    cout<<x<<' '<<y<<"\n";
}
void main()
{   int g=7;
    func(g,::g);
    cout<<g<<' '<<::g<<"\n";
    func(::g,g);
    cout<<g<<' '<<::g<<"\n";
}
```

Ans: Output:

-13,-130

-13,20

33,330

-13,33

1.f) Write a function named SUMFIN(), with arguments x, N, which returns the sum of N terms of the following series:

4

```
x - x^3/3 + x^5/5 - x^7/7 + x^9/9
#include<iostream.h>
#include<math.h>
#include<conio.h>
double SUMFIN(int x1,int n1);
void main()
```

```

{ int x;
  int n;
  clrscr();
  cout<<"Enter the vaue of X and N";
  cin>>x>>n;
cout<<"\nThe sum of Series = "<<SUMFIN(x,n);
  getch();
}
double SUMFIN(int x1,int n1)
{ double sum=0;
  int c=0;
  for(int i=1;i<=(2*n1);i=i+2)
  { c=c+1;
    if(c%2==1)
    { sum=sum+(pow(x1,i))/i;
    }
    else
    { sum=sum-(pow(x1,i))/i;
    }
  }
  return sum;
}

```

1.e) Give the output of the following program. 3

```

#include<iostream.h>
#include<conio.h>
int g=20;
void func(int &x,int y)
{ x=x-y;
  y=x*10;
  cout<<x<<','<<y<<\n';
}
void main( )
{ int g=7;
  func(g,::g);
  cout<<g<<','<<::g<<\n';
  func(::g,g);
  cout<<g<<','<<::g<<\n';
}

```

Answer:
-13,-130
-13,20
33,330
-13,33

2000:

1.b) Name the header file, to which following built in function belong: 2

- (i) isupper() (ii) setw()
- (iii) exp() (iv) strcmp()

Ans) (i) isupper() - ctype.h
(ii) setw() - iomanip.h
(iii) exp() - math.h
(iv) strcmp() - string.h

1.c) Will the following program execute successfully? If not, state the reason(s) 2

```

#include<stdio.h>
void main( )
{ int s1,s2,num;
  s1=s2=0;

```

```

for(x=0;x<11;x++)
{ cin<<num;
  if(num>0)s1+=num;else s2=/num;
}
cout<<s1<<s2;
}

```

Ans: The program will not execute successfully. Because some syntax errors are there in the program. They are
(ii) cin and cout, stream objects used but iostream.h header file is not included in the program.
(ii) x is not declared, it should be declared as int.
(iii) With cin, we should use >> instead of <<.
(iv) The shorthand operator /=, is given wrongly as =/.

So the corrected program is as follows:

```

#include<iostream.h>
void main( )
{ int s1,s2,num;
  s1=s2=0;
  for(int x=0;x<11;x++)
  { cin>>num;
    if(num>0)s1+=num;else s2/=num;
  }
  cout<<s1<<s2;
}

```

d) Give the output of the following program segment (Assuming all required header files are included in the program): 2

```

char *NAME="a ProFile";
for(int x=0;x<strlen(NAME);x++)
  if(islower(NAME[x]))
    NAME[x]=toupper(NAME[x]);
  else if(isupper(NAME[x]))
    if(x%2!=0)
      NAME[x]=tolower(NAME[x-1]);
    else
      NAME[x]--;
cout<<NAME<<endl;

```

Ans: Output: **AORo0liE**

1.e) Write the output of the following program 3

```

#include<iostream.h>
int func(int &x,int y=10)
{ if(x%y==0) return ++x;else return y- -;
}
void main( )
{ int p=20,q=23;
  q=func(p,q);
  cout<<p<<q<<endl;
  p=func(q);
  cout<<p<<q<<endl;
  q=func(p);
  cout<<p<<q<<endl;
}

```

Ans: Output: **2023**
 1023
 1111

f) Write a function seqsum() in C++ with two arguments, double x and int n. The function should return a value of type double and it should find the sum of the following series. 4
 $1 + x/2! + x^2/4! + x^3/6! + x^4/8! + x^5/10! + \dots + x^n/(2n)!$

```
#include<iostream.h>
#include<math.h>
#include<conio.h>
double seqsum(int x1,int m1);
void main()
{ int x;
  int m;
  clrscr();
  cout<<"Enter the vaue of X and M";
  cin>>x>>m;
  cout<<"\nThe sum of the series =
    "<<seqsum(x,m);
  getch();
}
double seqsum(int x1,int m1)
{ double sum=1;
  for(int i=1;i<=m1;i++)
  { int f=1;
    for(int j=1;j<=2*i;j++)
    { f=f*j;
    }
    sum=sum*pow(x1,i)/f;
  }
  return sum;
}
```

1999 Annual Paper:

1.a) Why main() function is so special. Give two reasons? 1
Ans: Execution of the program starts and ends at main(). The main() is the driver function of the program. If it is not present in a program, no execution can take place.

1.b) Name the header file of C++ to which following functions belong. (i)strcat() (ii) scanf() (iii) getchar() (iv)clrscr()

Ans: (i)strcat() - string.h
(ii)scanf() - stdio.h
(iii)getchar() - stdio.h
(iv)clrscr() - conio.h

1.c) Find the syntax error(s), if any, in the following program:

```
#include<iostream.h>
main()
{ int x[5],*y,z[5];
```

```
for(i=0;i<5;i++)
{ x[i]=i;
  z[i]=i+3;
  y=z;
  x=y;
}
}
```

Ans (i) Line No 5: Undefined symbol 'i'.
The variable 'i' is not declared in the program.
(ii)Line No 10:Assign the value of a pointer to an integer variable. Ie error in x=y.

1.e) Write the output of the following program.

```
#include<iostream.h>
static int i=100;
void abc( )
{ static int i=8;
  cout<<"first ="<<i;
}
main()
{ static int i=2;
  abc();
  cout<<"second ="<<i<<endl;
}
```

Ans: Output:

First =8second =2

1.f) Write a C++ function that converts a 2-digit octal number into binary number and prints the binary equivalent.

```
#include<iostream.h>
#include<conio.h>
void binary(int a)
//member function for conversion
{ int i,b[5]; //integer array 6
  for(i=3;i>=1;i--)
  { b[i]=a%2;
    a=a/2;
  }
  for(i=1;i<=3;i++)
  cout<<b[i];
}
void main()
{ int n,x,y;
  clrscr();
  cout<<"Enter a two digit octal number: ";
  cin>>n;
  x=n/10;
  y=n%10;
  binary(x);
  binary(y);
  getch();
}
```

1998 Annual Paper:

1.b)Name the header files, to which the following built in functions belongs to:

- (i)cos() (ii)setw()
 (iii)toupper() (iv)strcpy()
Ans: (i) cos() - math.h
 (ii) setw() - iomanip.h
 (iii) toupper() - ctype.h
 (iv) strcpy() - string.h

1.c) Find the syntax error(s), if any, in the following program:

```
include<iostream.h>
void main( )
{ int R; W=90;
  while W>60
  { R=W-50;
    switch(W)
    { 20:cout<<"Lower Range"<<endl;
      30:cout<<"Middle Range "<<endl;
      40:cout<<"Higher Range"<<endl;
    } }
}
```

- Ans:**
- (i) Line 1: It should be, #include<iostream.h>
 - (ii) Line 4: Variables should be separated using commas. It should be int R,W=90;
 - (iii) Line 5: Test expression should be in braces. It should be while (W>60)
 - (iv) Line 10: It should be case 20;
 - (v) Line 11: It should be case 30;
 - (vi) Line 13: It should be case 40;

So the corrected version of the program is as follows:

```
#include<iostream.h>
void main( )
{ int R, W=90;
  while (W>60)
  {R=W-50;
    switch(W)
    { case 20:cout<<"Lower Range"<<endl;
      case 30:cout<<"Middle Range "<<endl;
      case 40:cout<<"Higher Range"<<endl;
    } }
}
```

1.d) Give the **output** of the following program segment:

```
char *NAME="IntRAnE";
for(int x=0;x<strlen(NAME); x++)
if(islower(NAME[x])
NAME[x]=toupper(NAME[x]));
else if(isupper(NAME[x]))
if(x%2==0)
NAME[x]=tolower(NAME[x]);
else
NAME[x]=NAME[x-1];
puts(NAME);
```

Ans: Output: **INTTaNEE**

1.f) Write the output of the following program:

```
#include<iostream.h>
void Execute(int &X,int Y=200)
{ int TEMP=X+Y;
  X+=TEMP;
  if(Y!=200)
    cout<<TEMP<<X<<Y<<endl;
}
void main( )
{ int A=50,B=20;
  Execute(B);
  cout<<A<<B<<endl;
  Execute(A,B);
  cout<<A<<B<<endl;
}
```

Output:
50240
290340240
340240

1.f) Write a C++ function having two value parameters X and N with result type float to find the sum of series given below:

$$1 + x^1/2! + x^2/3! + x^3/4! + x^4/5! + \dots + x^n/(n+1)!$$

```
#include<iostream.h>
#include<conio.h>
#include<math.h>
float sum_series(float X,int N) //function being declared
{ float sum=0,term;
  int fact,f;
  sum+=1;
  for(int i=1;i<=N;i++)
  { fact=1;
    for(f=1;f<=(i+1);f++)
    fact*=f;
    term=pow(X,i)/fact;
    sum+=term;
  }
  return(sum);
}
void main( )
{ clrscr( );
  float x1;
  int n1;
  cout<<"\nEnter the value of X and N";
  cin>>x1>>n1;
  cout<<"\nThe Sum of the Series
  ..."<<sum_series(x1,n1);
  getch( ); }
```

Model Paper 1 for 2008-09 Batch:

Q1. (a) What is the difference between Global Variable and Local Variable? 2

Answer:

Global Variable	Local Variable
• It is a variable, which is declared outside all the	• It is a variable, which is declared with in a function

<p>functions</p> <ul style="list-style-type: none"> It is accessible throughout the program 	<p>or with in a compound statement</p> <ul style="list-style-type: none"> It is accessible only within a function/compound statement in which it is declared
<pre>#include <iostream.h> float NUM=900; //NUM is a global variable void LOCAL(int T) { int Total=0; //Total is a local variable for (int I=0;I<T;I++) Total+=I; cout<<NUM+Total; } void main() { LOCAL(45); }</pre>	

1.b) Write the names of the header files to which the following belong: 1

(i) strcmp() (ii) fabs()

Answer: (i) string.h (ii) math.h

1(d) Find the output of the following program: 3

```
#include <iostream.h>
struct PLAY
{
  int Score, Bonus;
};
void Calculate(PLAY &P, int N=10)
{
  P.Score++;
  P.Bonus+=N;
}
void main()
{
  PLAY PL={10,15};
  Calculate(PL,5);
  cout<<PL.Score<<": "<<PL.Bonus<<endl;
  Calculate(PL);
  cout<<PL.Score<<": "<<PL.Bonus<<endl;
  Calculate(PL,15);
  cout<<PL.Score<<": "<<PL.Bonus<<endl;
}
```

Answer:

11:20
12:30
13:45

1.e) Find the output of the following program 2

```
#include <iostream.h>
#include <ctype.h>
```

```
void Encrypt(char T[])
{ for (int i=0;T[i]!='\0';i+=2)
  if (T[i]=='A' || T[i]=='E')
    T[i]='#';
  else if (islower(T[i]))
    T[i]=toupper(T[i]);
  else
    T[i]='@';
}
void main()
{ char Text[]="SaVE EArTH";
//The two words in the string Text are separated by single space
  Encrypt(Text);
  cout<<Text<<endl;
}
```

Answer:

@a@E@E#rTH

1.f) In the following program, if the value of N given by the user is 15, what maximum and minimum values the program could possibly display? 2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{ int N,Guessme;
  randomize();
  cin>>N;
  Guessme=random(N)+10;
  cout<<Guessme<<endl;
}
```

Answer:

Maximum Value:24 Minimum Value:10

Model Paper 2 for 2008-09 Batch:

1.b) Write the names of the header files to which the following belong: 1

(i) frexp() (ii) isalnum()

Answer:

(i) math.h (ii) ctype.h

1.d) Find the output of the following program 3

```
#include <iostream.h>
void Changethecontent(int Arr[], int Count)
{
  for (int C=1;C<Count;C++)
    Arr[C-1]+=Arr[C];
}
void main()
{
  int A []={3,4,5},B []={10,20,30,40},C []={900,1200};
  Changethecontent(A,3);
  Changethecontent(B,4);
  Changethecontent(C,2);
  for (int L=0;L<3;L++)
```

```

    cout<<A[L]<<'#';
cout<<endl;
for (L=0;L<4;L++)
    cout<<B[L] <<'#';
cout<<endl;
for (L=0;L<2;L++)
    cout<<C[L] <<'#';
}

```

Answer:

```

7#9#5#
30#50#70#40#
2100#1200#

```

1.(e) Find the output of the following program:2

```

#include <iostream.h>
struct Game
{
    char Magic[20];int Score;
};
void main()
{
    Game M={"Tiger",500};
    char *Choice;
    Choice=M.Magic;
    Choice[4]='P';
    Choice[2]='L';
    M.Score+=50;
    cout<<M.Magic<<M.Score<<endl;
    Game N=M;
    N.Magic[0]='A';N.Magic[3]='J';
    N.Score-=120;
    cout<<N.Magic<<N.Score<<endl;
}

```

Answer:

```

TiLeP550
AiLJP430

```

1.f) In the following program, if the value of N given by the user is 20, what maximum and minimum values the program could possibly display? 2

```

#include <iostream.h>
#include <stdlib.h>
void main()
{ int N,Guessnum;
  randomize();
  cin>>N;
  Guessnum=random(N-10)+10;
  cout<<Guessnum<<endl;
}

```

Answer:

```

Maximum Value:19 Minimum Value:10

```

Sample Paper 1 for 2009-10:

1.a) What is the difference between Global Variable and Local Variable? Also, give a suitable C++ code to illustrate both. 2

Ans) Global Variable:

- * It is a variable which is declared outside all the Functions
- * It is accessible throughout the program

Local Variable:

- * It is a variable which is declared with in a function or with in a compound statement
- * It is accessible only within a function/ compound statement in which it is declared

```

#include <iostream.h>
float NUM=900; //NUM is a global variable
void LOCAL(int T)
{
    int Total=0; //Total is a local variable
    for (int I=0;I<T;I++)
        Total+=I;
    cout<<NUM+Total;
}
void main()
{
    LOCAL(45);
}

```

1.b) Which C++ header file(s) will be essentially required to be included to run /execute the following C++ code: 1

```

void main()
{
    char Msg[ ]="Sunset Gardens";
    for (int I=5;I<strlen(Msg);I++)
        puts(Msg);
}

```

A) (i) string.h (ii) stdio.h

1. d) Find the output of the following program:3

```

#include <iostream.h>
struct GAME
{
    int Score, Bonus;
};
void Play(GAME &g, int N=10)
{
    g.Score++;
    g.Bonus+=N;
}
void main()
{
    GAME G={110,50};
    Play(G,10);
    cout<<G.Score<<": "<<G.Bonus<<endl;
    Play(G);
    cout<<G.Score<<": "<<G.Bonus<<endl;
}

```

```
Play(G,15);
cout<<G.Score<<": "<<G.Bonus<<endl;
```

}
A)

111:60 3
112:70
113:85

e) Find the output of the following program: 2

```
#include <iostream.h>
void Secret(char Str[ ])
{
    for (int L=0;Str[L]!='\0';L++);
    for (int C=0;C<L/2;C++)
    if (Str[C]=='A' || Str[C]=='E')
        Str[C]='#';
    else
    {
        char Temp=Str[C];
        Str[C]=Str[L-C-1];
        Str[L-C-1]=Temp;
    }
}
void main()
{
    char Message[ ]="ArabSagar";
    Secret(Message);
    cout<<Message<<endl;
}
```

A) #agaSbarr

f) In the following program, if the value of Guess entered by the user is 65, what will be the expected output(s) from the following options (i), (ii), (iii) and (iv)? 2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{
    int Guess;
    randomize();
    cin>>Guess;
    for (int I=1;I<=4;I++)
    {
        New=Guess+random(I);
        cout<<(char)New;
    }
}
```

- (i) ABBC
- (ii) ACBA
- (iii) BCDA
- (iv) CABD

A)

(i) ABBC

Sample Paper 2 for 2009-10 Batch:

1.(a) What is the difference between Actual Parameter and Formal Parameters? Also, give a suitable C++ code to illustrate both 2

A) Actual Parameter Formal Parameter 2

* It is a parameter, which is used in function call to send the value from calling environment

* It is a parameter, which is used in function header, to receive the value from actual parameter

```
#include <iostream.h>
void Calc(int T) //T is formal parameter
{
    cout<<5*T;
}
void main()
{
    int A=45;
    Calc(A); //A is actual parameter
}
```

(b) Write the names of the header files to which the following belong: 1

(i) frexp() (ii) isalnum()

A) (i) math.h (ii) ctype.h

(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```
#include <iostream.h>
struct Pixels
{ int Color,Style;}
void ShowPoint(Pixels P)
{ cout<<P.Color,P.Style<<endl;}
void main()
{
    Pixels Point1=(5,3);
    ShowPoint(Point1);
    Pixels Point2=Point1;
    Color.Point1+=2;
    ShowPoint(Point2);
}
```

Ans:

```
#include <iostream.h> 2
struct Pixels
{
    int Color,Style;
};
void ShowPoint(Pixels P)
{
    cout<<P.Color<<P.Style<<endl;
}
```

```

void main()
{
    Pixels Point1={5,3};
    ShowPoint(Point1);
    Pixels Point2=Point1;
    Point1.Color+=2;
    ShowPoint(Point2);
}

```

(d) Find the output of the following program: 3

```

#include <iostream.h>
void Changethecontent(int Arr[ ], int Count)
{
    for (int C=1;C<Count;C++)
        Arr[C-1]+=Arr[C];
}
void main()
{
    int A[]={3,4,5},B[]={10,20,30,40},C[]={900,1200};
    Changethecontent(A,3);
    Changethecontent(B,4);
    Changethecontent(C,2);
    for (int L=0;L<3;L++) cout<<A[L]<<'#';
        cout<<endl;
    for (L=0;L<4;L++) cout<<B[L] <<'#';
        cout<<endl;
    for (L=0;L<2;L++) cout<<C[L] <<'#';
}

```

Ans:

7#9#5#
30#50#70#40#
2100#1200#

(e) Find the output of the following program: 2

```

#include <iostream.h>
struct Game
{
    char Magic[20];int Score;
};
void main()
{
    Game M={"Tiger",500};
    char *Choice;
    Choice=M.Magic;
    Choice[4]='P';
    Choice[2]='L';
    M.Score+=50;
    cout<<M.Magic<<M.Score<<endl;
    Game N=M;
    N.Magic[0]='A';N.Magic[3]='J';
    N.Score-=120;
    cout<<N.Magic<<N.Score<<endl;
}

```

A)

TiLeP550
AiLJP430

(f) In the following program, if the value of N given by the user is 20, what maximum and minimum values the program could possibly display? 2

```

#include <iostream.h>
#include <stdlib.h>

```

```

void main()
{
    int N,Guessnum;
    randomize();
    cin>>N;
    Guessnum=random(N-10)+10;
    cout<<Guessnum<<endl;
}
A)
Maximum Value: 19 Minimum Value: 10

```

Header files – Important Functions.

From Old Papers

Name the header files that shall be needed for the following

2009 Outside Delhi:

- (i) setw() – iomanip.h
- (ii) sqrt() – math.h

2008 Delhi & OD:

Due to cout, include **iostream.h**
 Due to setw(), include **iomanip.h**

2007 Delhi & OD:

Due to strcat(), include **string.h**
 Due to gets(), include **stdio.h**

2006 Delhi:

- (i) abs() - math.h, stdlib.h
- (ii) isupper() - ctype.h

2006 Outside Delhi

- (i) abs() - math.h, stdlib.h
- (ii) random() - stdlib.h

2005 Delhi:

- (i) abs() - stdlib.h, math.h
- (ii) strcmp() - string.h

2005 OD:

- (i) puts() - stdio.h
- (ii) isalnum() - ctype.h

2004 :

- (i) gets() - stdio.h
- (ii) strcmp() - string.h
- (iii) abs() - math.h, stdlib.h
- (iv) isalnum() - ctype.h

2003:

- (i) strcmp() - string.h
- (ii) getc() - stdio.h

2002:

- (i) get() - iostream.h
- (ii) open() - fstream.h
- (iii) abs() - math.h, stdlib.h

(iv) **strcat()** - string.h

2001:

(i) **getc()** - stdio.h

(ii) **strcat()** - string.h

2000:

(i) **isupper()** - ctype.h

(ii) **setw()** - iomanip.h

(iii) **exp()** - math.h

(iv) **strcmp()** - string.h

1999:

(i) **strcat()** - string.h

(ii) **scanf()** - stdio.h

(iii) **getchar()** - stdio.h

(iv) **clrscr()** - conio.h

1998:

(i) **cos()** - math.h

(ii) **setw()** - iomanip.h

(iii) **toupper()** - ctype.h

(iv) **strcpy()** - string.h

Model Paper 1:

(i) **strcmp()** - string.h

(ii) **fabs()** - math.h

Model Paper 2:

(i) **frexp()** - math.h

(ii) **isalnum()** - ctype.h

ctype.h (Character functions)

isalnum(), isalpha(), isdigit(), islower(),
isupper(), tolower(), toupper()

string.h (Generally starts with str)

strcat(), strcmp(), strcpy(), strlen(), strchr(),
stricmp(), strlwr(), strew(),strupr()

iomanip.h

setw(), setprecision(), endl, flush().

stdlib.h

abs(), labs(), free(), random(), atof(), atoi(),
atol(),strtol(), strtod(), calloc(),malloc(),
realloc()

iostream.h

(cout,cin – these are streams available in
iostream.h)

get() getline() read() write() put()
open() close() flush()
seekg() seekp() tellg() tellp()
bad() eof() fail() good() clear()

stdio.h (Many of the functions starting with f)

printf() scanf()
fflush() fgetc() fgetchar() fgets() fopen()
fprintf() fputc() putchar()
fputs() fread() freopen() fscanf() fseek()
fsetpos() fwrite() ftell()
fwrite() getc() getchar() gets() getw()
putc() putchar() puts() putw()

remove() rename()

conio.h

clrscr() getch() gotoxy() cprintf()

dos.h

sound() nosound() delay()

process.h

exit(0)

math.h

acos() acosl(), etc, etc div() exp() ceil()
ceill() fabs() floor() fmod() log() pow()
modf() poly() sqrt()

*“ The fear of the
Lord
is the beginning of wisdom”*

****All the best My Dear Children****

2.OBJECT ORIENTED PROGRAMMING & 3. FUNCTION OVERLOADING

2010 Delhi:

2. (a) What do you understand by
Polymorphism? Also, give an example in C++
to illustrate the same. **2**

Ans. The process of using an -operator or a
function in different ways for different set of
inputs given is known- as polymorphism.
Function overloading is- an example of
polymorphism, where the functions having same
name with different set of parameters perform
different operations.

Example:

```
void Disp () //Function 1
{
    cout<<"Hello"<<endl;
}
void Disp(int N) //Function 2
{
    for(int I=1;I<=N;I++)
        cout<<I<<endl;
}
void Disp (int N,int M) //Function 3
{
    for (int I=N;I<=M; I++)
        cout<<N<<"x"<<I<<"="<<N*I<<endl;
}
void main ()
{
    int x=5, y=10;
    Disp(x); //Function 2 called-Prints
    // numbers from 1 to 5
    Disp(x,y) ; //Function 3 called- Prints
    //from multiples of 5 ranging from 5 to 10
    Disp () ; //Function 1 called- Prints Hello
```

```
}
```

2010 Outside Delhi:

2. (a) What do you understand by Data Encapsulation and Data Hiding? Also, give an example in C++ to illustrate both. 2

Ans. Data Encapsulation: Wrapping up of data and functions together in a single unit is known as Data Encapsulation. In a class, we wrap up the data and functions together in a single unit.

Data Hiding: Keeping the data in private/protected visibility mode of the class to prevent it from accidental change is known as Data Hiding.

```
class Computer
{
    char CPU[10]; int RNM; //Data Hiding
public:
    //Data
    Encapsulation
    void STOCK();
    void SHOW();
};
```

2009 Outside Delhi:

2. (a) What is function overloading? Give an example in C++ to illustrate function overloading. 2

Ans Function overloading is an example of polymorphism, where the functions having same name with different set of parameters perform different operations. OR

When a function is having more than one definition and differentiable by the number/type of parameters is known as function overloading

Example:

```
void Disp() //Function 1
{
    cout<<"Hello"<<endl;
}
void Disp(int N) // Function 2
{
    for (int I=1;I<=N;I++)
        cout<<I<<endl;
}
void main ()
{
    int x=5;
    Disp(x); //call for Function 2 - Prints
    //numbers from 1 to 5
    Disp(); //call for Function 1 - Prints Hello
}
```

2005 Delhi:

2.a) Define the term Data Hiding in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same. 2

Ans: A class groups its members into three sections: private, protected and public. The private and protected members remain hidden

from outside world. Thus through private and protected members, a class enforces data – hiding. (The outside world is given only the essential and necessary information through public members, rest of the things remain hidden, which is nothing but abstraction. The act of representing only essential features without including background details is known as abstraction.)

Eg: class ABC

```
{
    private: int a,b;
    protected: int c,d;
    public: int e,f;
    void disp()
    {
        ----
    }
    ----
}
```

In the above class public members (ie e,f and disp()) only will be available to outside the class. The other private members (a,b), protected members (c,d) will not be available to outside the class. This concept is called data hiding.

2005 Outside Delhi:

2.a) Define the term Data Encapsulation in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same. 2

Ans: Encapsulation is wrapping up of characteristics and behavior into one unit. While implementing encapsulation, following things are taken care:

- Anything that an object does not know or cannot do is excluded from the objects.
- Encapsulation is used to hide unimportant implementation details from other objects.
- Packaging an object's variables within the protective custody of its methods is called encapsulation and this task is accomplished through classes. Ie the data and associated functions are wrapped up in one unit called class.

A class binds together data and its associated functions under one unit thereby enforcing encapsulation.

Eg: class Rectangle

```
{
    private: float len,bre,area;
    public: void readData()
    { cout<<"\nEnter the length and
        breadth..";
        cin>>len>>bre;
    }
    void calculate()
    { area=len*bre;
    }
    void display()
    { cout<<"\nThe area of the rectangle =
```

```
    "<<area;
```

```
    }
```

```
};
```

Eg: Here in the above class the data members ie len,bre,area and the member functions ie readData(), calculate(), display() are bind together in a class named as Rectangle. Ie The member functions can access any data member in the class.

Benefits with encapsulation:

- (i) Modularity.
- (ii) Information hiding.

2004:

1.a) What is polymorphism? Give an example in C ++ to show its implementation in C++.

Ans:Polymorphism is the attribute that allows one interface to be used with different situation.C++ implements polymorphism through virtual functions, through overloaded functions and overloaded operators.

A virtual function is used to specify the interface in abstract class, but its implementation details are made available by the concrete class(es).

An overloaded function refers to a function having (one name and) more than one distinct meanings. Similarly, when two or more distinct meanings are defined for an operator, it is said to be an 'overloaded operator'. It is the compiler's job to select the specific action as it applies to each situation.

Eg: The program in the next answer.

2003:

2.a) What do you understand by function overloading? Give an example illustrating its use in a c++ program.

Ans: A function name having several definitions that are differentiable by the number or types of their arguments, is known as an overloaded function and this process is known as function overloading.

Function overloading not only implements polymorphism but also reduces number of comparisons in a program and thereby makes the program run faster.

Example program illustrating function overloading:

```
//Program to find out area of a circle or area of //rectangle using function overloading.
```

```
#include<iostream.h>
#include<conio.h>
void area(float r)
{
    cout<<"\n\nThe area of the circle =
    "<<3.1415*r*r; }
void area(float l,float b)
{
    cout<<"\n\nThe area of the rectangle =
    "<<l*b; }
void main( )
{
    float rad,len,bre;
    int n;
    clrscr( );
    cout<<"\n1. Area of a Circle...";
    cout<<"\n2. Area of a Rectangle...";
    cout<<"\n\nEnter your choice: ";
    cin>>n;
    switch(n)
    {
        case 1: cout<<"\n\nEnter the radius: ";
                cin>>rad;
                area(rad);
                break;
        case 2: cout<<"\n\nEnter the length
                and breadth: ";
                cin>>len>>bre;
                area(len,bre);
                break;
        default: cout<<"\n\nYou have to enter
                either 1 or 2";
    } //end of switch
    getch( );
}
```

2000:

1.a) Illustrate the concept of function overloading with the help of an example. 1

Ans: The above answer.

1998:

1.a) Define the following terms:

- (i) Inheritance (ii)Encapsulation.

Ans:a) Inheritance: The capability of one class to inherit properties from another class is called as inheritance.The class inheritance, lets you generate a model that is closer to the real world. The class inheritance lets you derive new classes (derived class) from old ones (base class), with the derived class inheriting the properties, including the methods of the old class.

Uses of Inheritance:

i) Capability to express the inheritance relationship which ensures the closeness with the real world models.

ii) Reusability.

iii) Transitive nature of inheritance.

b) Encapsulation: The wrapping up of data and functions into a single unit (class) is called as encapsulation.

Model Paper 1 for 2008-09 Batch:

Q2.(a) What do you understand by Data Encapsulation and Data Hiding? 2

Answer:

Data Encapsulation: Wrapping up of data and function together in a single unit is known as Data Encapsulation. In a class, we wrap up the data and function together in a single unit.

Data Hiding: Keeping the data in private visibility mode of the class to prevent it from accidental change is known as Data Hiding.

```
class Computer
{
    char CPU[10];
    int RAM;
public:
    void STOCK();
    void SHOW();
};
```

Model Paper 2 for 2008-09 Batch:

1. (a) What is the difference between Object Oriented Programming and Procedural Programming? 2

Answer:

2.(a) What do you understand by Polymorphism? Give a suitable example of the same. 2

Answer:

Polymorphism: It is a method of using the same operator or function (method) to work using different sets of input. Function overloading is one of the example of polymorphism, where more than one function carrying same name behave differently with different set of parameters passed to them.

```
void Display()
{
    cout<<"Hello!"<<endl;
```

```
}
void Display(int N)
{
    cout<<2*N+5<<endl;
}
```

Sample Paper 1 for 2009-10 Batch:

2.a) What do you understand by Data Encapsulation and Data Hiding? Also, give a suitable C++ code to illustrate both. 2

A) Data Encapsulation: Wrapping up of data and functions together in a single unit is known as Data Encapsulation. In a class, we wrap up the data and functions together in a single unit.

Data Hiding: Keeping the data in private visibility mode of the class to prevent it from accidental change is known as Data Hiding.

```
class Computer
{
    char CPU[10];int RAM; //Data Hiding
public: //Data Encapsulation
    void STOCK();
    void SHOW();
};
```

Sample Paper for 2009-10 Batch:

2.a) What do you understand by Polymorphism? Give a suitable example of the same. 2

Ans) Polymorphism: It is a method of using the same operator or function (method) to work using different set of inputs. Function overloading is one of the examples of polymorphism, where more than one function carrying same name behave differently with different set of parameters passed to them.

Object Oriented Programming	Procedural Programming
<ul style="list-style-type: none"> Emphasis on Data Follows Bottom-Up approach in program design Data hiding feature prevents accidental change in data Features like data encapsulation, polymorphism, inheritance are present 	<ul style="list-style-type: none"> Emphasis on doing things (functions) Follows Top-down approach in program design Presence of Global variables increase chances of accidental change in data Such features are not available

```
void Display()
```

```

{
    cout<<"Hello!"<<endl;
}
void Display(int N)
{
    cout<<2*N+5<<endl;
}

```

**“The moment which is lost,
is lost for ever.
So utilize the time
properly”**

4. CLASSES AND OBJECTS

2010 Delhi:

1.(c) Rewrite the following c++ program code after removing the syntax error(s) (if any). Underline each correction. 2

```

include <iostream.h>
class TRAIN
{
long TrainNo;
char Description[25];
public
void Entry ( )
{
cin >>TrainNo; gets(Description);
}
Void Display ( )
{
cout<<TrainNo<<" "<<Description<<endl;
}
};
void main( )
{
TRAIN T;
Entry. T( ); Display. T( );
}

```

Ans.

```

#include<iostream.h>
#include<stdio.h>
class TRAIN
{
    long TrainNo;
    char Description [25];
public:
    void Entry ()
    {
        cin>>TrainNo; gets (Description);
    }
    void Display ()
    {
        cout<<TrainNo<<" "<<Description<<endl;
    }
}

```

```

}
};
void main ()
{
    TRAIN T;
    T.Entry();
    T.Display();
}

```

2.c) Define a class ITEM in C++ with following description: 4

Private Members

- _ Code of type integer (Item Code)
- _ Iname of type string (Item Name)
- _ Price of type float (Price of each item)
- _ Qty of type integer (Quantity of item in stock)
- _ Offer of type float (Offer percentage on the item)
- _ A member function GetOffer() to calculate Offer percentage as per the following rule:
If Qty<=50 Offer is 0
If 50<Qty<=100 Offer is 5
If Qty>100 Offer is 10

Public Members

- _ A function GetStock() to allow user to enter values for Code, Iname, Price, Qty and call function GetOffer() to calculate the offer
- _ A function ShowItem() to allow user to view the content of all the data members

Ans.

```

class ITEM
{
    int Code;
    char Iname [20] ;
    float Price;
    int Qty;
    float Offer;
    void GetOffer() ;
public:
    void GetStock ()
    {
        cin>>Code;
        gets (Iname) ;
        // OR cin.getline (Iname, 80) ; OR cin>>Iname;
        cin>>Price>>Qty;
        GetOffer() ;
    }
    void ShowItem ( )
    {
        cout<<Code<<Iname<<Price<<Qty<<Offer;
    };
    void ITEM: : GetOffer ()
    {
        if (Qty<=50)
            Offer = 0;
        else if (Qty <=100)
            Offer = 5; //OR Offer = 0.05;
        else
            Offer = 10; //OR Offer = 0.1;
    }
}

```

2010 Outside Delhi:

1. (c) Rewrite the following C++ program code after removing the syntax error(s) (if any). Underline each correction. 2

```
include <iostream.h>
class FLIGHT
{
long FlightCode;
char Description[25];
public
void AddInfo ( )
{
cin>>FlightCode; gets (Description) ;
{
void ShowInfo ( )
{
cout<<FlightCode<<":"<<Description<<endl;
}
};
void main()
{
FLIGHT F;
AddInfo.F(); ShowInfo.F();
}
```

Ans.

```
#include <iostream.h> // Error 1
#include <stdio.h> // Error 2
class FLIGHT
{
long FlightCode;
//not required if gets( ) is re-placed with
//cin.getline( ) or cin
char Description[25];
public : // Error 3
void AddInfo ( )
{
cin>>FlightCode; gets (Description) ;
}
void ShowInfo ( )
{
cout<<FlightCode<<":"<<Description<<endl
;
}
};
void main ( )
{
FLIGHT F;
F.AddInfo( ) ;
F. ShowInfo ( ) ; // Error 4
}
```

2(c) Define a class STOCK in C++ with following description: 4

Private Members

_ ICode of type integer (Item Code)
_ Item of type string (Item Name)

_ Price of type float (Price of each item)
_ Qty of type integer (Quantity in stock)
_ Discount of type float (Discount percentage on the item)
_ A member function FindDisc() to calculate discount as per the following rule:
If Qty<=50 Discount is 0
If 50<Qty<=100 Discount is 5
If Qty>100 Discount is 10

Public Members

_ A function Buy() to allow user to enter values for ICode, Item, Price, Qty and call function FindDisc() to calculate the Discount.
_ A function ShowAll() to allow user to view the content of all the data members.

Ans.

```
class STOCK
{
int ICode,Qty;
char Item[20];
float Price,Discount;
void FindDisc();
public:
void Buy();
void ShowAll();
};
void STOCK::Buy()
{
cin>>ICode;
gets(Item);
cin>>Price;
cin>>Qty;
FindDisc();
}
void STOCK::FindDisc()
{
if (Qty<=50)
Discount=0;
else if (Qty<=100)
Discount=5; // =0.05;
Else
Discount=10; // =0.1;
}
void STOCK::ShowAll()
{
cout<<ICode<<'\t'<<Item<<'\t'<<Price<<'\t'<<Qty
<<'\t'<<Discount<<endl;
}
```

2009 Delhi:

(c) Define a class RESORT in C++ with following description: 4

Private Members

_ Rno //Data member to store Room No
_ Name //Data member to store customer name
_ Charges //Data member to store per day charges

_ Days //Data member to store number of days of stay
 _ COMPUTE() //A function to calculate' and return Amount as Days*Charges and if the value of Days*Charges is more than 11000 then as 1.02*Days*Charges

Public Members

_ Getinfo () //A function to enter the content Rno, Name ,Charges and Days
 _ Dispinfo () //A function to display Rno, Name, Charges,Days and Amount (Amount to be displayed by calling function COMPUTE ())

Ans

```
class RESORT
{
    int Rno;
    char Name [20];
    float Charges;
    int Days;
    float COMPUTE();
public:
    void Getinfo() ;
    void Dispinfo();
};
void RESORT::Getinfo()
{
    cin>>Rno;
    gets (Name);
    cin>>Charges;
    cin>>Days;
}
void RESORT::Dispinfo()
{
    cout<<Rno<<" "<<Name<<" "<<Charges<<"
    "<<Days<< COMPUTE()<<endl;
}
float RESORT::COMPUTE()
{
    float Amount = Charges*Days;
    if (Amount>11000)
        Amount = 1.02*Days*Charges;
    return Amount;
}
```

2009 Outside Delhi:

1.(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```
include <iostream.h>
include <stdio.h>
class MyStudent
{
int StudentId = 1001;
```

```
char Name [20] ;
public
MyStudent(){ }
void Register ( ) {cin>>StudentId; gets (Name) ;}
void Display ( ) {cout<<StudentId<<" "
<<Name<<endl;}
};
void main ( )
{
MyStudent MS ;
Register.MS( ) ;
MS.Display( ) ;
}
Ans
# include <iostream.h>
# include <stdio.h>
class MyStudent
{
    int StudentId;
    char Name[20];
public :
    MyStudent( )
    {
        StudentId = 1001;
    }
    void Register( )
    {
        cin>>StudentId;
        gets (Name);
    }
    void Display ()
    {
        cout<<StudentId<<":"<<Name<<endl;
    }
};
void main ()
{
    MyStudent MS;
    MS. Register ();
    MS. Display ();
}
```

2. (c) Define a class HOTEL in C++ with the following description: 4

Private Members:

_ Rno //Data member to store Room No
 _ Name //Data member to store customer name
 _ Tariff //Data member to store per day charges
 _ NOD //Data member to store number of days of stay
 _ CALC() /*A function to calculate and return Amount as NOD*Tariff and if the value of NOD*Tariff is more than 10000 then as 1.05*NOD*Tariff */

Public Members

_ Checkin () // A function to enter the content Rno, Name, Tariff and NOD
 _ Checkout() // A function to display Rno, Name, Tariff,NOD and Amount (Amount to

be displayed by calling function CALC()

Ans

```
class HOTEL
{
    int Rno;
    char Name[20];
    float Tariff;
    int NOD;
    float CALC();
public:
    void Checkin();
    void Checkout();
};
float HOTEL::CALC()
{
    float Amount = Tariff*NOD;
    if (Amount>10000)
        Amount = 1.05*NOD*Tariff;
    return Amount;
}
void HOTEL::Checkin()
{
    cin>>Rno;
    gets (Name);
    cin>>Tariff;
    cin>>NOD;
}
void HOTEL::Checkout()
{
    cout<<Rno<<" "<<Name<<" "<<Tariff<<"
        "<<NOD<<CALC ()<<endl;
}
```

1.c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```
include <iostream.h>
include <stdio.h>
class MyStudent
{ int StudentId=1001;
  char Name[20];
public
  MyStudent() {}
  void Register()
  { cin>>StudentId;
    gets(Name);
  }
  void Display()
  { cout<<StudentId<<":"<<Name<<endl;
  }
};
void main()
{ MyStudent MS;
  Register.MS();
  MS.Display();
}
Ans:
```

```
#include <iostream.h>
#include <stdio.h>
class MyStudent
{ int StudentId;
  char Name[20];
public:
  MyStudent() {}
  void Register()
  { cin>>StudentId;
    gets(Name);
  }
  void Display()
  { cout<<StudentId<<":"<<Name<<endl;
  }
};
void main()
{ MyStudent MS;
  MS.Register();
  MS.Display();
}
```

2008 Delhi:

2.a) Differentiate between public and private visibility modes in context of Object Oriented Programming using a suitable example illustrating each.

Ans: public and private visibility modes in context of OOP:

The visibility mode (private or public or protected) in the definition of the derived class specifies whether the features of the base class are privately derived or publicly derived or protected derived. The visibility modes basically control the access specifier to be for inheritable members of base class, in the derived class.

Public visibility mode: The public derivation means that the derived class can access the public and protected members of the base class but not the private members of the base class. With publicly derived class, the public members of the base class become the public members of the derived class, and the protected members of the base class become the protected members of the derived class.

Private visibility mode: The private derivation means, the derived class can access the public and private members of the base class privately. With privately derived class, the public and protected members of the base class become private members of the derived class. That means the inherited members can be accessed only through member functions of the derived class.

Visibility Mode	Inheritable public member becomes (in derived class)	Inheritable protected member becomes (in derived class)	Private member of base class are not directly accessible to derived class.
public	Public	protected	
private	Private	private	

public and private access specifiers in context of OOP: public access specifier is used to define any method or a variable which may be accessed by any member function of the same class and also from outside the class. Private access specifier is used to make any variable or a method which has a limited access within the class only. The concept of data hiding is implemented through the private access specifier only.

Eg:

```
class student
{ private:
    int rno;
    char name[21];
public:
    int age;
    void input( );
    void display( );
}
```

Here, since rno and name are declared in private, they can be accessed only inside the class. Since age, input() and display() are declared in public, they can be accessed from outside class also.

2008 Outside Delhi:

2.a) Differentiate between private and protected visibility modes in context of object oriented programming using a suitable example illustrating each.

Ans: private and protected visibility modes in context of OOP:

The visibility mode (private or public or protected) in the definition of the derived class specifies whether the features of the base class are privately derived or publicly derived or protected derived. The visibility modes basically control the access specifier to be for inheritable members of base class, in the derived class.

Private visibility mode: The private derivation means, the derived class can access the public and private members of the base class privately. With privately derived class, the public and protected members of the base class become

private members of the derived class. That means the inherited members can be accessed only through member functions of the derived class.

Protected visibility mode: The protected derivation means that the derived class can access the public and private members of the base class protectedly. With protectedly derived class, the public and protected members of the base class become protected members of the derived class. That means the inherited members are now not available to the outside world and can be accessed only through the member functions of the derived class and the classes based upon the derived classes. These members can be inherited further if any classes are inheriting from the derived class.

Visibility Mode	Inheritable public member becomes (in derived class)	Inheritable protected member becomes (in derived class)	Private member of base class are not directly accessible to derived class.
protected	Protected	protected	
private	Private	private	

private and protected access specifiers in context of OOP:

private access specifier is used to make any variable or a method which has a limited access within the class only.

At the time of inheritance, these variables cannot be accessed (inherited) to the derived class.

protected access specifier is used to make any variable or a method which has a limited access within the class only (here like private). But at the time of inheritance, these variables can be inherited to the derived class.

Except regarding inheritance, both access specifiers ie private and protected will work same.

Eg:

```
class student
{ private:
    int rno;
    char name[21];
protected:
    int age;
    void input( );
    void display( );
}
```

Here, since rno and name are declared in private, they can be accessed only inside the class. Since age, input() and display() are declared in protected, they also can be accessed only inside the class but they can be inherited,

where as private members (rno and name) cannot be inherited.

2006 Delhi:

2.c) Define a class named ADMISSION in C++ with the following descriptions:

Private Members:

AD_NO integer(Ranges 10 – 2000)
NAME Array of characters(String)
CLASS Character
FEES Float

Public Members:

Function Read_Data() to read an object of ADMISSION type. Function Display() to display the details of an object. Function Draw-Nos.() to choose 2 students randomly. And display the details. Use random function to generate admission nos. to match with AD_NO.

Ans:

```
class ADMISSION
{ int AD_NO;
  char NAME[31];
  char CLASS;
  float FEES;
public:
  void Read_Data( )
  { cout<<"\nEnter the Admission Number: ";
    cin>>AD_NO;
    cout<<"\nEnter the Student Name: ";
    gets(NAME);
    cout<<"\nEnter the Class: ";
    cin>>CLASS;
    cout<<"\nEnter the Fees: ";
    cin>>FEES;
  }
  void Display()
  { cout<<"\nThe Admission Number of the
    student: "<<AD_NO;
    cout<<"\nThe name of the Student: "
      <<NAME;
    cout<<"\nThe Class of the Student:"
      <<CLASS;
    cout<<"\nThe Fees of the Student: "
      <<FEES;
  }
  void Draw_Nos();
};
void ADMISSION::Draw_Nos( )
{ //Dear Students, a test for you. Complete
  this member function.
}
```

2006 Outside Delhi:

1.b) Illustrate the use of Inline function in C++ with the help of an example. 2

Ans: INLINE FUNCTIONS: The inline functions are a C++ enhancement designed to speed up programs. The coding of normal functions and inline functions is similar except that inline functions definitions start with the keyword inline.

The working of inline functions:

After writing any program, it is first compiled to get an executable code, which consists of a set of machine language instructions. When this executable code is executed, the operating system loads these instructions into the computer's memory, so that each instruction is stored in a specific memory location. Thus, each instruction has a particular memory address.

After loading the executable program in the computer memory, these instructions are executed step by step. When a function call instruction is encountered, the program stores the memory address of the instruction immediately following the function call statement, loads the function being called into the memory, copies argument values, jumps to the memory location of the called function, executes the function code, stores the return value of the function, and then jumps back to the address of the instruction that was saved just before executing the called function.

With inline code, the compiler replaces the function call statement with the function code itself (this process is called expansion) and then compiles the entire code. Thus, with inline functions, the compiler does not have to jump to another location to execute the function, and then jump back as the code of the called function is already available to the calling program.

Inline functions run a little faster than the normal functions as function calling overheads are saved, however there is a memory penalty. If 10 times an inline function is called, there will be 10 copies of the function inserted into the code.

A function can be declared inline by placing the keyword inline before it. An inline function definition should be placed above all the functions that call it. The functions should be inlined only when they are small. Since for large functions, they will become memory penalty.

The inlining does not work for following situations:

- For functions that return values and are having a loop or a switch or a goto.
- For functions not returning values, if a return statement exists.
- If functions contain static variables.
- If the function is recursive(a function that calls itself).

Inlining and the member functions:

The member function of a class, if defined within the class definition, are inlined by default. Therefore, only very small member functions should be defined within the class definition.

The member functions defined outside the class definition can be made explicitly inline by placing the keyword inline before their definition.

Inline functions are best for small functions that are called often. The compiler may even ignore your attempt to inline a function if it consists more than 50 lines of code.

2. c) Define a class named HOUSING in C++ with the following descriptions: 4

Private Members:

REG_NO integer(Ranges 10-1000)
 NAME Array of characters(String)
 TYPE Character
 COST Float

Public Members:

Function Read_Data() to rread an object of HOUSING type.

Function Display() to display the details of an object.

Function Draw_Nos() to choose and display the details of 2 houses selected randomly from an array of 10 objects of type HOUSING. Use random function to generate the registration nos. to match with REG_NO from the array.

Ans:

```
class HOUSING
{ int REG_NO;
  char NAME[31];
  char TYPE;
  float COST;
public:
  void Read_Data( )
  { cout<<"\nEnter the House Registration
    Number: ";
    cin>>REG_NO;
    cout<<"\nEnter the House Name: ";
    gets(NAME);
    cout<<"\nEnter the House Type: ";
    cin>>TYPE;
```

```
    cout<<"\nEnter the House Cost: ";
    cin>>COST;
  }
  void Display()
  { cout<<"\nThe Registration Number of the
    House: "<<REG_NO;
    cout<<"\nThe name of the House: "
    <<NAME;
    cout<<"\nThe Type of the House: "<<TYPE;
    cout<<"\nThe Cost of the House: "<<COST;
  }
  void Draw_Nos();
};
void HOUSING::Draw_Nos( )
{ //Dear Students, a test for you. Complete this
  member function.
}
```

2004 :

2.b) Declare a class myfolder with the following specifications:

Private members of the class:

Filenames an array of strig of size[10][25]
 (to represent all the names of files inside myfolder)
 Availspace long
 (to represent total number of bytes available in myfolder)
 Usedspace long
 (to represent total number of bytes used in myfolder)

Public members of the class:

Newfileentry() : A function to accept values of Filenames, Availspace and Usedspace from user.
 Retavailspace(): A function that returns the value of total kilobytes available (1 kilobyte=1024 bytes)
 Showfiles(): A function that displays the names of all the files in myfolder

Ans:

```
class myfolder
{ char Filenames[10][25];
  long Availspace;
  long Usedspace;
public:
  void Newfileentry( )
  {
    cout<<"\nEnter any 10 file names: ";
    for(int i=0;i<=9;i++)
    {cout<<"\nEnter the "<<i+1<<" file name: ";
      gets(Filenames[i]);
    }
    cout<<"\nEnter the Available Space (In
```

```

        Kilobytes): ";
cin>>Availspace;
cout<<"\nEnter the Used Space (In
        Kilobytes): ";
cin>>Usedspace;
}
long RetavailSpace()
{   ret Availspace;
}
void Showfiles()
{   cout<<"\nThe names of the files in
        myfolder object....";
    for(i=0;i<=9;i++)
    {   puts(Filenames[i]);
        cout<<endl;
    }
}

```

2002:

2.a) What do you understand about a member function? How does a member function differ from an ordinary function?

Ans: A member function is a function declared within a class. It is said to be defined in two ways. Ie Outside the class and inside the class. When a member function is defined outside the class, the name of the function must be the full name including the class name as well. When a member function is defined inside the class, the name of the function is similar to an ordinary function but it will become an **inline** function.

2.b) Define a class Student for the following specifications.

Private members of the Student are:

```

roll_no    integer
name       array of characters of size 20
class_st   array of characters of size 8
marks      array of integers of size 5
Percentage float

```

Calculate() that calculates overall percentage marks and returns the percentage

Public Members of the Student are:

Readmarks reads mark and invoke the calculate function

Displaymarks prints the data.

Ans:

```

class Student
{   int roll_no;
    char name[20];
    char class_st[8];
    int marks[5];
    float percentage;
    float calculate()
    {   percentage=(marks[0]+marks[1]+marks[2]+
        marks[3]+marks[4])/5;

```

```

        return percentage;
    }
public:
void Readmarks()
{   cout<<"\nEnter any 5 subject marks;
    cin>>marks[0]>>marks[1]>>marks[2]>>
        marks[3]>>marks[4];
    calculate();
}
void Displaymarks()
{   cout<<"\nThe Roll Number of the
        Student: "<<roll_no;
    cout<<"\nThe Name of the Student:"
        <<name;
    cout<<"\nThe class of the Student: "
        <<class_st;
    cout<<"\n5 subject marks of the
        student...\n";
    cout<<marks[0]<<"\t"<<marks[1]<<"\t"<<
        marks[2]<<"\t";
    cout<<marks[3]<<"\t"<<marks[4]<<"\n";
    cout<<"Percentage ="<<percentage;
}
};

```

2001:

2.b) Declare a class to represent bank account of 10 customers with the following data members. Name of the depositor, account number, type of account (S for Savings and C for Current), Balance amount. The class also contains member functions to do the following:

(i) To initialize data members.

(ii) To deposit money

(iii) To withdraw money after checking the balance (minimum balance is Rs.1000)

(iv) To display the data members.

[Note: You are also required to give detailed function definitions.]

```

class Bank
{   char name[15];
    int acc_no;
    char acc_type;
    float bal_amount;
public:
void readData()
{   cout<<"\nEnter the name: ";
    gets(name);
    cout<<"\nEnter the account number: ";
    cin>>acc_no;
    cout<<"\nEnter the account type: ";
    cin>>acc_type;
    cout<<"\nEnter the amount to deposit: ";
    cin>>bal_amount;
}
void deposit()
{   float deposit;

```

```

cout<<"\nEnter your account number: ";
cin>>acc_no;
cout<<"\nEnter the amount to deposit: ";
cin>>deposit;
bal_amount=bal_amount + deposit;
}
void withdraw( )
{ float w_amount;
  cout<<"\nEnter your account number: ";
  cin>>acc_no;
  cout<<"\nEnter amount to withdraw";
  cin>>w_amount;
  if((bal_amount-w_amount)<1000)
    cout<<"\nWithdraw is not possible";
  else
  { bal_amount=bal_amount-w_amount;
    cout<<"\nThe balance is
      "<<bal_amount-w_amount;
  }
}
void display( )
{ cout<<"\nName of the depositor: "
  <<name;
  cout<<"\nAccount Number: "<<acc_no;
  cout<<"\nAccount Type: "<<acc_type;
  cout<<"\nThe balance amount is
    "<<bal_amount;
}
};

```

2000 :

2.b) Define a class worker with the following specification. 4

Private member of class worker:

wname 25characters
hrwrk,wgrate float (hours worked and
wagerate per hour)
totwage float(hrwrk*wgrate)
calkwg() A function to find hrwrk*wgrate
with float return type

Public members of class worker:

In_data(): A function to accept values for wno,
wname, hrrwrk, wgrate and invoke calkgw() to
calculate totpay.

Out_data(): A function to display all the data
members on the screen you should give
definitions of functions.

class worker

```

{ char wname[25];
  float hrwrk,wgrate;
  float totwage;
  float calkgw( )
  { return hrwrk*wgrate;
  }
}

```

public:

```

void In_data( )
{ cout<<"\nEnter Worker number,name,

```

```

  hours worked and wage rate";
  cin>>wno;
  gets(wname);
  cin>>hrwrk>>wgrate;
  calkgw( );
}
void Out_data( )
{ cout<<"\nThe Worker Number: "<<wno;
  cout<<"\nThe Name of the worker:
    "<<wname;
  cout<<"\nNumber of hours worked by the
    worker: "<<hrwrk;
  cout<<"\nThe Wage Rate of the Worker:
    "<<wgrate;
  cout<<"\nThe total wages of the worker:
    "<<totwage;
}

```

1999 :

2.b) Define a class Teacher with the following class specification:

Private members:

Name 20 characters
Subject 10 characters
Basic, DA, HRA float
Salary float

Calculate() function computes the salary and
returns it. Salary is sum of Basic, DA and HRA

Public members:

ReadData(): Function accepts the data values
and invoke the calculate function.

DisplayData():Function prints the data on the
screen.

class Teacher

```

{ char Name[20];
  char subject[10];
  float Basic,DA,HRA,Salary;
  float Calculate( )
  { Salary=Basic+DA+HRA;
    return Salary;
  }
public:
void ReadData( )
{ cout<<"\nEnter Basic, Dearness
  Allowance and "
  cout<<" House Rent Allowance: ";
  cin>>Basic>>DA>>HRA;
  Calculate();
}
void DisplayData( )
{ cout<<"\nThe Basic : "<<Basic;
  cout<<"\nThe Dearness
  Allowance: "<<DA;
  cout<<"\nThe House Rent

```

```

        Allowance: "<<HRA;
        cout<<"\nThe Salary: "<<Salary;
    }
};

```

1998:

2.b) Define a class student with the following specifications:

Private members of class student:

Admno	integer
Sname	20 character
English	float
Math	float
Science	float
Total	float
Ctotal()	A function to calculate

English + math + science with float return type

Public member functions of class student:

Takedata():Function to accept values for admno,sname, English, math, science and invoke ctotal to calculate total.

Showdata():Function to display all the data members on the screen.

```

class student
{
    int Admno;
    char Sname[20];
    float English,Math,Science,Total;
    float Ctotal()
    {
        Total=English+math+science;
        return Total;
    }
public:
    void Takedata()
    {
        cout<<"\nEnter the admission
        number,name of the student: ";
        cin>>Admno;
        gets(sname);
        cout<<"\nEnter English, Maths,
        Science Marks: ";
        cin>>English>>Math>>Science;
        Ctotal( );
    }
    void Showdata( )
    {
        cout<<"\nThe admission number of
        the student: "<<Admno;
        cout<<"\nThe name of the student:
        "<<Sname;
        cout<<"\nEnglish , Maths and
        Science Marks are...";
        cout<<english<<"\t"<<math<<"\t"
        <<science<<"\n";
        cout<<"\nTotal marks of the
        student: "<<Total;
    }
};

```

Model Paper 1 for 2008-09 Batch:

b) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```

#include [iostream.h]
class PAYITNOW
{
    int Charge;
PUBLIC:
    void Raise(){cin>>Charge;}
    void Show{cout<<Charge;}
};
void main()
{
    PAYITNOW P;
    P.Raise();
    Show();
}

```

Answer:

```

#include <istream.h>
class PAYITNOW
{
    int Charge;
public:
    void Raise(){cin>>Charge;}
    void Show(){cout<<Charge;}
};
void main()
{
    PAYITNOW P;
    P.Raise();
    P.Show();
}

```

Model Paper 1 for 2008-09 Batch:

2.e) Define a class TEST in C++ with following description: 4

Private Members

- TestCode of type integer
- Description of type string
- NoCandidate of type integer
- CenterReqd (number of centers required) of type integer
- A member function CALCNTR() to calculate and return the number of centers as (NoCandidates/100+1)

Public Members

- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres
- A function DISPTTEST() to allow user to view the content of all the data members

Answer:

```
class TEST
```

```

{
    int TestCode;
    char Description[20];
    int NoCandidate,CenterReqd;
    void CALCNTR();

public:
    void SCHEDULE();
    void DISPTEST();

};
void TEST::CALCNTR()
{
    CenterReqd=NoCandidate/100 +
    1;
}
void TEST::SCHEDULE()
{cout<<"Test Code  :";
  cin>>TestCode;
  cout<<"Description  :";
  gets(Description);
  cout<<"Number   :";
  cin>>NoCandidate;
  CALCNTR();
}
void TEST::DISPTEST()
{
  cout<<"Test Code  :"<<TestCode<<endl;
  cout<<"Description :"<<Description<<endl;
  cout<<"Number    :"<<NoCandidate<<endl;;
  cout<<"Centres   :"<<CenterReqd<<endl;;
}

```

Model Paper 2 for 2008-09 Batch:

2.d) Define a class in C++ with following description: 4

Private Members

- *A data member Flight number of type integer
- *A data member Destination of type string
- *A data member Distance of type float
- *A data member Fuel of type float
- *A member function CALFUEL() to calculate the value of Fuel as per the following criteria

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100
more than 2000	2200

Public Members

- *A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel
- *A function SHOWINFO() to allow user to view the content of all the data members

Answer:

```

class FLIGHT
{
    int Fno;
    char Destination[20];
    float Distance, Fuel;
    void CALFUEL();

public:

```

```

    void FEEDINFO();
    void SHOWINFO();
};
void FLIGHT::CALFUEL()
{
    if (Distance<1000)
        Fuel=500;
    else
        if (Distance<2000)
            Fuel=1100;
        else
            Fuel=2200;
}
void FLIGHT::FEEDINFO()
{cout<<"Flight No  :";cin>>Fno;
  cout<<"Destination  :";gets(Destination);
  cout<<"Distance   :";cin>>Distance;
  CALFUEL();
}
void FLIGHT::SHOWINFO()
{
  cout<<"Flight No  :"<<Fno<<endl;
  cout<<"Destination :"<<Destination<<endl;
  cout<<"Distance   :"<<Distance<<endl;;
  cout<<"Fuel     :"<<Fuel<<endl;;
}

```

Sample Paper 1 for 2009-10 Batch:

1.C) Rewrite the following program after removing the syntactical errors (if any).

Underline each correction. 2

```

#include [iostream.h]
class MEMBER
{
  int Mno;float Fees;
PUBLIC:
  void Register(){cin>>Mno>>Fees;}
  void Display{cout<<Mno<<" : "<<Fees<<endl;}
};
void main()
{
  MEMBER M;
  Register();
  M.Display();
}
A)
#include <iostream.h>
class MEMBER
{  int Mno;float Fees;
  public:
    void Register()
    {
      cin>>Mno>>Fees;
    }
    void Display()
    {
      cout<<Mno<<" : "<<Fees<<endl;
    }
}

```

```
};
void main()
{
    MEMBER M;
    M.Register();
    M.Display();
}
```

2.c) Define a class TEST in C++ with following description: 4

Private Members

- TestCode of type integer
- Description of type string
- NoCandidate of type integer
- CenterReqd (number of centers required) of type integer
- A member function CALCNTR() to calculate and return the number of centers as (NoCandidates/100+1)

Public Members

- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres
- A function DISPTTEST() to allow user to view the content of all the data members

A)

```
class TEST
{
    int TestCode;
    char Description[20];
    int NoCandidate,CenterReqd;
    void CALCNTR();
public:
    void SCHEDULE();
    void DISPTTEST();
};
void TEST::CALCNTR()
{
    CenterReqd=NoCandidate/100 + 1;
}
void TEST::SCHEDULE()
{
    cout<<"Test Code :";cin>>TestCode;
    cout<<"Description :";gets(Description);
    cout<<"Number :";cin>>NoCandidate;
    CALCNTR();
}
{
    cout<<"Test Code :"<<TestCode<<endl;
    cout<<"Description :"<<Description<<endl;
    cout<<"Number :"<<NoCandidate<<endl;;
    cout<<"Centres :"<<CenterReqd<<endl;;
}
```

2.c) Define a class in C++ with following description: 4

Private Members

- A data member Flight number of type integer
- A data member Destination of type string
- A data member Distance of type float
- A data member Fuel of type float
- A member function CALFUEL() to calculate the value of Fuel as per the following criteria

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100
more than 2000	2200

Public Members

- " A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel
- " A function SHOWINFO() to allow user to view the content of all the data members

A)

```
class FLIGHT
{
    int Fno;
    char Destination[20];
    float Distance, Fuel;
    void CALFUEL();
public:
    void FEEDINFO();
    void SHOWINFO();
};
void FLIGHT::CALFUEL()
{
    if (Distance<=1000)
        Fuel=500;
    else
    if (Distance<=2000)
        Fuel=1100;
    else
        Fuel=2200;
}
void FLIGHT::FEEDINFO()
{
    cout<<"Flight No :";cin>>Fno;
    cout<<"Destination :";gets(Destination);
    cout<<"Distance :";cin>>Distance;
    CALFUEL();
}
void FLIGHT::SHOWINFO()
{
    cout<<"Flight No :"<<Fno<<endl;
    cout<<"Destination :"<<Destination<<endl;
    cout<<"Distance :"<<Distance<<endl;;
    cout<<"Fuel :"<<Fuel<<endl;;
}
```

Sample Paper 2 for 2009-10 Batch:

***“If wealth is lost,
nothing is lost***

***If health is lost,
something is lost***

***If character is lost,
everything is lost”***

5.CONSTRUCTORS & DESTRUCTORS

MATERIAL

Constructor: A member function with the same name as its class is called Constructor and it is used to initialize the objects of that class type with a legal initial value.

If a class has a constructor, each object of that class will be initialized before any use is made of the object.

Need for Constructors: A variable, an array or a structure in C++ can be initialized at the time of their declaration.

Eg:

```
int a=10;
int a[3]= {5,10,15};
struct student
{
    int rno;
    float m1,m2,m3;
};
student s1={1,55.0,90.5,80.0};
```

But this type of initialization does not work for a class because the class members have their associated access specifiers. They might not be available to the outside world (outside their class). A Constructor is used to initialize the objects of the class being created (automatically called by the compiler).

Difference between a constructor and an ordinary member function:

Constructor	Member Function
-------------	-----------------

Name	Name of the Class	Any Identifier	Valid
Purpose	Initialize the object when it is being created	For any general purpose	
Call	Implicit	Explicit	
Return type	Should not keep	Must be there at least void	

Declaration and Definition:

A constructor is a member function of a class with the same name as that of its class name. A constructor is defined like other member functions of a class. It can be defined either inside the class definition or outside the class definition.

Eg:

```
class X
{ int i;
public:
    int j,k;
    X ( )           //Constructor
    {
        i = j = k = 0;
    }
    -----
    //Other members
    -----
};
```

This simple constructor (X::X ()) is as an inline member function. Constructors can be written as outline functions also as it is shown below:

```
class X
{
    int i;
public:
    int j, k;
    X ( );           //Only constructor
                    //Other members
                    -----
};
X :: X ( )         //Constructor defined
outside
{
    i = j = k = 0;
}
```

Generally constructor will be defined under public section, which can be available to non members also. But it can also be defined under private or protected. A private or protected constructor is not available to the

non-member functions. Ie With a private or protected constructor, you cannot create an object of the same class in a non-member function.

There are three types of constructors

- a) Non-parameterized or Default Constructor
- b) Parameterized Constructor
- c) Copy Constructors

a) Default constructor:

A constructor that accepts no parameter is called the default constructor. With a default constructor, objects are created just the same way as variables of other data types are created.

```
class X
{
    int i;
    public:
    int j, k;
    -----
    //Members Functions
    -----
};
```

Eg: X ob1;
Student s1;

If a class has no explicit constructor defined, the compiler will supply a default constructor. This implicitly declared default constructor is an **inline public** members of its class. Declaring a constructor with arguments hides the default constructor.

There can be a default constructor as well as another constructor with arguments for a class, having multiple constructors is called as constructor overloading.

A constructor can also have default arguments. A constructor with default arguments is equivalent to a default constructor.

Eg: class Rectangle

```
{
    float l,b,a;
    public:
    Rectangle ( float len = 5.0, float bre = 5.0)
    //Constructor with Default arguments
    {
        l = len;
        b = bre;
```

```
    }
    -----
    -----
};

void main()
{
    Rectangle first(7.0,9.5);
    Rectangle second;
    //Takes default argument values. Equivalent to
    second(5.0,5.0)
    ----
    ----
}
```

The default constructors are very useful when you want to create objects without having to type the initial objects every time with pre specified initial values or if you want to create array of objects of your class type. You can't create an array of objects unless your class has a default constructor (implicitly or explicitly defined).

b) Parameterized Constructor:

A constructor that take arguments, is called as parameterized constructor. The parameterized constructor allow us to initialize the various data elements of different objects with different values when they are created. This is achieved by passing different values as arguments to the constructor function when the objects are created.

Eg: class Rectangle

```
{    float l,b,a;
    public:
        Rectangle ( float len , float bre )
        //Parameterized Constructor.
        {    l = len;
            b = bre;
        }
        -----
        -----
};
```

```
void main()
{
    Rectangle first(7.0,9.5);
    ----
    ----
}
```

With a parameterized constructor, the initial values must be passed at the time of object created. This can be done in two manners:

(i) By calling the constructor implicitly
(implicit call)

Eg: Rectangle first(8.5,3.9);

(ii) By calling the constructor explicitly
(Explicit call)

Eg: Rectangle first = Rectangle (8.5,3.9);

Temporary Instances:

A temporary instance lives in the memory as long it is being used or referenced in an expression and after this it dies. A temporary instance will not have any name. The explicit call to a constructor also allows you to create a temporary instance or temporary object. The temporary instances are deleted when they are no longer referenced.

Eg: class Sample

```
{
    int i,j;
public:
    sample (int a, int b)
    {
        i=a;
        j=b;
    }
    void print ( )
    {
        cout<<i<<j<<"\n";
    }
    ----
    ----
};
```

```
void test ( )
{
    Sample S1(2,5);
        //An object S1 created
    S1.print ( );
        //Data values of S1 printed
    Sample (4,9).print ( );
        //Data values of a temporary
        //sample instance printed
}
```

The primitive (fundamental) types also have their own constructors. When no values are provided, they use their default constructors but when you provide initial values, the newly created instance is initialized with the provided value.

Eg: int a,b,c;
//Default constructor used
int i(3), j(4), k(5); //i,j,k initialized

c) Copy Constructor:

A copy constructor is a constructor of the form **classname(classname &)**. The compiler will use the copy constructor whenever you initialize an instance using values of another instance of same type.

Eg:

```
Sample S1; //Default constructor used
Sample S2=S1; //Copy constructor used. Also
Sample S2(S1);
```

In the above code, for the second statement, the compiler will copy the instance S1 to S2 member by member. If you have not defined a copy constructor, the compiler automatically, creates it and it is public.

A copy constructor takes a reference to an object of the same class as an argument.

Eg:

```
class Sample
{
    int i,j;
public:
    Sample (int a, int b) //Constructor
    {
        i = a;
        j = b;
    }
    Sample (Sample &s) //Copy Constructor
    {
        i=s.i;
        j=s.j;
        cout<<"Copy constructor
            Working\n";
    }
    void print( )
    {
        cout<<i<<"\t"<<j<<"\n";
    }
    ----
    ----
};
```

```
void main( )
{
    Sample S1(4,9);
        //S1 initialized first constructor used
    Sample S2(S1);
        //S1 copied to S2. Copy constructor called.
    Sample S3=S1;
        //S1 copied to S3. Copy constructor called
        //again.
    ----
    ----
}
```

```
}
```

Why the argument to a copy constructor is passed by reference:

If we try to pass the argument by value to a copy constructor (ie, for a class X, if we use an X(X) constructor in place of X(X&), the compiler complains out of memory. The reason is, when an argument is passed by value, a copy of it is constructed. To create a copy of the object, the copy constructor works. But the copy constructor is creating a copy of the object for itself, thus it calls itself. Again the called copy constructor requires another copy so again it is called. In fact it calls itself again until the compiler runs out of memory. So, in the copy constructor, the argument must be passed by reference, so that to make a copy of the passed object, original object is directly available.

Dynamic initialization of objects: The dynamic initialization means that the initial values may be provided during runtime. The benefit of dynamic initialization is that it provides the flexibility of assigning initial values at run time.

Initialization of Const & Reference Members: If your class contains a constant and a reference as member field, then you need to specify that through **Member-Initialization List**.

A constructor can initialize the constituent data members of its class through a mem-initialization list that appears in the function header of the constructor.

Eg:

```
class Test
{
    int a ;
    char b;
public:
    Test(int i,char j):a(i), b(j);//a(i) initializes
member a with
//value i, b(j)....b with j.
{
    ....
}
}
```

You can even have a combination of mem-initialization list and initialization within constructor body.

Eg:

```
class Test
{
```

```
.....
public:
    Test(int i, char j):a(i)
    {
        b=j;
    }
    ....
};
```

And if your class contains a **const** and /or a **reference** member, then these members must be initialized through mem-initialization list as these cannot be initialized within constructor body.

Eg:

```
struct Sname
{
    char fname[25];
    char lname[25];
} S1;

class Test
{
    int a,b;
    const int max;           //const member
    Sname &name;             //reference member
public:
    Test ( ):max(300),name(S1)
    {
        a=0;
        b=10;
    }
    -----
};
```

Mem-initialization lists are especially used in the following four cases:

- (i) initialization of const members.
- (ii) initialization of reference members.
- (iii) Invoking base class constructor.
- (iv) Initialization of member objects.

Constructor Overloading:

The constructor of a class may also be overloaded so that even with different number and types of initial values, an object may still be initialized.

Default Arguments Versus Overloading:

Using default arguments gives the appearance of overloading, because the function may be called with an optional number of arguments.

Eg:

Prototype : float amount (float principal, int time=2, float rate=0.08);

Can be called as

Amount(2000.0,4,0.10);

Amount(3520.5,3);

Amount(5500.0);

Special Characteristics of Constructors:

1. Constructor functions are invoked automatically when the objects are created.
2. If a class has a constructor, each object of that class will be initialized before any use is made of the object.
3. Constructor functions obey the usual access rules. I.e private and protected constructors are available only for member and friend functions, however, public constructors are available for all the functions. Only the functions that have access to the constructor of a class, can create an object of the class.
4. No return type (not even void) can be specified for a constructor.
5. They cannot be inherited, though a derived class can call the base class constructor.
6. A constructor may not be static.
7. Default constructors and copy constructors are generated (by the compiler) where needed. Generated constructors are public.
8. Like other c++ functions, constructors can also have default arguments.
9. It is not possible to take the address of a constructor.
10. An object of a class with a constructor cannot be a member of a union.
11. Member functions may be called from within a constructor.
12. A constructor can be used explicitly to create new objects of its class type, using the syntax class-name (expression-list)
Eg: Sample obj1=Sample(13,22.42);

DESTRUCTORS

Destructor:

A destructor is used to destroy the objects that have been created by a constructor. A destructor destroys the values of the object being destroyed.

A destructor is also a member function whose name is the same as the class name but is preceded by tilde (~). A destructor takes no

arguments, and no return types can be specified for it (not even void). It is automatically called by the compiler when an object is destroyed. A local object, local to a block, is destroyed when the block gets over; a global or static object is destroyed when the program terminates. A destructor cleans up the storage (memory area of the object) that is no longer accessible.

Eg:

```
class Sample
{
    int i,j;
    Public:
        Sample(int a, int b) //Constructor
        {
            i=a; j=b;
        }
        ~Sample()
        {
            cout<<"Destructor at work\n";
        }
        -----
        -----
};
void main( )
{
    Sample s1(3,4);
    //Local object s1 constructed with values 3
    // & 4 using Sample ( )
    -----
    ---/*Automatically s1 is destructed at the end of
    the block using destructor ~Sample()*/
}
```

Need for Destructors:

During construction of any object by the constructor, resources may be allocated for use. (for example, a constructor may have opened a file and a memory area may be allotted to it). These allocated resources must be de allocated before the object is destroyed. A destructor performs these types of tasks.

Some Characteristics of Destructors:

1. Destructor functions are invoked automatically when the objects are destroyed.
2. If a class has a destructor, each object of that class will be deinitialized before the object goes out of scope. (Local objects at the end of the block defining them and global and static objects at the end of the program).
3. Destructor functions also, obey the usual access rules as other member functions do.
4. No argument can be provided to a destructor, neither does it return any value.

5. They cannot be inherited.
6. A destructor may not be static.
7. It is not possible to take the address of a destructor.
8. Member functions may be called from within a destructor.
9. An object of a class with a destructor cannot be a member of a union.

CONSTRUCTORS AND DESTRUCTORS (PROGRAMS)

1. Program to find area of a circle using class, constructor functions and destructor.

```
#include<iostream.h>
#include<conio.h>
class Circle
{ float r,a; //r and a are private
public:
    Circle()
//Non parameterized or Default Constructor
    { r=0.0;
      a=0.0;
    }
    Circle(float rad)
//Parameterized Constructor
    { r = rad;
      a = 3.1415*r*r;
    }
    Circle(Circle &obj) //Copy Constructor
    { r = obj.r;
      a = obj.a;
    }
    ~Circle()
    { cout<<"\n\nThe object is being destroyed....";
    }
    void take()
    {
      cout<<"Enter the value of Radius: ";
      cin>>r;
    }
    void calculate()
    {
      a = 3.1415*r*r;
    }
    void display()
    { cout<<"\n\nThe Radius of the Circle = "<<r;
      cout<<"\n\nThe Area of the Circle = "<<a;
    }
};
void main()
{ clrscr();
```

```
Circle c1; /*Default Constructor will be called
implicitly. ie c1.r = 0.0 and c1.a = 0.0 */
Circle c2(10.3);
//Parameterized Constructor will be called
//implicitly
Circle c3(c2);
//Copy Constructor will be called implicitly
c1.take();
c1.calculate();
c1.display();
c2.display();
c3.display();
getch();
}
```

2. Program to process student data using class concept, constructors and destructor.

```
#include<iostream.h>
#include<conio.h>
class Student
{ float m1,m2,m3,total,avg;
public:
    Student()
    { m1=0.0;
      m2=0.0;
      m3=0.0;
      total=0.0;
      avg=0.0;
    }
    Student(float x,float y,float z)
    { m1=x;
      m2=y;
      m3=z;
      total=m1+m2+m3;
      avg=total/3;
    }
    Student(Student &Test)
    { m1=Test.m1;
      m2=Test.m2;
      m3=Test.m3;
      total=Test.total;
      avg=Test.avg;
    }
    ~Student()
    { cout<<"The Object is being Destroyed....";
    }
    void readProcess()
    { cout<<"\n\nEnter the 3 Subject marks of a
      student: ";
      cin>>m1>>m2>>m3;
      total=m1+m2+m3;
      avg=total/3;
    }
    void display()
    { cout<<"\n\nTotal Marks = "<<total;
      cout<<"\n\nAverage Marks = "<<avg;
    }
};
```

```

void main()
{
    clrscr();
    Student S1;
    Student S2(50.5,90.0,75.5);
    Student S3=S2;
    S1.readProcess();
    S1.display();
    S2.readProcess();
    S2.display();
    S3.display();  getch();
}

```

2010 Delhi:

(b) Answer the questions (i) and (ii) after going through the following class: **2**

```

class TEST
{
    int Regno, Max, Min, Score;
public:
    TEST() //Function 1
    {
        Regno= 101;
        Max=100;
        Min=40;
        Score=75;
    }
    TEST(int Pregno,int Pscore) //Function 2
    {
        Regno=Pregno;
        Max=100;
        Min=40;
        Score=Pscore;
    }
    ~TEST() //Function 3
    {
        cout<<"TEST Over"<<endl;
    }
    void Display() //Function 4
    {
        cout<<Regno<<":"<<Max<<":"<<Min<<endl;
        cout<<"[Score]"<<Score<<endl;
    }
};

```

(i) As per Object Oriented Programming, which concept is illustrated by **Function 1** and **Function 2** together?

Ans.

Polymorphism (OR) Function Overloading
(OR) Constructor Overloading

(ii) What is **Function 3** specifically referred as? When do you think, **Function 3** will be invoked/called?

Ans.

Destructor, invoked or called when scope of an Object

2010 Outside Delhi:

2. (b) Answer the questions (i) and (ii) after going through the following class: **2**

```

class Exam
{
    int Rno,MaxMarks,MinMarks,Marks;
public:
    Exam () //Module 1
    {
        Rno=101;
        MaxMarks=100;
        MinMarks=40;
        Marks=75;
    }
    Exam (int Prno, int Pmarks) //Module 2
    {
        Rno=Prno;
        MaxMarks=100;
        MinMarks=40;
        Marks=Pmarks;
    }
    ~Exam () //Module 3
    {
        cout<<"Exam Over"<<endl;
    }
    void Show () //Module 4
    {
        cout<<Rno<<":"<<MaxMarks<<":"<<MinMarks<<endl;
        cout<<"[Marks Got]"<<Marks<<endl;
    }
};

```

(i) As per Object Oriented Programming, which concept is illustrated by **Module 1** and **Module 2** together?

Ans.

Polymorphism (OR) Constructor Overloading
(OR) Function Overloading

(ii) What is **Module 3** referred as? When do you think, **Module 3** will be invoked/called?

Ans.

Destructor. It is invoked as soon as the scope of the object gets over.

2009 Delhi:

(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. **2**

```

#include [iostream.h]
#include [stdio.h]
class Employee
{

```

```

int EmpId=901;
char EName [20];
public
Employee(){
void Joining() {cin>>EmpId; gets (EName);}
void List () {cout<<EmpId<<" :
"<<EName<<endl;}
};
void main ()
{
Employee E;
Joining.E();
E.List()
}

```

Ans

```

#include <iostream.h>
#include <stdio.h>
class Employee
{
    int EmpId;
    char EName[20];
public :
    Employee()
    {
        EmpId=901;
    }
    void Joining()
    {
        cin>>EmpId;
        gets (EName);
    }
    void List ()
    {
        cout<<EmpId<<" : "<<EName<<endl;
    }
};
void main ()
{
    Employee E;
    E.Joining ();
    E.List ();
}

```

2.(a)What is copy constructor?Give an example in C++ to illustrate copy constructor. 2

Ans A copy constructor is an overloaded constructor function in which (an) object(s) of the same class is/are passed as a reference parameter(s). It is used when an object's data value is related to or is initialised using another object's data value of the same class. In the example below the values of data members of object Q are dependent on the values of data members of object P and Data members of object R dependent on Q.

//Example of Copy Constructor
class Play

```

{
    int Count, Number;
public:
    Play(); //constructor
    Play(Play &);//copy constructor
    void Disp();
    void Change(int,int);
};
Play::Play () //constructor
{
    Count=0;
    Number=0;
}
Play:: Play (Play &P) //copy constructor
{
    Count=P.Count+10;
    Number=P.Number+20;
}
void Play::Disp()
{
    cout<<Count;
    cout<<Number<<endl;
}
void Play::Change(int C,int N)
{
    Count=C;
    Number=N;
}
void main ()
{
    Play P; //Call for constructor
    P.Disp (); P.Change(90,80) ;
    Play Q(P); //Copy constructor call
    Q.Disp();
    Play R=Q; //Copy constructor call
    [same as P1ay R(Q);]
    R. Disp();
}

```

(b) Answer the questions (i) and (ii) after going through the following class:

```

class WORK 2
{
    int WorkId;char WorkType ;
public:
    -WORK () //Function 1
    {
        cout<<"Un-Allocated"<<endl ;
    }
    void status () //Function 2
    {
        cout<<WorkId<<" : "<<WorkType<<endl ;
    }
    WORK () //Function 3
    {
        WorkId = 10;
        WorkType='T' ;
    }
}

```

```

WORK(WORK &W) //Function 4
{
    WorkId=W. WorkId+12;
    WorkType=W. WorkType+1
}
};

```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

Ans Function 1

Destructor.

(ii) WORK W; // Statement 1

WORK Y(W); // Statement 2

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class WORK will be called on execution of statement written as statement 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

Ans Function 4

Copy Constructor.

2009 Outside Delhi:

(b) Answer the questions (i) and (ii) after going through the following class: 2

```

class Job
{
    int JobId;
    char JobType;
public:
    ~Job () //Function 1
    {
        cout<< "Resigned" <<endl;
    }
    Job () //Function 2
    {
        JobId=10 ;
        JobType ="T" ;
    }
    void TellMe ()//Function 3
    {
        cout<<JobId<< ":" <<JobType<<endl;
    }
    Job (Job &J) //Function 4
    {
        JobId=J.JobId+10;
        JobType=J.JobType+l;
    }
};

```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job is called automatically, when the scope of an object gets

over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

Ans Function 1.

Destructor.

(ii) Job P ; //Line 1

Job Q(P) ; //Line 2

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Job will be called on execution of statement written as Line 2 ? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

Ans Function 4.

Copy Constructor.

2008 DELHI:

2.b) Answer the questions (i) and (ii) after going through the following program: 2

```

#include <iostream.h>
#include<string.h>
class bazaar
{
    char Type[20] ;
    char product [20];
    int qty ;
    float price ;
    bazaar() //function 1
    {
        strcpy (type , "Electronic");
        strcpy (product , "calculator");
        qty=10;
        price=225;
    }
public :
    void Disp() //function 2
    {
        cout<< type <<"-"<<product<<":"
        <<qty<< "@" << price << endl ;
    }
};
void main ()
{
    Bazaar B; //statement 1
    B. disp() ; //statement 2
}

```

(i) Will statement 1 initialize all the data members for object B with the values given in the function 1 ? (YES OR NO).

Justify your answer suggesting the correction(s) to be made in the above code.

Ans: No. The reason is the constructor should be defined under the public visibility label.

(ii) What shall be the possible output when the program gets executed ? (Assuming, if required _ the suggested correction(s) are made in the program).

Ans: Possible Output:

Electronic-Calculator:10@225

2.c) Define a class Garments in c++ with following descriptions 4

private members :

GCode of type string
 GType of type string
 Gsize of type integer
 Gfabric of type istring
 Gprice of type float

A function **Assign()** which calculate and the value of GPrice as follows.

For the value of GFabric "COTTON",

GType	GPrice(RS)
TROUSER	1300
SHIRT	1100

For GFabric other than "COTTON", the above mentioned

GPrice gets reduced by 10%

public members:

A constructor to assign initial values of GCode, GType and GFabric with the a word "NOT ALLOTTED" and Gsize and Gprice with 0.

A function Input () to the values of the data members GCode, GType, Gsize and GFabric and invoke the Assign() function.

A function Display () which displays the content of all the data members for a garment.

```
#include<iostream.h>
#include<string.h>
#include<conio.h>
#include<stdio.h>
class Garments
{ char GCode[21],GType[21];
  int Gsize;
  char Gfabric[21];
  float Gprice;
  void Assign( )
  {
if(strcmp(strupr(Gfabric),"COTTON")==0)
{ if(strcmp(strupr(GType),"TROUSER")==0)
      Gprice=1300;
  if(strcmp(strupr(GType),"SHIRT")==0)
      Gprice=1100;
}
else
{if(strcmp(strupr(GType),"TROUSER")==0)
      Gprice=1300*0.90;
if(strcmp(strupr(GType),"SHIRT")==0)
      Gprice=1100*0.90;
}
}
public:
  Garments( )
  {
  strcpy(GCode,"NOT ALLOTTED");
  strcpy(GType,"NOT ALLOTTED");
  Gsize=0;
  strcpy(Gfabric,"NOT ALLOTTED");
```

```
      Gprice=0;
}
void Input( )
{ cout<<"\nEnter the Grament Code: ";
  gets(GCode);
  cout<<"\nEnter the Garment Type: ";
  gets(GType);
  cout<<"\nEnter the Garment Size: ";
  cin>>Gsize;
  cout<<"\nEnter the Garment Fabric: ";
  gets(Gfabric);
  Assign( );
}
void display( )
{ cout<<"\nThe Garment Code: "<<GCode;
  cout<<"\nThe Garment Type: "<<GType;
  cout<<"\nThe Garment Size: "<<Gsize;
  cout<<"\nThe Garment Fabric: "<<Gfabric;
  cout<<"\nThe Garment Price: "<<Gprice;
}
};
void main( )
{ Garments G;
  G.Input( );
  G.display( ); }
```

2008 OUTSIDE DELHI:

2.b) Answer the questions (i) and (ii) after going through the following program:

```
#include<iostream.h>
#include<string.h>
class Retail
{ char category[20];
  char item[20];
  int qty;
  float price;
  retail () //function 1
  { strcpy (category, "cerial");
    strcpy (Item, "Rice");
    qty =100 ;
    price =25 ;
  }
public;
  void show() //function 2
  { cout << category <<"-"<< Item << "
    :"<<Qty<<"@"<< price<<endl;
  }
};
void main()
{ Retail R; //statement 1
  R. show (); //statement 2
}
```

(i) will statement 1 initialize all the data members for objects R with the given in the function 1 ? (YES OR NO). Justify your Answer suggesting the corrections(s) to be made in the above code.

Ans:No. The reason is the constructor should be defined under the public visibility label.

(ii) What shall be the possible out put when the program gets executed ? (Assuming, if required the suggested correction(s) are made in the program)

Ans: Possible Output:

cerial-Rice:100@25

2.c) Define a class clothing in c++ with the following descriptions :

private members :

code of type string
 type of type string
 size of type intiger
 material of type string
 price of type float

A function **calc_price()** which calculates and assigns the value of GPrice as follows ;

For the value of material as "COTTON" :

Type	price (Rs)
TROUSER	1500.
SHIRT	1200.

for material other than "COTTON", the above mentioned GPrice price gets reduced by 25%

public members :

* A constructor to assign initial values of code ,type and material with the word "NOT ASSIGNED "and size and price with 0.

* A function enter() to input the values of the data members code, type, size and material and invoke the caclPrice () function.

* A function show which displays the content of all the data members for a clothing.

```
#include<iostream.h>
#include<string.h>
#include<conio.h>
#include<stdio.h>
class clothing
{ char Code[21],Type[21];
  int size;
  char material[21];
  float price;
  void calc_price( )
  {
if(strcmp(strupr(material),"COTTON")==0)
{ if(strcmp(strupr(Type),"TROUSER")==0)
  price=1500;
  if(strcmp(strupr(Type),"SHIRT")==0)
  price=1200;
}
else
{ if(strcmp(strupr(Type),"TROUSER")==0)
  price=1500*0.75;
  if(strcmp(strupr(Type),"SHIRT")==0)
  price=1200*0.75;
}
}
```

```
}
public:
clothing( )
{ strcpy(Code,"NOT ALLOTED");
  strcpy(Type,"NOT ALLOTED");
  size=0;
  strcpy(material,"NOT ALLOTED");
  price=0;
}
void enter( )
{ cout<<"\nEnter the Cloth Code: ";
  gets(Code);
  cout<<"\nEnter the Cloth Type: ";
  gets(Type);
  cout<<"\nEnter the Cloth Size: ";
  cin>>size;
  cout<<"\nEnter the cloth material: ";
  gets(material);
  calc_price( );
}
void show( )
{ cout<<"\nThe Cloth Code: "<<Code;
  cout<<"\nThe Cloth Type: "<<Type;
  cout<<"\nThe Cloth Size: "<<size;
  cout<<"\nThe Cloth Material: "
    <<material;
  cout<<"\nThe Cloth Price: "<<price;
}
};
void main( )
{ clothing C;
  C.enter( );
  C.show( );
}
```

2007 DELHI:

2.a) Differentiate between Constructor and Destructor function in context of Classes and Objects Using C++? 2

Ans:

Constructor: A constructor is used to initialize the objects of that class type with a legal initial value.If a class has a constructor, each object of that class will be initialized before any use is made of the object.

(A member function with the same name as its class is called Constructor and it is

Constructor	Destructor
Purpose: Is used to initialize the objects of that class type with a legal initial value	Purpose: Is used to destroy the objects that have been created by a constructor
Name: The name of the class	Name: The name of the class preceded by a ~.
Calling: It will be called automatically at the time of creation of the object. Ie Implicite calling	Calling: It will be called automatically at the time of destruction of an object. Ie Implicite calling
Return Type: No return type not even void	Return Type: No return type not even void

used to initialize the objects of that class type with a legal initial value.)

Destructor: A destructor is used to destroy the objects that have been created by a constructor. A destructor destroys the values of the object being destroyed.

2.b) Answer the question (i) and (ii) after going through the following class: 2

```
class Maths
{
    char Chapter[20]
    int Marks;
public:
    Maths() //Member Function 1
    {
        strcpy (Chapter, "Geometry");
        Marks=10;
        cout <<"Chapter Initialised ";
    }
    ~Maths() //Member Functions 2
    {
        cout<<"Chapter Over";
    }
};
```

(i) Name the specific features of class shown by member Function 1 and Member Function 2 in the above example.

Ans: Member function 1 is a (non-parameterized or default) constructor (, which will be executed automatically at the time of creation of an object of class Maths). Member function 2 is a destructor (, which will be executed automatically at the time of destruction of an object of class Maths).

(ii) How would Member Function 1 and Member Function 2 get executed ?

Ans: They will be executed automatically. Member function 1 will be executed at the time of creation of an object of class Maths. Member function 2 will be executed at the time of destruction of an object of class Maths.

2.c) Define a class Tour in C++ with the description given below 4

Private Members:

TCode of type string
 No of Adults of type integer
 No of Kids of type integer
 Kilometers of type integer
 TotalFare of type float

Public Members:

- A constructor to assign initial values as follows:
 TCode with the word "NULL"
 No of Adults as 0
 No of Kids as 0
 Kilometers as 0
 TotalFare as 0
- A function AssignFare() which calculates and assigns the value of the data member Totalfare as follows
 For **each** Adult

Fare (Rs)	For Kilometers
500	>=1000
300	<1000 & >=500
200	<500

For **each** Kid the above Fare will be 50% of the Fare mentioned in the above table
 For Example:

If Kilometers is 850, Noofadults =2 and NoofKids =3 Then TotalFare should be calculated as

Numof Adults *300+ NoofKids *150
 i.e., 2*300+ 3 *150 =1050

- A function EnterTour() to input the values of the data members TCode, NoofAdults, NoofKids and Kilometers ; and invoke the AssignFare() function.
- A function ShowTour() which displays the content of all the data members for a Tour.

Ans:

```
#include<conio.h>
#include<stdio.h>
#include<string.h>
#include<iostream.h>
class Tour
{
    char TCode[21];
    int NoofAdults,NoofKids,Kilometres;
    float TotalFare;
public:
    Tour( )
    {
        strcpy(TCode,"NULL");
        NoofAdults=NoofKids=Kilometres=TotalFare=0;
    }
    void AssignFare( )
    {
        if(Kilometres>=1000)
            TotalFare=NoofAdults*500+NoofKids*250;
        else if(Kilometres>=500)
            TotalFare=NoofAdults*300+NoofKids*150;
        else
            TotalFare=NoofAdults*200+NoofKids*100;
    }
    void EnterTour( )
    {
        cout<<"\nEnter the Tour Code: ";
        gets(TCode);
        cout<<"\nEnter the Number of Adults: ";
        cin>>NoofAdults;
```

```

cout<<"\nEnter the Number of Kids: ";
cin>>NoofKids;
cout<<"\nEnter the Number of Kilometres: ";
cin>>Kilometres;
AssignFare( );
}
void ShowTour( )
{ cout<<"\nThe Tour Code: "<<TCode;
  cout<<"\nThe Number of Adults:"
    <<NoofAdults;
  cout<<"\nThe Number of Kids: "<<NoofKids;
  cout<<"\nThe Number of Kilometres: "
    <<Kilometres;
  cout<<"\n\nThe Total Fare: "<<TotalFare;
}
};
void main( )
{ clrscr();
  Tour T;
  T.EnterTour( );
  T.ShowTour( );
  getch();
}

```

2007 OUTSIDE DELHI:

2.b) Answer the questions (i) and (ii) after going through the following class : 2

```

class Science
{   char Topic[20];
    int Weightage;
public:
    Science() //Function 1
    {   strcpy(Topic, "Optics");
        Weightage =30
        cout<<"Topic Activated";
    }
    ~Science() //Function 2
    {   cout<<"Topic Deactivated"; }
};

```

(i) Name the specific features of class shown by Function 1 and Function 2 in the above example.

Ans: Member function 1 is a (non-parameterized or default) constructor (, which will be executed automatically at the time of creation of an object of class Science).
Member function 2 is a destructor (, which will be executed automatically at the time of destruction of an object of class Science).

(ii) How would Function 1 and Function 2 get executed ?

Ans: They will be executed automatically. Member function 1 will be executed at the time of creation of an object of class Science. Member function 2 will be executed at the time of destruction of an object of class Science.

2.c) Define a class Travel in C++ with the description given below : 4

Private Members:

T_Code of type string
No_of_Adults of type integer
No_of_Children of type integer
Distance of type integer
TotalFare of type float

Public Members:

- A constructor to assign initial values as follows:
TCode with the word "NULL"
No_of_Adults as 0
No_of_Children as 0
Distance as 0
TotalFare as 0
- A function AssignFare() which calculates and assigns the value of the data member Totalfare as follows
For **each** Adult

<i>Fare (Rs)</i>	<i>For Kilometers</i>
500	>=1000
300	<1000 & >=500
200	<500

For **each** Child the above Fare will be 50% of the Fare mentioned in the above table

For Example:

If Distance is 750, No_of_adults =3 and No_of_Children =2

Then TotalFare should be calculated as
Num_of_Adults *300+ No_of_Children *150
i.e., 3*300+ 2 *150 =1200

- A function EnterTour() to input the values of the data members T_Code, No_of_Adults, No_of_Children and Distance ; and invoke the AssignFare() function.
- A function ShowTravel() which displays the content of all the data members for a Travel.

```

#include<conio.h>
#include<stdio.h>
#include<string.h>
#include<iostream.h>
class Travel
{ char T_Code[21];
  int No_of_Adults,No_of_Children,Distance;
  float TotalFare;
public:
  Travel()
  { strcpy(T_Code,"NULL");
    No_of_Adults=No_of_Children=Distance=
    TotalFare=0;

```

```

}
void AssignFare( )
{
if(Distance>=1000)
    TotalFare=No_of_Adults*500+No_of_Children*250;
else if(Distance>=500)
    TotalFare=No_of_Adults*300+No_of_Children*150;
else
    TotalFare=No_of_Adults*200+No_of_Children*100;
}
void EnterTravel( )
{ cout<<"\nEnter the Travel Code: ";
  gets(T_Code);
  cout<<"\nEnter the Number of Adults: ";
  cin>>No_of_Adults;
  cout<<"\nEnter the Number of Children: ";
  cin>>No_of_Children;
  cout<<"\nEnter the Distance in Kilometres: ";
  cin>>Distance;
  AssignFare( );
}
void ShowTravel( )
{ cout<<"\nThe Travel Code: " <<T_Code;
  cout<<"\nThe Number of Adults: " <<No_of_Adults;
  cout<<"\nThe Number of Children: " <<No_of_Children;
  cout<<"\nThe Distance in Kilometres: " <<Distance;
  cout<<"\n\nThe Total Fare: " <<TotalFare;
}
};
void main( )
{
  clrscr();
  Travel T;
  T.EnterTravel( );
  T.ShowTravel( );
  getch();
}

```

2006 DELHI:

2.b) Answer the following questions (i) and (ii) after going through the following class. 2

```

class Interview
{ int Month;
public:
interview(int y) {Month=y;}
//constructor 1
interview(Interview&t);
//constructor 2
};

```

(i) create an object, such that it invokes Constructor 1.

Ans: Interview A(10); //invoking constructor 1 by passing a number.

(ii) write complete definition for Constructor 2.

Ans: Interview(Interview &t)
//This is a copy constructor.
{ Month=t.Month;
}

2006 OUTSIDE DELHI:

1.f) What is a default constructor? How does it differ from destructor? 2

a) Default constructor: A constructor that accepts no parameter is called the default constructor.

With a default constructor, objects are created just the same way as variables of other data types are created.

```

class X
{ int i;
public:
int j, k;
----- //Members Functions
-----
};
Eg: X ob1;
Student s1;

```

If a class has no explicit constructor defined, the compiler will supply a default constructor. This implicitly declared default constructor is an **inline public** members of its class. Declaring a constructor with arguments hides the default constructor.

There can be a default constructor as well as another constructor with arguments for a class, having multiple constructors is called as constructor overloading.

2.b) Answer the following questions (i) and (ii) after going through the following class. 2

```

class Exam
{ int Year;
public:
Exam(int y) //Constructor 1
{ Year=y;
}
Exam(Exam &t);
//Constructor 2
};

```

(i) Create an object, such that it invokes Constructor 1

Ans: Exam E((2008);

(ii) Write complete definition for constructor 2.

Ans: Exam(Exam &t)
//Copy Constructor.
{ Year=t.Year;
}

2005 DELHI:

2.b) Answer the following questions (i) and (ii) after going through the following class.

```

class Test
{   char Paper[20];
    int Marks
public:
    Test() //Function 1
    {   strcpy(Paper,"Computer");
        Marks=0;
    }

    //Function 2
    Test(char P[])
    {   strcpy(Paper,P);
        Marks=0;
    }

    //Function 3
    Test(int M)
    {   strcpy(Paper,"Computer");
        Marks=M;
    }
    Test(char P[],int M)
    //Function 4
    {   strcpy(Paper,P);
        Marks=M;
    }
};

```

(i) Which feature Object Oriented programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class text?

Ans: Function overloading (here it is constructor overloading).

(ii) Write statements in C++ that would execute Function 2 and Function 4 of class Text.

Ans: (**let** char name[20];
int X=60;
strcpy(name,"COMPUTERSCIENCE");
are declared in the program)

- (i) Test A(name);
//Will execute Function 2
(ii) Test B(name,X);
//Will execute Function 4

2.c) Define a class Travelplan in C++ with the following descriptions:

Private Members:

Plancode of type long
Place of type character

array(string)

Number_of_travellers of type integer
Number_of_buses of type integer

Public Members:

*A constructor to assign initial values of PlanCode as 1001, Place as "agra", Number_of_travellers as 5, Number_of_buses as 1

* A function NewPlan() which allows user to enter PlanCode, Place and Number_of travelers.

Also, assign the value of Number_of_buses as per the following conditions:

Number_of_travellers	Number_of_buses
less than 20	1
Equal to or more than 20 and less than 40	2
Equal to 40 or more than 40	3

* A function ShowPlan() to display the content of all the data members on the screen.

Ans:

```

#include<iostream.h>
#include<conio.h>
#include<stdio.h>
#include<string.h>
class TravelPlan
{   long PlanCode;
    char Place[21];
    int Number_of_travellers,Number_of_buses;
public:
    TravelPlan( )
    {   PlanCode=1001;
        strcpy(Place,"Agra");
        Number_of_travellers=5;
        Number_of_buses=1;
    }
    void NewPlan( )
    {   cout<<"\nEnter the Plan Code: ";
        cin>>PlanCode;
        cout<<"\nEnter the Place to Travel: ";
        gets(Place);
        cout<<"\nEnter the Number of Travellers: ";
        cin>>Number_of_travellers;
        if(Number_of_travellers>=40)
            Number_of_buses=3;
        else if(Number_of_travellers>=20)
            Number_of_buses=2;
        else
            Number_of_buses=1;
    }
    void ShowPlan( )
    {   cout<<"\nThe Plan Code: "<<PlanCode;
        cout<<"\nThe Place of Travel: "<<Place;
        cout<<"\nNumber of Travellers: "
            <<Number_of_travellers;
        cout<<"\nNumber of Buses: "
            <<Number_of_buses;
    }
};
void main( )
{   clrscr( );
    TravelPlan T;
    T.NewPlan( );
    T.ShowPlan( );
    getch( );
}

```

2005 OUTSIDE DELHI:

1.a) Differentiate between a default constructor and copy constructor, giving suitable examples of each.

Ans: A default constructor also called as non-parameterized constructor will take no argument and initialize the object with the predefined values in that constructor,

Where as a copy constructor will take an already created object of that class and stores that object values into the newly created object of that class. A copy constructor takes a reference to an object of the same class as an argument.

2.b) Answer the following questions (i) and (ii) after going through the following class.

```
class Exam
{
    int Marks;
    char Subject[20];
public:
    Exam() //Function 1
    { strcpy(Subject,"Computer");
      Marks=0;
    }
    Exam(char S[]) //Function 2
    { strcpy(Subject,S);
      Marks=0;
    }
    Exam(int M) //Function 3
    { strcpy(Subject,"Computer");
      Marks=M;
    }
    Exam(char S[],int M) //Function4
    { Strcpy(Subject,P);
      Marks=M;
    }
};
```

(i) Write statements in C++ that would execute Function 3 and Function 4 of class Exam.

```
(let char name[20];
int X=60;
```

strcpy(name,"COMPUTERSCIENCE");
are declared in the program)

- (i) Exam A(X);
//Will execute Function 3
(ii) Exam B(name,X);
//Will execute Function 4

(ii) Which feature Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class text?

Ans: Function overloading (here it is constructor overloading).

2.c) Define a class Travel in C++ with the following descriptions:

Private Members:

Travelcode of type long

Place of type character
array(string)

Number_of_travellers of type integer

Number_of_buses of type integer

Public Members:

* A constructor to assign initial values of TravelCode as 201,

Place as "Nainital", Number_of_travellers as 10, Number_of_buses as 1

* A function NewTravel() which allows user to enter TravelCode, Place and Number_of travelers. Also, assign the value of Number_of_buses as per the following conditions:

Number_of_travellers **Number_of_buses**

1

less than 20

1

Equal to or more than 20 and less than 40

2

Equal to 40 or more than 40

3

* A function ShowTravel() to display the content of all the data members on the screen.

Ans:

```
#include<iostream.h>
```

```
#include<conio.h>
```

```
#include<stdio.h>
```

```
#include<string.h>
```

```
class Travel
```

```
{ long TravelCode;
```

```
char Place[21];
```

```
int No_of_travellers,No_of_buses;
```

```
public:
```

```
Travel( )
```

```
{ TravelCode=201;
```

```
strcpy(Place,"Nainital");
```

```
No_of_travellers=5;
```

```
No_of_buses=1;
```

```
}
```

```
void NewTravel( )
```

```
{ cout<<"\nEnter the Travel Code: ";
```

```
cin>>TravelCode;
```

```
cout<<"\nEnter the Place to Travel: ";
```

```
gets(Place);
```

```
cout<<"\nEnter the Number of Travellers: ";
```

```
cin>>No_of_travellers;
```

```
if(No_of_travellers>=40)
```

```
    No_of_buses=3;
```

```
else if(No_of_travellers>=20)
```

```
    No_of_buses=2;
```

```
else
```

```
    No_of_buses=1;
```

```
}
```

```
void ShowTravel( )
```

```
{ cout<<"\nThe Plan Code: "<<TravelCode;
```

```
cout<<"\nThe Place of Travel: "<<Place;
```

```
cout<<"\nNumber of Travellers: "
```

```
<<No_of_travellers;
```

```
cout<<"\nNumber of Buses: "
```

```
<<No_of_buses;
```

```
}
```

```
};
void main( )
{ clrscr( );
  Travel T;
  T.NewTravel( );
  T.ShowTravel( );
  getch( );
}
```

2004 DELHI:

2.a) Given the following C++ code, answer the questions (i) and (ii)

```
class TestMeOut
{ public:
  ~TestMeOut( ) //Function 1
  {
  cout<<"Leaving the examination hall"<<endl;
  }
  TestMeOut( ) //Function 2
  {
  cout<<"Appearing for examination"<<endl;
  }
  void MyWork( )
  {
  cout<<"Attempting Questions"<<endl;
  }
};
```

(i) In Object Oriented programming, what is Function 1 referred as and when does it get invoked/called?

Ans: Function 1 is called as Destructor, It will automatically executed at the time of destruction of the object of class TestMeOut.

(ii) In Object Oriented Programming, what is Function 2 referred as and when does it get invoked/called?

Ans: Function 2 is called as constructor (Non-parameterized or default constructor), it will automatically executed at the time of creation of the object of class TestMeOut.

2003 DELHI:

2.b) Define a class **Play** in C++ with the following specifications:

Private members of class **Play**

*Play code integer
*Playtime 25 character
*Duration float
*Noofscenes integer

Public member function of class **Play**

*A constructor function to initialize Duration as 45 and Noofscenes as

*Newplay() function to values for Playcode and Playtitle.

*Moreinfor() to assign the values of assign the values of Duration and Noofscenes with the of

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corresponding values passed as parameters to this function.

*Shopplay() function to display all the dataq members on the screen.

```
Ans: #include<iostream.h>
#include<conio.h>
#include<string.h>
#include<stdio.h>
class Play
{ int Playcode;
  char Playtitle[25];
  float Duration;
  int Noofscenes;
public:
  Play( )
  { Duration=45;
    Noofscenes=5;
  }
  void Newplay( )
  { cout<<"\nEnter the Play Code: ";
    cin>>Playcode;
    cout<<"\nEnter the Play Title: ";
    gets(Playtitle);
  }
  void Moreinfor(float D,int N)
  { Duration = D;
    Noofscenes = N;
  }
  void Showplay( )
  { cout<<"\nThe Play Code : "
    <<Playcode;
    cout<<"\nThe Play Title : "
    <<Playtitle;
    cout<<"\nThe Duration : "
    <<Duration;
    cout<<"\nThe No of
      Scenes:"<<Noofscenes;
  }
};
void main( )
{ clrscr( );
  Play P;
  P.Newplay( );
  float Dur;
  int NS;
  cout<<"\nEnter the Duration and
    Number of Scenes: ";
  cin>>Dur>>NS;
  P.Moreinfor(Dur,NS);
  P.Showplay( );
  getch( );
}
```

2002 DELHI:

2.c) Write the **output** of the following program.4

Ans: #include<iostream.h>

```

class Counter
{ private:
    unsigned int count;
public:
    Counter()
    { count=0; }
    void inc_Count()
    { count++; }
    int get_Count()
    { return count; }
};
void main()
{ Counter C1,C2;
  cout<<"\nC1="<<C1.get_Count();
  cout<<"\nC2="<<C2.get_Count();
  C1.inc_Count();
  C2.inc_Count();
  C2.inc_Count();
  cout<<"\nC1="<<C1.get_Count();
  cout<<"\nC2="<<C2.get_Count();
}

```

Output:

C1=0
C2=0
C1=1
C2=2

2000 DELHI:

2.a) Why is destructor function required in classes? Illustrate with the function with an example.

Ans: A destructor is a function which de-allocates/frees the memory which was reserved by the constructor.

Eg:

```

class Sample
{
    Int i,j;
Public:
    Sample(int a,int b) //Constructor
    { i=a;j=b; }
    ~Sample()
    { cout<<"Destructor at work\n"; }
    -----
};
void main()
{
    Sample s1(3,4); //Local object s1
    constructed with values 3
    // and 4 using Sample ()
    -----
    -----
    ----//Automatically s1 is destructed at the end
    of the block
    //using destructor ~Sample()
}

```

Here in the above example the destructor ~Sample() will be automatically executed at the

time of destruction of an object, and which is used to de-allocate the memory, before doing it whatever written in the destructor will be executed.

In the above example whenever an object of the class is being destroyed, "Destructor at work" will be displayed.

1998 DELHI:

2.a) What is a copy constructor? What do you understand by constructor overloading?

Ans: copy constructor is a constructor of the form **classname(classname &)**. The compiler will use the copy constructor whenever you initialize an instance using values of another instance of same type.

Eg: Sample S1;

//Default constructor used

Sample S2 = S1;

//Copy constructor used. Also

//Sample S2(S1);

In the above code, for the second statement, the compiler will copy the instance S1 to S2 member by member. If you have not defined a copy constructor, the compiler automatically, creates it and it is public.

A copy constructor takes a reference to an object of the same class as an argument.

Constructor Overloading:

With same constructor name, having several definitions that are differentiable by the number or types of their arguments (ie Parameterized, non-parameterized and copy constructors) is known as an overloaded constructor and this process is known as constructor overloading.

Constructor overloading implements polymorphism.

An Example using Constructor Overloading:

1. Program to find area of a circle using class, constructor functions and destructor.

```
#include<iostream.h>
```

```
#include<conio.h>
```

```
class Circle
```

```
{ float r,a; //r and a are private
public:
```

```
Circle() //Non parameterized or Default
Constructor
```

```
{ r=0.0; a=0.0; }
```

```
Circle(float rad) //Parameterized
```

```
Constructor
```

```
{ r = rad;
```

```
a = 3.1415*r*r;
```

```
}
```

```

Circle(Circle &obj) //Copy Constructor
{ r = obj.r;
  a = obj.a;
}
~Circle()
{ cout<<"\n\nThe object is being
  destroyed...."; }
void take()
{ cout<<"Enter the value of Radius: ";
  cin>>r;
}
void calculate()
{ a = 3.1415*r*r; }
void display()
{ cout<<"\n\nThe Radius of the Circle = "<<r;
  cout<<"\n\nThe Area of the Circle = "<<a;
}
};
void main()
{ clrscr();
  Circle c1; /*Default Constructor will be called
  implicitly,ie c1.r = 0.0 and c1.a = 0.0 */
  Circle c2(10.3); //Parameterized
//Constructor will be called mplicitly
  Circle c3(c2);
//Copy Constructor will be called implicitly
  c1.take();
  c1.calculate();
  c1.display();
  c2.display();
  c3.display();
  getch();}

```

Model Paper 1 for 2008-09 Batch:

2.c) Answer the questions (i) and (ii) after going through the following class: 2

```

class Seminar
{
  int Time;
  public:
  Seminar() //Function 1
  {
    Time=30;cout<<"Seminar starts now"<<end1;
  }
  void Lecture() //Function 2
  {
    cout<<"Lectures in the seminar on"<<end1;
  }
  Seminar(int Duration) //Function 3
  {
    Time=Duration;cout<<"Seminar starts
    now"<<end1;
  }
  ~Seminar() //Function 4
  {
    cout<<"Vote of thanks"<<end1;
  }
}

```

```

};
i)In Object Oriented Programming, what is
Function 4 referred as and when does it get
invoked/called?

```

Answer:

Destructor, it is invoked as soon as the scope of the object gets over.

ii)In Object Oriented Programming, which concept is illustrated by Function 1 and Function 3 together? Write an example illustrating the calls for these functions.

Answer:

Constructor Overloading
(Polymorphism)
Seminar S1,S2(90);

Model Paper 2 for 2008-09 Batch:

2.c) Answer the questions (i) and (ii) after going through the following program: 2

```

class Match
{
  int Time;
  public:
  Match() //Function 1
  {
    Time=0;
    cout<<"Match commences"<<end1;
  }
  void Details() //Function 2
  {
    cout<<"Inter Section Basketball
  Match"<<end1;
  }
  Match(int Duration) //Function 3
  {
    Time=Duration;
    cout<<"Another Match begins now"<<end1;
  }
  Match(Match &M) //Function 4
  {
    Time=M.Duration;
    cout<<"Like Previous Match "<<end1;
  }
};

```

i) Which category of constructor - Function 4 belongs to and what is the purpose of using it?

Answer:

Copy Constructor, it is invoked when an object is created and initialised with values of an already existing object.

ii) Write statements that would call the member Functions 1 and 3

Answer:

```
Match M1; //for Function 1
Match M2(90); //for Function 3
```

Sample Paper 1 for 2009-10 Batch:

2. b) Answer the questions (i) and (ii) after going through the following class: 2

```
class Seminar
{
    int Time;
public:
    Seminar() //Function 1
    {
        Time=30;
        cout<<"Seminar starts now"<<end1;
    }
    void Lecture() //Function 2
    {
        cout<<"Lectures in the seminar
on"<<end1;
    }
    Seminar(int Duration) //Function 3
    {
        Time=Duration;
        cout<<"Seminar starts now"<<end1;
    }
    ~Seminar() //Function 4
    {
        cout<<"Vote of thanks"<<end1;
    }
};
```

i) In Object Oriented Programming, what is Function 4 referred as and when does it get invoked/called?

A) Destructor, it is invoked as soon as the scope of the object gets over. 2

ii) In Object Oriented Programming, which concept is illustrated by Function 1 and Function 3 together? Write an example illustrating the calls for these functions.

A) Constructor Overloading (or Function Overloading or Polymorphism)

```
Seminar S1; //Function 1
Seminar S2(90); //Function 3
```

Sample Paper 2 for 2009-10 Batch:

2.b) Answer the questions (i) and (ii) after going through the following program: 2

```
class Match
{
    int Time;
```

public:

```
Match() //Function 1
{
    Time=0;
    cout<<"Match commences"<<end1;
}
void Details() //Function 2
{
    cout<<"Inter Section Basketball
Match"<<end1;
}
Match(int Duration) //Function 3
{
    Time=Duration;
    cout<<"Another Match begins now"<<end1;
}
Match(Match &M) //Function 4
{
    Time=M.Duration;
    cout<<"Like Previous Match "<<end1;
}
};
```

i) Which category of constructor - Function 4 belongs to and what is the purpose of using it?

A) Copy constructor, It will help to copy the data from one object to another

ii) Write statements that would call the member Functions 1 and 3

```
A) Match M; //Function 1
Match N(10); //Function 3
```

**" If WEALTH is lost, nothing is lost.
If HEALTH is lost, something is lost.
If CHARACTER is lost, everything is
lost."**

**"The fear of the Lord is the beginning
of wisdom"**

6. INHERITANCE

2010 Delhi:

2.(d) Answer the questions (i) to (iv) based on the following: 4

class Chairperson

```
{
    long CID; //Chairperson Identification Number
    char CName[20];
protected:
    char Description [40];
```

```

void Allocate();
public:
Chairperson();
void Assign();
void Show();
};
class Director
{
    int DID; //Director ID
    char Dname[20];
protected:
    char Profile[30];
public:
    Director();
    void Input();
    void output();
};
class Company:private Chairperson, 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 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

2010 Outside Delhi:

2.(d) Answer the questions (i) to (iv) based on the following: 4

```

class Director
{
    long DID; //Director Identification Number
    char Name[20];

```

```

protected:
    char Description[40];
    void Allocate ();

```

```

public:
    Director();
    void Assign ();
    void Show ();
};

```

class Factory:public Director

```

{
    int FID; //Factory ID
    char Address[20];

```

```

protected:
    int NOE; //No. of Employees

```

```

public:
    Factory();
    void Input ();
    void Output ();
};

```

class ShowRoom:private Factory

```

{
    int SID; //Showroom ID
    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()

2009 Delhi:

2.(d) Answer the questions (i) to (iv) based on the following: 4

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()
SiteIn(). SiteOut().
Input(), Output()

iii) Write 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.

2009 Outside Delhi:

2(d) Answer the questions (i) to (iv) based on the following: 4

class Regular

Prepared By: Mr.M.Ravi Kiran.

```
{
    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 through 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.

2008 DELHI:

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

class Dolls

Doubt? mrkdata@yahoo.com XII Computer

```

{ 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:
    ElectronicDolls();
    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()

2008 OUTSIDE DELHI:

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 STDdisplay();
};
class ElectronicToys:public Toys
{ char ETName[20];
  int No_of_Batteries;
  public:
    ElectronicToys();
    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 Bytes
float 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()

2007 DELHI:

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(),

2007 OUT SIDE DELHI:

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

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: Multiple 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 Functions: 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.

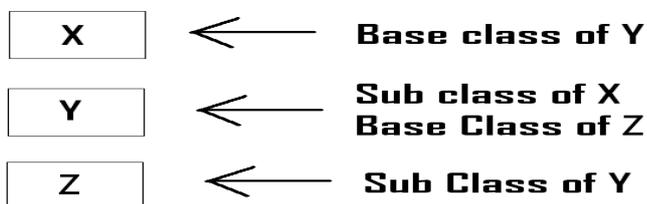
Ans: School::SchEntry()
School::SchDisplay()

2006 DELHI:

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

Ans:

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



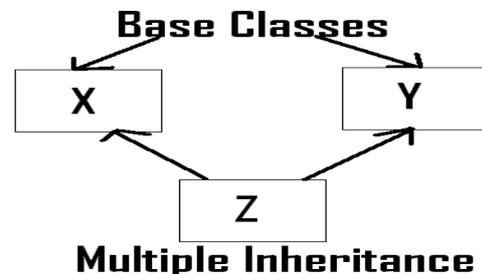
Multi level Inheritance

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()

2006 OUT SIDE DELHI:

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()

2005 DELHI:

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 Funtions:

```
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
```

2005 OUTSIDE DELHI:

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

2004 DELHI:

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_organ,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.

2003 DELHI:

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 and 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

2002 DELHI:

1.a) Illustrate the concept of Inheritance with the help of an example. 2

Ans: The capability of one class to inherit properties from another class, is called as inheritance.

The most important advantage of inheritance is code reusability.

There are 5 types of inheritance:

- (i) Single Inheritance: When a sub class inherits only from one base class, it is known as single inheritance.
- (ii) Multiple Inheritance: When a sub class inherits from multiple base classes, it is known as multiple inheritance.
- (iii) Hierarchical Inheritance: When many sub classes inherit from a single base class, it is known as hierarchical inheritance.
- (iv) Multilevel Inheritance: When a subclass inherits from a class that itself inherits from another class, it is known as multilevel inheritance.
- (v) 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 inherit the existing features (members) and you can develop new class consists the remaining features using **inheritance (in Object Oriented Programming ie in C++.)**

2000 DELHI:

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 to the objects of Dept?

Ans: Yes. Since it is public member function.

1999 DELHI:

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_vehicle - 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.

1998 DELHI:

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.

Model Paper 1 for 2008-09 Batch:

2.f) Answer the questions (i) to (iv) based on the following: 4

```

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();
};

```

(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

```

Model Paper 2 for 2008-09 Batch:

2.e) Answer the questions (i) to (iv) based on the following: 4

```

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 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

Sample Paper 1 for 2009-10 batch:

2.d) Answer the questions (i) to (iv) based on the following: 4

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:

Prepared By: Mr.M.Ravi Kiran.

```
AUTHOR();
void Start();
void Show();
```

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

Ans) Haveit(), Giveit()

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

Sample Paper 2 for 2009-10 Batch:

2.d) Answer the questions (i) to (iv) based on the following: 4

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

***“ If WEALTH is lost,
nothing is lost.***

***If HEALTH is lost,
something is lost.***

***If CHARACTER is
lost, everything is
lost.”***

***“The fear of
the LORD is
the beginning
of wisdom”***

***ALL THE BEST**

FROM

Mr.&Mrs.

M.RAVI KIRAN

7.DATA FILE HANDLING

DELHI 2010:

4. (a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using tellg() and seekp() functions for performing the required task. **1**

```
#include <fstream.h>
class Client
{
    long Cno;
    charName[20],Email[30] ;
public:
    //Function to allow user to enter
    //the Cno, Name,Email
    void Enter() ;
    //Function to allow user to enter
    //(modify) Email
    void Modify() ;
    long ReturnCno()
    {
        return Cno;
    }
};

void ChangeEmail()
```

```

        |ios::in |ios::out);
long Cnoc; //Client's no. whose
        //Email needs to be changed
cin>>Cnoc;
while (F.read((char*)&C,
        sizeof(C)))
{
    if (Cnoc==C.ReturnCno())
    {
        C.Modify(); //Statement 1
        int Pos = _____
            //To find the current position
            //of file pointer

        _____ // Statement 2
            //To move the file pointer to
            //write the modified record
            //back onto the file for the
            //desired Cnoc
        F.write((char*)&C, sizeof(C));
    }
}
F.close();
}

```

Ans)

Statement 1:

F. tellg ();

Statement 2:

F. seekp(Pos-sizeof(C));

OR

F.seekp(-sizeof(C), ios::cur);

(b) Write a function in C++ to count the words “**this**” and “**these**” present in a text file “ARTICLE.TXT”. 2

[Note that the words “this” and “these” are complete words]

Ans)

```

void COUNT ( )
{
    ifstream Fil; // ifstreamFil(“ARTICLE.TXT”);
    Fil. open(“ARTICLE.TXT”);
    char Word[80] ,Ch;
    int C1 =0, C2 = 0, I=0;
    while(Fil.get(Ch))
    {
        if (Ch! = ' ')
            Word[I++] = Ch;
        else
        {
            Word[I] = '\0';
            if (strcmp(Word,“this)==0)
                C1++;
            else if (strcmp(Word,“these)==0)

```

```

        C2++;
        I=0;
    }
}
cout<<“Count of -this- in file:”<<C1;
cout<<“Count of -these- in file:”<<C2;
// OR cout<<“Count of -this- and -
//these- in file: “<<C1+C2;
Fil.close( );
}

```

(c) Write a function in C++ to search and display details of all flights, whose destination is “Mumbai” from a binary file “FLIGHT.DAT”. Assuming the binary file is containing the objects of the following class. 3

```

class FLIGHT
{
    int Fno; //Flight Number
    char From[20]; //Flight Starting Point
    char To[20]; //Flight Destination
public:
    char* GetFrom( )
        {return From;}
    char* GetTo( )
        {return To;}
    void Enter( )
    {
        cin>>Fno;
        gets(From);
        gets(To);
    }
    void Display( )
    {
        cout<<Fno<<“.”<<From<<“.”<<To<<endl;
    }
};

```

Ans)

```

void Read ( )
{
    FLIGHT F;
    ifstream fin;
    fin.open(“FLIGHT.DAT”,ios::binary);
    //OR ifstream fin (“FLIGHT. DAT”, ios: :binary) ;
    while(fin.read((char*)&F,sizeof(F)))
    {
        if (strcmp(F. GetTo(),“Mumbai”))
            F.Display( ) ;
    }
    fin.close(); //

```

```

}
OR
void Read( )
{
FLIGHT F;
ifstream fin;
fin.open ("FLIGHT. DAT", ios::binary) ;
//OR ifstream fin ("FLIGHT. DAT", ios:: binary);
if (fin)
{ fin.read((char*)&F, sizeof (F));
while(!fin.eof( ))
{
if (strcmp(F. GetTo( ), "Mumbai"))
F.Display( );
fin.read((char*)&F, sizeof(F))
}
fin.close( );
}
}

```

OUTSIDE DELHI 2010:

4. (a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using tellg() and seekp() functions for performing the required task. 1

```

#include <fstream.h>
class Customer
{ long Cno;
char Name[20], Mobile[12];
public:
//Function to allow user to enter
//the Cno, Name, Mobile
void Enter( );
//Function to allow user to enter (modify)
//mobile number
void Modify( );
//Function to return value of Cno
long GetCno( )
{
return Cno;
}
};
void ChangeMobile( )
{
Customer C;
fstream F;
F.open("CONTACT.DAT", ios::binary |
ios::in | ios::out);
long Cnoc;
//Customer no. whose mobile number
//needs to be changed
cin >> Cnoc;

```

```

while (F.read((char*)&C, sizeof(C)))
{
if (Choc == C.GetCno( ))
{
C.Modify( );
int Pos = _____ //Statement 1
//To find the current position of file pointer
_____ //Statement 2
//To move the file pointer to write the
//modified record back onto the file for the
//desired Cnoc
F.write((char*)&C, sizeof(C));
}
}
F.close( );
}

```

Ans)

Statement 1

F.tellg();

Statement 2

F.seekp(Pos-sizeof(C));

OR

File.seekp(-1* sizeof(C), ios::cur);

(b) Write a function in C++ to count the words "**to**" and "**the**" present in a text file "POEM.TXT". 2
[Note that the words "to" and "the" are complete words]

Ans)

```

void COUNT( )
{
ifstream Fil;
Fil.open ("POEM.TXT");
//OR ifstream Fil("POEM.TXT");
char Word[80], Ch;
int C1 = 0, C2 = 0, i = 0;
while(Fil.get(Ch))
{
if (Ch != ' ')
Word[i++] = Ch;
else
{
Word[i] = '\0';
if (strcmp (Word, "to") == 0)
C1++;
else if (strcmp (Word, "the") == 0)
C2++;
i = 0;
}
}
}

```

```

cout<<"Count of -to- in file:"<<C1;
cout<<"Count of -the- in file:"<<C2;
//OR cout<<"Count of -to- and -the- in
Fil.close( );
}

```

(c) Write a function in C++ to search and display details. of all trains, whose destination is "Delhi" . from a binary file "TRAIN.DAT". Assuming the binary file is containing the objects of the following class.
3

```

class TRAIN
{
    int Tno;                // Train Number
    charFrom[20]; // Train Starting Point
    charTo [20]; // Train Destination
public:
    char* GetFrom( )
    {
        return From;
    }
    char* GetTo( )
    {
        return To;
    }
    void Input( )
    {
        cin>>Tno;
        gets(From);
        gets(To);
    }
    void Show( )
    {
        cout<<Tno<<" "<<From<<" "<<To<<endl;
    }
};

```

Ans)

```

void Read ( )
{
    TRAIN T;
    ifstream fin;
    fin. open ("TRAIN.DAT",ios::binary);
    //OR ifstream fin ("TRAIN.DAT", ios::binary);
    while(fin.read((char*)&T, sizeof(T)))
    {
        if(strcmp(T.GetTo(),"Delhi")==0)
            T.Show( ) ;
    }
    fin.close( );
}

```

DELHI 2009:

4. (a) Observe the program segment given below carefully and fill in the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task. 1

```

#include <fstream.h>
class Stock
{
    long Ino ;           //Item Number
    char Item [20] ; //Item Name
    int Qty ;           //Quantity
public:
    void Get(int);
    //Function to enter the content
    void show( );
    //Function to display the content
    void Purchase (int Tqty)
    {
        Qty + = Tqty ;
    } //Function to increment in Qty
    long KnowIno ( )
    {
        return Ino;
    }
};
void Purchaseitem(long PINo, int PQty)
    //PINo -> Ino of the item purchased
    //PQty -> Number of item purchased
{
    fstream File;
    File.open("ITEMS.DAT", ios ::
        binarylios ::inlios :: out);
    int Pos = -1 ;
    Stock S ;
    while (Pos == -1 && File.read((char*) &S, sizeof
(S)))
    if (S. KnowIno( ) ==PINo)
    {
        S. Purchase (PQty);
        //To update the number of Items
        Pos = File.tellg ( ) -sizeof (S) ;
        _____;
        //Line 1: To place the file
        //pointer to the required position
        _____;
        //Line 2: To write the object S on to
        //the binary file
    }
    if (Pos == -1)
        cout<<"No updation done as
        required Ino not found.." ;
    File.close ( ) ;
}

```

```
}
```

Ans)

Statement 1:

```
File.seekp(Pos);
```

OR

```
File.seekp(-sizeof(A), ios:: cur);
```

Statement 2:

```
File.write((char*)&S, sizeof(S));
```

OR

```
File.write((char*)&S, sizeof(Stock));
```

(b) Write a function COUNT_DO() in C++ to count the presence of a word 'do' in a text file "MEMO.TXT" 2

Example:

If the content of the file "MEMO.TXT" is as follows:

I will **do** it, if you request me to **do** it.

It would have been done much earlier.

The function COUNT_DO () will display the following message:

Count of -do- in file : **2**

Note: In the above example, 'do' occurring as a part of word done is not considered.

Ans)

```
void COUNT_DO( )
{
    ifstream Fil;
    Fil.open("MEMO.TXT");
    //OR ifstream Fil("MEMO.TXT");
    char Word[80],Ch;
    int Count =0,I=0;
    while(Fil.get(Ch))
    {
        if (Ch! = ' ')
            Word[I++] = Ch;
        else
        {
            Word[I] = '\0';
            if (strcmp (Word, "do") ==0)
                Count++;
            I=0;
        }
    }
    cout<<"Count of-do- in file:"<<Count;
    Fil.close( );
}
```

(c) Write a function in C++ to read and display the detail of all the users whose status is 'A' (i.e. Active) from a binary file "USER.DAT". Assuming the binary file "USER.DAT" is containing objects of class USER, which is defined as follows: 3

```
class USER
{
    int Uid ;           //User Id
    char Uname [20]; //User Name
    char Status; //User Type: A Active I Inactive

Public:
    void Register ( );
    //Function to enter the content
    void show ( ) ;
    //Function to display all data members
    char Getstatus ( )
    {
        return Status;
    }
};
```

Ans)

```
void DisplayActive ( )
{
    USER U;
    ifstream fin;
    fin.open ("USER.DAT", ios::binary);
    //OR ifstream fin ("USER.DAT", ios::binary);
    while(fin.read((char*)&U, sizeof(U)))
    {
        if(U.Getstatus()=='A')
            U.show( );
    }
    fin.close( );
}
```

OR

```
void DisplayActive()
{
    USER U;
    ifstream fin;
    fin.open ("USER.DAT", ios::binary);
    //OR ifstream fin("USER.DAT",ios::binary);
    if (fin)
    {
        fin.read((char*)&U, sizeof(U));
        while(!fin.eof())
        {
            if (U.Getstatus( )=='A')
                U.show( );
            fin.read((char*)&U, sizeof(U))
        }
    }
}
```

```
fin.close( );
}
```

OUTSIDE DELHI 2009:

4. (a) Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task. 1

```
#include <fstream.h>
class Library
{
    long Ano;
        //Ano - Accession Number of the Book
    char Title[20];
        //Title - Title of the Book
    int Qty;
        //Qty - Number of Books in Library
public:
    void Enter (int);
        //Function to enter the content
    void Display();
        //Function to display the content
    void Buy(int Tqty)
    {
        Qty+=Tqty;
    } //Function to increment in Qty
    long GetAno( )
    {
        return Ano;
    }
};
```

```
void BuyBook(long BANo,int BQty)
//BANo ->□Ano of the book purchased
//BQty ->□Number of books purchased
{
fstream File;
File.open("STOCK.DAT" ,
ios::binary | ios::in | ios::out);
int position=-1;
Library L;
while(Position== -1 &&
File.read((char*)&L,sizeof(L)))
if (L.GetAno()==BANo)
{
L.Buy(BQty);
//To update the number of Books
Position = File.tellg()-sizeof(L) ;
_____ ;
//Line 1: To place the file pointer to the required position
_____ ;
//Line 2:To write the object L on to the binary file
}
}
```

```
if (Position== -1)
cout<< "No updation do:r{e as
required Ano not found..";
File.close( );
}
```

Ans)

Statement 1

```
File.seekp(Position);
```

OR

```
File.seekp (-sizeof (L), ios::cur);
```

Statement 2

```
File.write((char*)&L, sizeof(L));
```

OR

```
File.write((char*)&L,sizeof(Library));
```

(b) Write a function COUNT_TO() in C++ to count the presence of a word 'to' in a text file "NOTES.TXT". 2

Example:

If the content of the file "NOTES.TXT" is as follows:

It is very important **to** know that smoking is injurious **to** health.

Let us take initiative **to** stop it.

The function COUNT_TO() will display the following message:

Count of -to- in file: **3**

Note: In the above example, 'to' occurring as a part of word stop is not considered.

Ans)

```
void COUNT_TO ( )
{
ifstream Fil;
//OR ifstream Fi1("NOTES.TXT");
Fil.open("NOTES.TXT")
char Word[80],Ch;
int Count =0, I=0;
while(Fil.get(Ch))
{
if (Ch!= ' ')
Word [I++] = Ch;
else
{
Word[I] = '\0';
if (strcmp (Word, "to") ==0)
Count++;
I=0;
}
}
}
Fil.close( );
```

```
cout<<"Count of -to- in file: "<<Count;
}
```

(c) Write a function in C++ to read and display the detail of all the members whose membership type is 'L' or 'M' from a binary file "CLUB.DAT". Assume the binary file "CLUB.DAT" contains objects of class CLUB, which is defined as follows: 3

```
class CLUB
{
    int Mno;           //Member Number
    char Mname [20];  //Member Name
    char Type; //Member Type: L Life Member M
                  //Monthly Member G Guest
public:
    void Register( );
                  //Function to enter the content
    void Display( );
                  //Function to display all data members
    char WhatType( )
    {
        return Type;
    }
};
```

Ans)

```
void DisplayL_M( )
{
    CLUB C;
    fstream fin;
    fin. open ("CLUB.DAT",
               ios::binary | ios::in);
    //OR ifstream fin ("CLUB.DAT", ios::binary);
    while(fin.read((char*)&C, sizeof(C))
    {
        if(C.WhatType()=='L' | C.WhatType()=='M')
            C .Display ( );
    }
    fin.close( );
}
```

OR

```
void DisplayL_M ( )
{
    CLUB C;
    fstream fin;
    fin.open ("CLUB.DAT", ios::binary | ios::in);
    //ifstream fin ("CLUB.DAT",ios::binary);
    if(fin)
    {
        fin.read((char*)&C, sizeof(C));
        while(!fin.eof())
        {
            if(C.WhatType()=='L' | C.WhatType()=='M')
```

```
            C. Display( );
        fin.read((char*)&C, sizeof(C));
        }
    }
    fin.close( );
}
```

DELHI : 2008:

4.a)Observe the program segment given below carefully, and answer the question that follows

```
class Applicant
{
    long Aid ;           // Applicant's Id
    char Name[20] ;     // Applicant's Name
    float Score ;       // Applicant's Score
public ;
    void Enroll( ) ;
    void Disp( ) ;
    void MarksScore( ) ;
                  //Function to change Score
    long R_Aid( )
    {
        return Aid;
    }
};
void ScoreUpdate (long Id)
{
    fstream File ;
    File.open ("APPLI.DAT" , ios :: binary |
               ios :: in | ios :: out) ;
    Applicant A ;
    int Record = 0, Found = 0 ;
    while (!Found && File.read
           ( (char*)&C, sizeof(c) ) )
    {
        if (Id == A.R_Aid( ) )
        {
            cout << "Enter new Score" ;
            A.MarksScore( ) ;
            _____ //Statement 1
            _____ //Statement 2
            Found=1;
        }
        Record++ ;
    }
    if (Found == 1)
        cout << "Record Updated" ;
    File.close( ) ;
}
```

Write the Statement 1 to position the File Pointer at the beginning of the Record for which the Applicant's Id matches with the argument passed, and Statement 2 to write the updated record at that position.

Ans)

Statement 1

```
File.seekp(File.tellp( )-sizeof(A));
```

Statement 2

```
File.seekp(Record*sizeof(Applicant));
    or
File.write((char*)&A,sizeof(A));
```

4.b) Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK.TXT".

Solution:

```
void LowerLetters( )
{
    clrscr( );
    ifstream fin("BOOK.TXT",ios::in);
    char ch;
    int lowercount=0;
    while(fin)
    {
        fin.get(ch);
        if(islower(ch))
            lowercount++;
    }
    cout<<"\nTotal number of Lowercase
    alphabets in the file = "<<lowercount;
    getch( );
}
```

4.c) Given a binary file PHONE.DAT, containing records of the following structure type

```
class phonlist
{
    char Name[20] ;
    char Address[30] ;
    char AreaCode[5] ;
    char PhoneNo[15] ;
public ;
    void Register( ) ;
    void Show( ) ;
    int CheckCode(char AC[ ])
    { return strcmp(AreaCode,AC) ;
```

```
    }
};
```

Write a function TRANSFER() in C++, that would copy all those records which are having AreaCode as "DEL" from PHONE.DAT to PHONBACK.DAT.

Solution:

```
void TRANSFER( )
{
    ifstream fin("PHONE.DAT",ios::in,ios::binary);
    ofstream fout("PHONEBACK.DAT",
        ios::out,ios::binary);
    phonlist P;
    while(fin) // or while(!fin.eof( ))
    {
        fin.read((char*)&P,sizeof(P));
        if(P.CheckCode("DEL")= = 0)
            fout.write((char*)&P,sizeof(P));
    }
    fin.close( );
    fout.close( );
}
```

OUTSIDE DELHI 2008:

4.a) Observe the program segment given below carefully, and answer the question that follows

```
class candidate
{
    long Cid ; // Candidate's Id
    char CName[20]; // Candidate's Name
    float Marks ; // Candidate's Marks
public ;
    void Enter( ) ;
    void Display( ) ;
    void MarksChange( ) ;
        //Function to change marks
    long R_Cid( )
    {
        return Cid;
    }
};
void MarksUpdate (long Id)
{
    ifstream File ;
    File.open ("CANDIDATE.DAT", ios ::
        binary | ios::in | ios :: out) ;
    Candidate C ;
    int Record = 0, Found = 0 ;
    while (!Found&&File.read((char*)&C, sizeof(C)))
```

```

{
if (Id == C.R_Cid( ))
{
cout << "Enter new Marks" ;
C.MarksChange( ) ;
_____ //Statement1
_____ //Statement 2
Found = 1 ;
}
}
Record++ ;
}
if (Found == 1)
cout << " Record Updated" ;
File.close( ) ;
}

```

Write the Statement to position the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 to write the updated Record at that position.

Ans)

Statement 1

```
File.seekp(File.tellp( )-sizeof(C));
```

Or

```
File.seekp(Record*sizeof(C));
```

Statement 2

```
File.write((char*)&C,sizeof(C));
```

Or

```
File.write((char*)&C,sizeof(Candidate));
```

4.b) Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT".

Solution:

```

void UpperLetters( )
{
clrscr( );
ifstream fin("ARTICLE.TXT",ios::in);
char ch;
int uppercount=0;
while(fin)
{ fin.get(ch);
if(isupper(ch))
uppercount++;
}
cout<<"\nTotal number of Uppercase
alphabets in the file = "<<uppercount;
getch( );
}

```

4.c) Given a binary file TELEPHON.DAT, containing records of the following class Directory :

```

class Directory
{
char Name[20] ;
char Address[30] ;
char AreaCode[5] ;
char phone_No[15] ;
public ;
void Register( ) ;
void Show( ) ;
int CheckCode(char AC[ ])
{
return strcmp(AreaCode, AC) ;
}
} ;

```

Write a function COPYABC() in C++, that would copy all those records having AreaCode as "123" from TELEPHON.DAT to TELEBACK.DAT.

Solution:

```

void COPYABC( )
{ ifstream fin("TELEPHON.DAT",ios::in | ios::binary);
ofstream fout("TELEBACK.DAT",ios::out,ios | binary);
Directory D;
while(fin) // or while(!fin.eof( ))
{
fin.read((char*)&D,sizeof(D));
if(D.CheckCode("123")== 0)
fout.write((char*)&D,sizeof(D));
}
fin.close( );
fout.close( );
}

```

DELHI : 2007

4.a) Observe the program segment given below carefully, and answer the question that follows

```

class PracFile
{
int Pracno ;
char PracName[20]
int TimeTaken ;
int Marks ;
public :
void EnterPrac( ) ;
//Function to enter PracFile details

```

```

void ShowPrac( ) :
    //Function to display PracFile details
int RTime( )//function to return Time Taken
{
return TimeTaken;}
void Assignmarks(int M)
    //Function to assign Marks
{
    Marks = M ;
}
};
void AllocateMarks( )
{
fstream File ;
File.open ("MARKS.DAT", ios :: binary
           | ios :: in | ios :: out ) ;
PracFile P ;
int Record = 0 ;
while (File.read ( (char*) &P, sizeof (P) ) )
{
    if (P.RTime( ) > 50)
        P.Assignmarks(0)
    else
        P.Assignmarks(10)
        _____; //Statement 1
        _____; //Statement2
    Record++ ;
}
File . close( ) ;
}

```

If the function AllocateMarks() is supposed to Allocate Marks for the records in the file MARKS.DAT based on their value of the member TimeTaken. Write C++ statements for the **statement 1** and **statement 2**, where, **statement 1** is required to position the file write pointer to an appropriate place in the file and **statement 2** is to perform the write operation with the modified record.

Ans)

Statement 1

```

File.seekp(File.tell( )-sizeof(P));
File.seekp(Record*sizeof(P));

```

Statement 2

```

File.write((char*)&P,sizeof(P));
File.write((char*)&P,sizeof(PracFile));

```

4.b) Write a function in C++ to print the count of the word **is** as an

independent word in a text file DIALOGUE.TXT.

For example,if the content of the file DIALOGUE.TXT is

This **is** his book. **Is** this book good ?

Then the output of the program should be 2.

Solution:

Ans)

```

void COUNT_IS ( )
{
    ifstream Fil;
    //OR ifstream Fil("NOTES.TXT");
    Fil.open("DIALOGUE.TXT")
    char Word[80],Ch;
    int Count =0, I=0;
    while(Fil.get(Ch))
    {
        if (Ch!= ' ')
            Word [I++] = Ch;
        else
        {
            Word[I] = '\0';
            if (strcmp (Word, "is") ==0)
                Count++;
            I=0;
        }
    }
    Fil.close( );
    cout<<"Count of -is- in file: "<<Count;
}

```

4.c) Given a binary file GAME.DAT, containing records of the following structure type

```

struct Game
{
    char GameName[20] ;
    char Participate[10][30] ;
};

```

Write a function in C++ that would read contents from the file GAME.DAT and creates a file named BASKET.DAT copying only those records from GAME.DAT where the game name is "Basket Ball".

Solution:

```

void BPlayers( )

```

```

{
ifstream fin("GAME.DAT",ios::in,ios::binary);
ofstream fout("BASKET.DAT",ios::out|ios::binary);
Game G;
while(fin) // or while(!fin.eof())
{
fin.read((char*)&G,sizeof(Game));
if(strcmp(G.GameName,"Basket Ball")== 0)
fout.write((char*)&G,sizeof(G));
}
fin.close();
fout.close();
}

```

OUTSIDE DELHI : 2007

4.a) Observe the program segment given below carefully, and answer the question that follows:

```

class Labrecord
{
int Expno;
char Experiment[20];
char Checked;
int Marks;
public:
void EnterExp(); //function to enter Experiment details
void ShowExp(); //function to display Experiment details
char RChecked() //function to return Expno
{
return Checked;
}
void Assignmarks (int M) //function to assign Marks
{
Marks = M;
}
};

void ModifyMarks()
{
fstream File;
File.open ("Marks.Dat", ios :: binary |
ios :: in | ios :: out);
Labrecord L;
int Rec=0;
while (File.read ( (char*) &L,sizeof (L)))
{
if (L.RChecked() != 'N')
L.Assignmarks(0)
else

```

L.Assignmarks (10)

_____ ; //Statement 1

_____ ;//Statement 2

```

Rec++;
}
File.close();
}

```

If the function ModifyMarks () is supposed to modify marks for the records in the file MARKS.DAT based on their status of the member Checked (containing value either 'Y' or 'N'). Write C++ statements for the statement 1 and statement 2, where, statement 1 is required to position the file write pointer to an appropriate place in the file and statement 2 is to perform the write operation with the modified record.

Ans)

Statement 1

File.seekp(File.tellp() - sizeof(L));

or

File.seekp(Rec * sizeof(L));

Statement 2

File.write((char*)&L, sizeof(L));

or

File.write((char*)&L, sizeof(Labrecord));

4.b) Write a function in C++ to print the count of the word **the** as an independent word in a text file STORY.TXT.

For **example**, if the content of the file STORY.TXT is

There was a monkey in **the** zoo. **The** monkey was very naughty.

Then the output of the program should be **2**.

Solution:

```

void COUNT_THE ()
{
ifstream Fil;
//OR ifstream Fi("NOTES.TXT");
Fil.open("STORY.TXT");
char Word[80], Ch;
int Count = 0, I=0;

```

```

while(Fil.get(Ch))
{
if (Ch!= ' ')
Word [I++] = Ch;
else
{
Word[I] = '\0';
if (strcmp (strupr(Word), "THE") ==0)
Count++;
I=0;
}
}
}
Fil.close( );
cout<<"Count of-the- in file: "<<Count;
}

```

4.c) Given a binary file SPORTS.DAT, containing records of the following structure type:

```

struct Sports
{
char Event[20] ;
char Participant[10][30] ;
};

```

Write a function in C++ that would read contents from the file SPORTS.DAT and creates a file named ATHLETIC.DAT copying only those records from SPORTS.DAT where the event name is "Athletics".

Solution:

```

void AthletsList( )
{
ifstream fin("SPORTS.DAT",ios::in,
ios::binary);
ofstream fout("ATHLETIC.DAT",
ios::out | ios::binary);
Sports S;
while(fin // or while(!fin.eof( ))
{
fin.read((char*)&S,sizeof(Sports));
if(strcmp(S.Event,"Athletics")= = 0)
fout.write((char*)&S,sizeof(S));
}
fin.close( );
fout.close( );
}

```

DELHI : 2006

4.a)

```

void main( )
{
char ch = 'A' ;
fstream fileout("data.dat", ios::out) ;
fileout<<ch ;
int p = fileout.tellg( )
cout<<p ;
}

```

What is the output if the file content before the execution of the program is the string "ABC"

(Note that " " are not part of the file).

Ans) 1

(Since, the file is opened in out mode, it loses all the previous content, if the file mode is app, then result will be 4)

4.b) Write a function to count the number of words present in a text file named "PARA.TXT". Assume that each word is separated by a single blank/space character and no blanks/spaces in the beginning and end of the file.

Solution:

```

void WordsCount( )
{
clrscr( );
ifstream fin("PARA.TXT",ios::in);
char ch;
int Words=1;
if(!fin)
{
cout<<"No words at all in the file";
exit(0);
}
while(fin)
{ fin.get(ch);
if(ch= ' ')
Words++;
}
cout<<"\nTotal number of Words in
the file = "<<Words;
getch( );
}

```

4.c) Following is the structure of each record in a data file named "COLONY.DAT"

```

struct COLONY
{
    char Colony_Code[10] ;
    char Colony_Name[10]
    int No_of_People ;
};

```

Write a function in C++ to update the file with a new value of No_of_People. The value of Colony_Code and No_of_People are read during the execution of the program.

Solution:

```

void Update( )
{
    fstream finout("COLONY.DAT",ios::in |
ios::out);
    COLONY C;
    finout.seekg(0);
    while(finout)
    {
        finout.read((char *)&C, sizeof(C));
        cout<<"\nThe Colony Code is
                "<<C.Colony_Code;
        cout<<"\nThe Colony Name
                is"<<C.Colony_Name;
        cout<<"\nEnter the Number of
                People";
        cin>>C.No_of_People;
        finout.seekp(finout.seekp( )-sizeof(C));
        finout.write((char *)&C,sizeof(C));
    }
}

```

OUTSIDE DELHI : 2006

4.a)

```

void main( )
{
    char ch = 'A' ;
    fstream fileout("data.dat", ios :: app);
    fileout<<ch ;
    int p = fileout.tellg( ) ;
    cout << p ;
}

```

What is the output if the file content before the execution of the program is the string ? "ABC"
(Note that " " are not part of the file)

Ans)4

(Since, the file is opened in app mode, it retains the previous content also, if the file mode is out, then result will be 0 since it will lose all the old content of the file.)

4.b) Write a function to count the number of blanks present in a text file named "PARA.TXT" .

Solution:

```

void BlanksCount( )
{
    clrscr( ) ;
    ifstream fin("PARA.TXT",ios::in);
    char ch;
    int Blanks=0;
    if(!fin)
    { cout<<"No words at all in the file.
                So no blank spaces";
        exit(0);
    }
    while(fin)
    {
        fin.get(ch);
        if(ch= =' ')
            Blanks++;
    }
    cout<<"\nTotal number of Blank
        Spaces in the file = "<<Blanks;
    getch( ) ;
}

```

4.c) Following is the structure of each record in a data file named "PRODUCT.DAT" .

```

struct PRODUCT
{ char Product_Code[10] ;
  char Product_Description[10] ;
  int Stock ;
};

```

Write a function in C++ to update the file with a new value of Stock. The Stock and the Product_Code, whose Stock to be updated, are read during the execution of the program.

Solution:

```

void Update( )
{
    fstream finout("PRODUCT.DAT",

```

```

        ios::in | ios::out);
PRODUCT P;
finout.seekg(0);
while(finout)
{
    finout.read((char *)&P, sizeof(P));
    cout<<"\nThe Product Code is
        "<<P.Product_Code;
    cout<<"\nThe Product
        Description is"<<
        P.Product_Description;
    cout<<"\nEnter the Stock: ";
    cin>>P.Stock;
    finout.seekp(finout.seekp()-sizeof(P));
    finout.write((char *)&P,sizeof(P));
}
}

```

DELHI : 2005

4.a) Observe the program segment given below carefully, and answer the question that

```

class Book
{
    int Book_no ;
    char Book_name[20] ;
public ;
    void enterdetails( ) ;
        //function to enter Book details

    void showdetails( ) ;
        //function to display Book details
    int Rbook_no( )
    {return Book_no ;}
        //function to return Book_no
};

void Modify (Book NEW)
{
    ifstream File ;
    File.open("BOOK.DAT", ios :: binary
        |ios :: in | ios :: out) ;
    Book OB ;
    int Record = 0, Found = 0 ;

    while (!Found && File.read((char*)
        &OB, sizeof(OB) ) )
    {
        Recordsread++ ;
        if (NEW.RBook_no( ) == OB.RBook_no( ))
        {

```

```

        _____ //Missing Statement
        File.write((char*) &NEW, size of(NEW)) ;
        Found = 1 ;
    }
    else
        File.write((char*) &OB, sizeof(OB)) ;
    }
    if (!Found)
        cout << "Record for modification
            does not exist" ;
    File.close( ) ;
}

```

If the function Modify() is supposed to modify a record in file BOOK.DAT with the values of Book NEW passed to its argument, write the appropriate statement for **Missing Statement** using seekp() or seekg(), whichever needed, in the above code that would write the modified record at its proper place.

Ans)

```

File.seekp((Recordsread-1)*sizeof(NEW));
OR
File.seekp(-sizeof(NEW), ios::curr);
OR
File.seekp(File.tellg()-sizeof(NEW));

```

4.b) Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT".

Example :

If the file "LINES.TXT" contains the following lines,

A boy is playing there.

There is a playground.

An aeroplane is in the sky.

Alphabets and numbers are allowed in the password.

The function should display the output as **3**

Ans)

```

void counter( )
{
    char Aline[80];
    int Count=0;
    ifstream Fin ("LINES.TXT");

```

```

while(Fin.getline(Aline,80, '\n'))
if (Aline[0]== 'A')
    Count++;
Fin.close();
cout<<Count<<endl;
}

```

4.c) Given a binary file STUDENT.DAT, containing records of the following class Student type

```

class Student
{
    char S_Admno[10] ;
        //Admission number of student
    char S_Name[30] ;
        //Name of student
    int Percentage ;
        //Marks Percentage of student
public :
    void EnterData( )
    {
        gets(S_Admno);
        gets(S_Name);
        cin >> Percentage ;
    }
    void DisplayData( )
    {
        cout << setw(12) << S_Admno ;
        cout << setw(32) << S_Name ;
        cout << setw(3) << Percentage << endl ;
    }
    int ReturnPercentage( )
    {
        return Percentage;
    }
};

```

Write a function in C++, that would read contents of file STUDENT.DAT and display the details of those Students whose Percentage is above 75.

Ans)

```

void Distinction()
{
    Student S;
    ifstream Fin;
    Fin.open("STUDENT.DAT",
        ios::binary | ios::in);
    while(Fin.read((char*)&S,

```

```

        sizeof(Student))
if (S.ReturnPercentage(>75)
    S.DisplayData();
    Fin.close();
}

```

OUTSIDE DELHI : 2005

4.a) Observe the program segment given below carefully, and answer the question that follows :

```

class Member
{
    int Member_no ;
    char Member_name[20] ;
public :
    void enterdetails ( ) ;
        //function to enter Member details
    void showdetails ( ) ;
        //function to display Member details
    int RMember_no( )
    {
        return Member_no;
    } //function to return Member_no
};
void Update (Member NEW)
{
    ofstream File ;
    File.open("MEMBER.DAT" , ios ::
        binary | ios :: in | ios :: out) ;
    Member OM ;
    int Recordsread = 0, Found = 0 ;
    while (!Found && File.read((char*)
        & OM, sizeof(OM)))
    {
        Recordsread++ ;
        if (NEW.RMember_no( ) ==
            OM.RMember_no( ))
        {
            _____ //Missing Statement
            File.write((char*) & NEW ,
                sizeof(NEW) ;
            Found = 1 ;
        }
        else
            File.write((char*) & OM,
                sizeof(OM)) ;
    }
    if (!Found)
        cout<<"Record for modification does
            not exist" ;
    File.close( ) ;
}

```

If the function Update() is supposed to modify a record in file MEMBER.DAT with the values of Member NEW passed to its argument, write the appropriate statement for **Missing statement** using seekp() or seekg(), whichever needed, in the above code that would write the modified record at its proper place.

Ans)

```
File.seekp((Recordsread-1)*sizeof(OM));
```

OR

```
File.seekp(Recordsread*sizeof(OM));
```

OR

```
File.seekp(-1*sizeof(OM),ios::curr);
```

OR

```
File.seekp(file.tellg()-sizeof(OM));
```

2.b) Write a function in C++ to count and display the number of lines not starting with alphabet 'A' present in a text file "STORY.TXT".

Example :

If the file "STORY.TXT" contains the following lines,

The rose is red.

A girl is playing there.

There is a playground.

An aeroplane is in the sky.

Numbers are not allowed in the password.

The function should display the output as **3**

Ans)

```
void COUNTALINES()
{
    ifstream FILE("STORY.TXT");
    int CA=0;
    char LINE[80];
    while (FILE.getline (LINE,80))
        if (LINE[0]!='A')
            CA++;
    cout<<"Not Starting with A counts to "<<CA<<endl;
    FILE.close( );
}
```

4.c) Given a binary file APPLY.DAT, containing records of the following class Applicant type **3**

```
class Applicant
{
    char A_Rno[10] ;
        //Roll number of applicant
    char A_Name[30];
        //Name of applicant
    int A_Score; //Score of applicant
public :
    void Enrol( )
    {
        gets(A_Rno);
        gets(A_Name);
        cin >> A_Score ;
    }
    void Status( )
    {
        cout << setw(12) << A_Admno ;
        cout << setw(32) << A_Name ;
        cout << setw(3) << A_Score << endl ;
    }
    int ReturnScore( )
    {
        return A_Score;
    }
};
```

Write a function in C++, that would read contents of file APPLY.DAT and display the details of those Students whose A_Score is above 70.

DELHI : 2004

4.a) Assuming that a text file named FIRST.TXT contains some text written into it, write a function named **vowelwords()**, that reads the file FIRST.TXT and creates a new file named SECOND.TXT, to contain only those **words** from the file FIRST.TXT which start with start with a lowercase vowel (i.e. with 'a', 'e', 'i', 'o', 'u'). For example if the file FIRST.TXT contains

Carry umbrella and overcoat when it rains

Then the file SECOND.TXT shall contain:

umbrella and overcoat it

4.b) Assuming the class Computer as follows:

```
class computer
```

```

{
    char chiptype[10];
    int speed;
public:
    void getdetails( )
    {
        get(chiptype);
        cin>>speed;
    }
    void showdetails( )
    {
        cout<<"Chip"<<chiptype<<"Spe
ed = "speed;
    }
};

```

4.c) Write a function **readfile()** to read all the records present in already existing binary file SHIP.DAT and display them on the screen, also count the number of records present in the file.

DELHI : 2003

4.a) Write a user defined function in C++ to read the content from a text file NOTES.TXT, count and display the number of blank spaces present in it.

4.b) Assuming a binary file FUN.DAT is containing objects belonging to a class LAUGHTER (as defined below). Write a user defined function in C++ to add more objects belonging to class LAUGHTER at the bottom of it.

```

class LAUGHTER
{
    int Idno;           // Identification number
    char Type[5];      //LAUGHTER Type
    char Desc[255];    //Description
public :
    void Newentry( )
    {
        cin>>Idno;gets(Type);gets(Desc);
    }
    void Showonscreen( )
    {
        cout<<Idno<<":"<<Type<<endl
        <<Desc<<endl;
    }
};

```

DELHI : 2002

4.a) What is the difference between `pub()` and `write()` ?

4.b) Write a C++ program, which initializes a string variable to the content "Time is a great teacher but unfortunately it kills all its pupils. Berlioz" and outputs the string one character at a time to the disk file OUT.TXT. You have to include all the header files if required.

DELHI : 2001

4.a) Distinguish between `ios::out` and `ios::app`.

Ans)

The `ios::out` mode opens the file in output mode only.

The `ios::app` mode opens the file in append mode, where the file can be appended.

4.b) Consider the class declaration `class FLIGHT`

```

{
    protected:
        int flight_no;
        char destination[20];
        float distance;
public:
    void INPUT( );
        //To read an object from the keyboard
    void write_file(int);
        //To write N objects into the file,
        //Where N is passed as argument.
    void OUTPUT( );
        //To display the file contents on the
        //monitor.
};

```

Complete the member functions definitions.

2000:

Q 4 (a) Name two member functions of `ofstream` class

Q 4 (b) Assuming the class DRINKS defined below, write functions in C++ to perform the following:

(i) Write the objects of DRINKS to a binary file.

(ii) Read the objects of DRINKS from

binary file and display them on screen when DNAME has value "INDY COLA".

```
class DRINKS
{
    int DCODE;
    char DNAME[13]; //Name of the drink
    int DSIZE;      //Size in liters
    float DPRICE;
public:
    void getdrinks( )
    {
        cin>>DCODE>>DNAME>
        >DSIZE>>DPRICE;
    }
    void showdrinks( )
    {
        cout<<DCODE<<DNAME<<DSIZE<<
        DPRICE<<endl;
    }
    char *getname( )
    {return DNAME;}
};
```

1999:

Q 4 (a) Differentiate between functions read() and write().

Q 4 (b) Assuming the class FLOPPYBOX, write a function in C++ to perform following:

(i) Write the objects of FLOPPYBOX to a binary file.

(ii) Reads the objects of FLOPPYBOX from binary file and display them on screen.

```
class FLOPPYBOX
{
    int size;
    char name[10];
public:
    void getdata()
    {
        cin>>size;gets(name);
    }
    void showdata(){cout<<size<<"
    <<name<<endl;}
};
```

1998:

Q 4(a) Write name of two member functions belonging to fstream class.

Q 4(b) Assuming the class EMPLOYEE given below, write functions in C++ to perform the following:

(i) Write the objects of EMPLOYEE to a binary file.

(ii) Read the objects of EMPLOYEE from binary file and display them on the screen.

```
class EMPLOYEE
{
    int ENO;
    char ENAME[10];
public:
    void GETIT( )
    {
        cin>>ENO;
        gets(ENAME);
    }
    void SHOWIT( )
    { cout<< ENO<<ENAME<<endl;
    }
};
```

2009-10 MODEL PAPER 1:

4.a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement2 using seekp() and seekg() functions for performing the required task. 1

```
#include <fstream.h>
class Item
{
    int Ino;
    char Item[20];
public:
    void Search(int );
        //Function to search and display the
        //content from a particular record number
    void Modify(int);
        //Function to modify the content of a
        //particular record number
};
void Item::Search(int RecNo)
{
    fstream File;
    File.open("STOCK.DAT",ios::binary|ios::in);
    _____ //Statement 1
    File.read((char*)this,sizeof(Item));
    cout<<Ino<<"=="<<"<<Item<<endl;
    File.close( );
}
void Item::Modify(int RecNo)
```

```

{
fstream File;
File.open("STOCK.DAT",ios::binary | ios
          ::in | ios::out);
cout>>Ino;cin.getline(Item,20);
_____ //Statement 2
File.write((char*)this,sizeof(Item));
File.close( );
}

```

Ans)

Statement 1

```
File.seekg(RecNo*sizeof(Item));
```

Statement 2

```
File.seekp(RecNo*sizeof(Item));
```

b) Write a function in C++ to count the number of lines present in a text file "STORY.TXT". 2

Ans)

```

void CountLine()
{
ifstream FIL("STORY.TXT");
int LINES=0;
char STR[80];
while (FIL.getline(STR,80))
    LINES++;
cout<<"No. of Lines:"<<LINES<<endl;
f.close( );
}

```

c) Write a function in C++ to search for a BookNo from a binary file "BOOK.DAT", assuming the binary file is containing the objects of the following class. 3

```

class
{
int Bno;
char Title[20];
public:
int RBno( )
    {return Bno;}
void Enter( )
    {cin>>Bno;gets(Title);}
void Display( )
    {cout<<Bno<<Title<<endl;}
};

```

Ans)

```

void BookSearch()
{
fstream FIL;
FIL.open("BOOK.DAT",ios::binary | ios::in);
BOOK B;
int bn,Found=0;
cout<<"Enter Book No. to search...";
cin>>bn;
while (FIL.read((char*)&S,sizeof(S))
        if (FIL.RBno()==bn)
        {
            S.Display();
            Found++;
        }
if (Found==0)
    cout<<"Sorry! Book not
        found!!!"<<endl;
FIL.close( );
}

```

2009-10 MODEL PAPER 2:

4.a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekg() and tellg() functions for performing the required task. 1

```

#include <fstream.h>
class Employee
{
    int Eno;char Ename[20];
public:
    //Function to count the total number of records
    int Countrec( );
};
int Item::Countrec( )
{
fstream File;
File.open("EMP.DAT",ios::binary | ios::in);
_____ //Statement 1
int Bytes = _____ //Statement 2
int Count = Bytes/sizeof(Item);
File.close( );
return Count;
}

```

Ans)

Statement 1

```
File.seekg(0,ios::end);
```

Statement 2

```
File.tellg( );
```

b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT". 2

Ans)

```
void CountAlphabet()
{
ifstream FIL("NOTES.TXT");
int CALPHA=0;
char CH=FIL.get();
while (!FIL.eof())
{
if (isalpha(CH))
CALPHA++;
CH=FIL.get( );
}
cout<<"No. of Alphabets:"<<
CALPHA<<endl;
}
```

c) Write a function in C++ to add new objects at the bottom of a binary file "STUDENT.DAT", assuming the binary file is containing the objects of the following class. 3

```
class STUD
{
int Rno;
char Name[20];
public:
void Enter( )
{ cin>>Rno;gets(Name);
}
void Display( )
{ cout<<Rno<<Name<<endl;
}
};
```

Ans)

```
void Addnew( )
{
fstream FIL;
FIL.open("STUDENT.DAT",ios::binary|ios::app);
STUD S;
char CH;
do
{
S.Enter();
FIL.write((char*)&S,sizeof(S));
cout<<"More(Y/N)?";cin>>CH;
}
while(CH!='Y');
FIL.close( );
}
```

2008-09 MODEL PAPER 1:

Q4. (a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekp() and seekg() functions for performing the required task.

1

```
#include <fstream.h>
class Item
{
int Ino;char Item[20];
public:
void Search(int );
//Function to search and display the content
//from a particular record number
void Modify(int);
//Function to modify the content of a
//particular record number
};
void Item::Search(int RecNo)
{
fstream File;
File.open("STOCK.DAT",ios::binary|ios::in);
_____ //Statement 1
File.read((char*)this,sizeof(Item));
cout<<Ino<<"=="<<"<<Item<<endl;
File.close( );
}
void Item::Modify(int RecNo)
{
fstream File;
File.open("STOCK.DAT",ios::binary|ios
::in|ios::out);
cout>>Ino;
cin.getline(Item,20);
_____ //Statement 2
File.write((char*)this,sizeof(Item));
File.close( );
}
```

Answer:

Statement 1

File.seekg(RecNo*sizeof(Item));

Statement 2

File.seekp(RecNo*sizeof(Item));

(b) Write a function in C++ to count the number of lines present in a text file "STORY.TXT". 2

Answer:

```
void CountLine( )
{
    ifstream FIL("STORY.TXT");
    int LINES=0;
    char STR[80];
    while (FIL.getline(STR,80))
        LINES++;
    cout<<"No. of Lines:"<<LINES<<endl;
    FIL.close( );
}
```

c) Write a function in C++ to search for a BookNo from a binary file "BOOK.DAT", assuming the binary file is containing the objects of the following class. 3

```
class BOOK
{
    int Bno;
    char Title[20];
public:
    int RBno( )
    {
        return Bno;
    }
    void Enter( )
    {
        cin>>Bno;gets(Title);
    }
    void Display( )
    {
        cout<<Bno<<Title<<endl;
    }
};
```

Answer:

```
void BookSearch()
{
    ifstream FIL;
    FIL.open("BOOK.DAT",ios::binary|ios::in);
    BOOK B;
    int bn,Found=0;
    cout<<"Enter Book Num to search...";
    cin>>bn;
    while (FIL.read((char*)&S,sizeof(S)))
        if (B.RBno( )==bn)
        {
            B.Display( );
            Found++;
        }
    if (Found==0) cout<<"Sorry! Book
```

```
not found!!!"<<endl;
FIL.close( );
}
```

2008-09 MODEL PAPER 2:

4.(a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekg() and tellg() functions for performing the required task. 1

```
#include <fstream.h>
class Employee
{
    int Eno;char Ename[20];
public:
    //Function to count the total number of records
    int Countrec( );
};
int Item::Countrec( )
{
    ifstream File;
    File.open("EMP.DAT",ios::binary|ios::in);
    _____ //Statement 1
    int Bytes = _____ //Statement 2
    int Count = Bytes / sizeof(Item);
    File.close();
    return Count;
}
```

Answer:

```
File.seekg(0,ios::end); //Statement 1
File.tellg( ); //Statement 2
```

(b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT". 2

Answer:

```
void CountAlphabet()
{
    ifstream FIL("NOTES.TXT");
    int CALPHA=0;
    char CH=FIL.get( );
    while (!FIL.eof( ))
    {
        if (isalpha(CH))
            CALPHA++;
        CH=FIL.get( );
    }
    cout<<"No. of Alphabets:"<<CALPHA <<endl;
    FIL.close( );
}
```

c) Write a function in C++ to add new objects at the bottom of a binary file "STUDENT.DAT", assuming the binary file is containing the objects of the following class. 3

```
class STUD
{
    int Rno;
    char Name[20];
public:
    void Enter( )
    {
        cin>>Rno;
        gets(Name);
    }
    void Display( )
    {
        cout<<Rno<<Name<<endl;
    }
};
```

Answer:

```
void Addnew()
{
    fstream FIL;
    FIL.open("STUDENT.DAT",ios::binary|ios::app);
    STUD S;
    char CH;
    do
    {
        S.Enter();
        FIL.write((char*)&S,sizeof(S));
        cout<<"More(Y/N)?";
        cin>>CH;
    }
    while(CH!='Y');
    FIL.close();
}
```

8.POINTERS

2009 Delhi:

1.(d) Find the output of the following program: 3

```
#include<iostream.h>
void main( )
{
    int X[ ] = {10,25,30,55,110};
    int *p = X;
    while ( *p < 110)
    {
        if ( *P%3 != 0 )
            *p=*p+1;
        else
            *p = *p + 2;
```

```
        p++;
    }
    for(int I = 4; I>=1 ; I--)
    {
        cout << X[I] << "*" ;
        if ( I%3 == 0)
            cout<<endl;
    }
    cout<<X[0] * 3<<endl;
}
```

Ans)

110*56*
32*26*33

2009 Outside Delhi:

1.(d) Find the output of the following program: 3

```
#include<iostream.h>
void main( )
{
    int A[ ] = {10, 15, 20, 25, 30}
    int *p = A;
    while (*p < 30)
    {
        if (*p%3 != 0)
            *p = *p + 2 ;
        else
            *p = *p + 1;
        p++;
    }
    for (int J = 0; J<=4; J++)
    {
        cout << A[J] << "*" ;
        if ( J%3 == 0)
            cout<<endl;
    }
    cout<<A[4] * 3<<endl;
}
```

Ans)

12*
16*22*27*
30*90

2007 Delhi:

1.(d)Find the output of the following program: 2

```
#include<iostream.h>
```

```

void main( )
{
    int Array[ ]={4,6,10,12};
    int *pointer=Array;
    for(int I=1;I<=3;I++)
    {
        cout<<*pointer<<"#";
        pointer++;
    }
    cout<<endl;
    for(I=1;I<=4;I++)
    { (*pointer)*=3;
      --pointer;
    }
    for(I=1;I<5;I++)
        cout<<Array[I-1]<<"@";
    cout<<endl;
}

```

Output:

4#6#10#
12@18@30@36@

2007 Outside Delhi:

1.d) Find the output of the following program: 2

```

#include<iostream.h>
void main( )
{ int Numbers[]={2,4,8,10};
  int *ptr=Numbers;
  for(int C=1;C<3;C++)
  { cout<<*ptr<<"@";
    ptr++;
  }
  cout<<endl;
  for(C=0;C<4;C++)
  { (*ptr)*=2;
    --ptr;
  }
  for(C=0;C<4;C++)
      cout<<Numbers[C]<<"#";
  cout<<endl;
}

```

Output:

2@4@
4#8#16#10#

2006 Delhi:

1.d) Find the output of the following program: 3

```

#include<iostream.h>
#include<string.h>
class state
{
    char *state_name;
    int size;

```

```

public:
    state( )
    {
        size=0;
        state_name=new char[size+1];
    }
    state(char *s)
    { size=strlen(s);
      state_name=new char[size+1];
      strcpy(state_name,s);
    }
    void display( )
    { cout<<state_name<<endl;
    }
    void Replace(state &a, state &b)
    { size=a.size+b.size;
      delete state_name;
      state_name=new char[size+1];
      strcpy(state_name,a.state_name);
      strcat(state_name,b.state_name);
    }
};

```

```

void main( )
{ char *temp="Delhi";
  State state1(temp),state2("Mumbai"),
    state3("Nagpur"),S1,S2;
  S1.Replace(state1,state2);
  S2.Replace(S1,state3);
  S1.display( );
  S2.display( );
}

```

Output:

DelhiMumbai
DelhiMumbaiNagpur

2006 Outside Delhi:

1.d) Find the output of the following program 3

```

#include<iostream.h>
#include<string.h>

```

```

class student
{
    char *name;
    int I;
public:
    student( )
    {
        I=0;
        name=new char[I+1];
    }
    student(char *s)
    {
        I=strlen(s);

```

```

        name=new char[I+1];
        strcpy(name,s);
    }
    void display()
    { cout<<name<<endl;
    }
    void manipulate(student &a, student &b)
    {
        I=a.I+b.I;
        delete name;
        name=new char[I+1];
        strcpy(name,a.name);
        strcat(name,b.name);
    }
};

void main()
{
    char *temp="Jack";
    Student name1(temp),name2("Jill"),
        name3 ("John"),S1,S2;
    S1.manipulate(name1,name2);
    S2.manipulate(S1,name3);
    S1.display();
    S2.display();
}

```

Output:

**JackJill
JackJillJohn**

2006 Outside Delhi:

2.a) What is “this” pointer? Give an example to illustrate the use of it in C++.

Ans: A special pointer known as this pointer stores the address of the object that is currently invoking a member function. The this pointer is implicitly passed to the member functions of a class whenever they are invoked.

(As soon as you define a class, the member functions are created and placed in the memory space only once. That is, only one copy of member functions is maintained that is shared by all the objects of the class. Only

space for data members is allocated separately for each object.

When a member function is called, it is automatically passed an implicit(in built) argument that is a pointer to the object that invoked the function. This pointer is called this. If an object is invoking a member function, then an implicit argument is passed to that member function that points to (that) object. The programmer also can explicitly specify ‘this’ in the program if he desires.)

Eg: Example program to demonstrate the usage of this pointer.

```

#include<iostream.h>
#include<conio.h>
class Rectangle
{
    float area,len,bre;
public:
    void input()
    { cout<<"\nEnter the length and
        breadth: ";
        cin>>this->len>>this->bre;
    }
    void calculate()
    {
        area=len*bre;
        //Here Implicit 'this' pointer will be worked.
    }
    void output()
    {
        cout<<"\nThe Area of the
            Rectangle:"<<this->area;
    }
};

void main()
{
    Rectangle R;
    clrscr();
    R.input();
    R.calculate();
    R.output();
    getch();
}

```

2004:

1.d) What will be the output of the following program:

```
#include<iostream.h>
#include<conio.h>
#include<ctype.h>
#include<string.h>

void ChangeString(char Text[],int
                  &Counter)
{
    char *Ptr=Text;
    int Length=strlen(Text);
    for(;Counter<Length- 2; Counter+=2,Ptr++)
    {
        *(Ptr+Counter)=toupper(*(Ptr+Counter));
    }
}
```

Output:

PoiNteRs Fun@10

```
void main( )
{
    clrscr( );
    int Position=0;
    char Message[]="Pointers Fun";
    ChangeString(Message,Position);
    cout<<Message<<"@"<<Position;
}
```

2001:

1.c) Identify the syntax error(s), if any, in the following program. Also give reason for errors. 2

```
void main( )
{
    const int i=20;
    const int* const ptr=&i;
    (*ptr)++;
    int j=15;
    ptr=&j;
}
```

Ans:

Error Line 5 : Cannot modify a const object.
Error Line 7 : Cannot modify a const object.

Warning Line 8 : 'j' is assigned a value that is never used.

Warning Line 8 : 'ptr' is assigned a value that is never used.

Explanation:

(1)Error 1 is in Line no.5 ie (*ptr)++
Here ptr is a constant pointer ie the contents can't be modified.

(2)Error 2 is in Line no.7 ie ptr=&j;
Here ptr is a constant pointer the

address in this pointer can't be modified.

(It is already pointing the address of i.)

1.d) Give the output of the following program segment. (Assuming all required header files are included in the program) 2

```
void main( )
{
    int a=32,*x=&a;
    char ch=65,&cho=ch;
    cho+=a;
    *x+=ch;
    cout<<a<<','<<ch<<endl;
}
```

Output:

129,a

2.a) Distinguish between
int *ptr=new int(5);
int *ptr=new int[5]; 2

Ans: The int *ptr=new int(5); declares and creates the space for the new data directly.

ie The new operator reserves 2 bytes of memory from heap memory (free pool) and returns the address of that memory location to a pointer variable called ptr, 5 is the initial value to be stored in the newly allocated memory.

The int *ptr = new int[5]; initializes an array element. A memory space for an integer type of array having 5 elements will be created from the heap memory (free pool).

2.c) Give the output of the following program 4

```
#include<iostream.h>
#include<string.h>
class per
```

```
{ char name[20];
  float salary;
public:
    per(char *s, float a)
    { strcpy(name,s);
      salary=a;
    }
    per *GR(per &x)
    { if(x.salary>=salary
```

Output:

Name:REEMA

Salary:10000

Name:KRISHNAN

Salary:20000

```

        return &x;
    else
        return this;
}
void display( )
{
    cout<<"Name:"<<name<<"\n";
    cout<<"Salary:"<<salary<<"\n";
}
};
void main( )
{
    Per P1("REEMA",10000),
        P2("KRISHNAN",20000),
        P3("GEORGE",5000);
    per *P;
    P=P1.GR(P3);P->display( );
    P=P2.GR(P3);P->display( ); }

```

1999:

1.d) Give the output of the following program.

```

#include<stdio.h>
void main( )
{
    char *p="Difficult";
    char c;
    c=*p++;
    printf("%c",c); }

```

Output:

D

9.ARRAYS

DELHI 2010:

3.(a) Write a function CHANGE0 in C++, which accepts an array of integer and its size as parameters and divide all those array elements by 7 which are divisible by 7 and multiply other-array elements by 3. **3**

Sample Input Data of the array

A[0]	A[1]	A[2]	A[3]	A[4]
21	12	35	42	18

Content of the array after Calling CHANGE() function

A[0]	A[1]	A[2]	A[3]	A[4]
3	36	5	6	54

Ans)

```

void CHANGE (int A[ ], int N)
{
    for(int I = 0; I<N; I++)
    {
        if (A[I]%7 == 0)
            A [I] = A [I] /7;
        else
            A[I] = A[I] * 3;
    }
}

```

}

(b) An array P[50] [60] is stored in the memory along the column with each of the element occupying 2 bytes, find out the memory location for the element P[10][20], if the Base Address of the array is 6800. **3**

Ans)

$$\begin{aligned}
 \text{Loc}(P[I] [J]) &= \text{Base}(P)+W(I+J*M)i \\
 \text{Loc}(P[10][20]) &= \text{Base}(P)+2(10+20*50) \\
 \text{Loc}(P[10] [20]) &= 6800 + 2(10+20*50) \\
 &= 6800 + 2 (10+1000) \\
 &= 6800 + 2*1010 \\
 &= 6800 + 2020 \\
 &= 8820
 \end{aligned}$$

OR

$$\begin{aligned}
 \text{Address of } P[i] [j] &= \text{BaseAddress} \\
 &+ W((i-L1)+(j-L2)*M) \\
 \text{Address of } P[10] [20] &= 6800 + \\
 &2((10-0)+(20-0)x50) \\
 &= 6800 + 2 x 1010 \\
 &= 6800 + 2020 \\
 &= 8820
 \end{aligned}$$

OR

$$\begin{aligned}
 \text{Address of } P[I] [J] \text{ along the column} \\
 &= \text{BaseAddress} + W((I-LBR)+(J- \\
 &LBC)*M)
 \end{aligned}$$

(where N is the number of rows, LBR = LBC = 1)

$$\begin{aligned}
 \text{Address of } P[10][20] \\
 &= 6800+2((10-1)+(20-1)x50) \\
 &= 6800 + 2 (9 + 19 x 50) \\
 &= 6800 + 2 x 959 \\
 &= 6800 + 1918 \\
 &= 8718
 \end{aligned}$$

(d) Write a function int SKIPSUM(int A[] [3], int N,int M) in C++ to find and return the sum of elements from all alternate elements of a two-dimensional array starting from A[0] [0]. **2**

Hint:

If the following is the content of the array

A[0][0]	A[0][1]	A[0][2]
4	5	1
A[1][0]	A[1][1]	A[1][2]
2	8	7
A[2][0]	A[2][1]	A[2][2]
9	6	3

The function SKIPSUM() should add elements A[0][0], A[0][2], A[1][1], A[2][0] and A[2][2].

Ans)

```
int SKIPSUM(int A[ ][ 3 ], int N,int M)
{ int S=0;
  for(int I = 0; I < N; I++)
    for (int J = (I%2)?1:0; J<M; J = J+2)
      S = S + A [I][J];
  return S;
}
```

OR

```
int SKIPSUM(int A[ ][3], int N, int M)
{ int S=0;
  for (int I = 0; I < N; I++)
    for (int J = (I%2==0)? 0:1 ; J<M; J = J+2)
      S = S + A [I][J];
  return S;
}
```

OR

```
int SKIPSUM(int A[ ][3], int N, int M)
{
  int I,J, S=0;
  for (I = 0; I < N; I++)
  {
    if (I%2)
      //OR (I%2 !=0 ) OR (I%2 == 1)
      J = 1;
    else
      J = 0;
    for ( ; J<M; J = J+2)
      S = S + A[I][J];
  }
  return S;
}
```

OR

```
int SKIPSUM(int A[ ][3], int N, int M)
{
  int S=0, C=0;
  for(int I = 0; I < N; I++)
    for (int J = 0; J<M; J++ )
    {
```

```
      if (C%2 == 0)
        S = S + A[I][J];
      C++;
    }
  return S;
}
```

OR

```
int SKIPSUM(int A[ ][3], int N, int M)
{
  int S=0, C=1;
  for(int I = 0; I<N; I++)
    for (int J = 0; J<M; J++ )
    {
      if (C%2 != 0)
        S = S + A[I][J];
      C++;
    }
  return S;
}
```

OR

```
int SKIPSUM (int A[ ][3], int N, int M)
{
  int S=0;
  for(int I = 0; I < N; I++)
    for (int J = 0; J<M; J++ )
    {
      if ((I+J)%2 == 0)
        S = S + A[I][J];
    }
  return S;
}
```

OUTSIDE DELHI 2010:

3. (a) Write a function REASSIGNO in C++, which accepts an array of integers and its size as parameters and divide all those array elements by 5 which are divisible by 5 and multiply other array elements by 2. 3

Sample Input Data of the array

A[0]	A[1]	A[2]	A[3]	A[4]
20	12	15	60	32

Content of the array after calling REASSIGNO function

A[0]	A[1]	A[2]	A[3]	A[4]
4	24	3	12	64

Ans)

```
void REASSIGN (int Arr[ ], int Size)
{
    for (int i=0;i<Size;i++)
        if (Arr[i]%5==0)
            Arr[i]/=5;
        else
            Arr[i]*=2;
}
```

OR

```
void REASSIGN(int Arr[ ],int Size)
{
    for (int i=0;i<Size;i++)
        Arr[i]%5 ? Arr[i]/=5 :
        Arr[i] *= 2;
}
```

(b) An array T[90][100] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the memory location for the element T[10][40], if the Base Address of the array is 7200. 3

Ans.

$$\begin{aligned} \text{Loc}(T[I][J]) &= \text{Base}(T) + W(I + J * N) \\ (\text{where } N \text{ is the number of rows, } LBR = LBC = 0) \\ &= 7200 + 4[10 + 40 \times 90] \\ &= 7200 + 4[10 + 3600] \\ &= 7200 + 4 \times 3610 \\ &= 7200 + 14440 \\ &= 21640 \end{aligned}$$

OR

Address of T[I][J] along the column
 $= \text{BaseAddress} + W [(I - LBR) + (J - LBC) * N]$
 (where N is the number of rows, LBR=LBC = 1)

Address of T[10][40] = BaseAddress +
 $4 [(10 - 1) + (40 - 1) \times 90]$
 $= 7200 + 4[9 + 39 \times 90]$
 $= 7200 + 4[9 + 3510]$
 $= 7200 + 4 \times 3519$
 $= 7200 + 14076$
 $= 21276$

(d) Write a function int ALTERSUM (int B[][5], int N, int M in C++ to find and return the sum of elements from all alternate elements of a two-dimensional array starting from B[0][0]. 2

Hint: If the following is the content of the array:

B[0][0]	B[0][1]	B[0][2]
4	5	1
B[1][0]	B[1][1]	B[1][2]
2	8	7
B[2][0]	B[2][1]	B[2][2]
9	6	3

The function should add elements B[0][0], B[0][2], B[1][1], B[2][0] and B[2][2].

Ans.

```
int ALTERSUM(int B[ ][5],int N,int M)
{
    int Sum=0;
    for (int I=0;I<N;I++)
        for (int J=(I%2==0)?0:1;J<M;J+=2)
            Sum+=B[I][J] ;
    return Sum;
}
```

OR

```
int ALTERSUM(int B[ ][5],int N,int M)
{
    int Sum=0,J=0;
    for (int I=0;I<N;I++)
    {
        for (;J<M;J+=2)
            Sum+=B[I][J] ;
        J-=M;
    }
    return Sum;
}
```

OR

```
int ALTERSUM(int B[ ][5],int N,int M)
{
    int *P=&B[0][0],Sum=0;
    for (int I=0;I<M*N;I+=2)
    {
        Sum+=(*P);
        P+=2;
    }
}
```

```

    }
    return Sum;
}

```

OR

```

int ALTERSUM (int B[ ][5], int N, int M)
{ int S=0, C=0;
  for(int I = 0; I < N; I++)
    for (int J = 0; J < M; J++)
    {
      if (C%2 == 0)
        S = S + B[I][J];
      C++;
    }
  return S;
}

```

OR

```

int ALTERSUM(int B[ ][5],int N,int M)
{ int Sum=0;
  for (int I=0;I<N;I++)
    for (int J=0;J<M;J++)
      if ((I+J)%2==0)
        Sum+=B [I][J] ;
  return Sum;
}

```

OR

```

int ALTERSUM(int B[ ][5],int N,int M)
{
  int Sum=0;
  for (int I=0;I<N;I++)
    for (int J=0;J<M;J++)
    {
      if ((I%2==0 && J%2=0) || (I%2!=0
        && J%2!=0))
        Sum+=B [I][J] ;
    }
  return Sum;
}

```

DELHI 2009:

3. (a) Write a function SORTPOINTS() in C++ to sort an array of structure Game in descending order of Points using Bubble Sort. 3

Note: Assume the following definition of structure Game

```

struct Game
{
  long PNo; //Player Number
  char PName [20] ;
}

```

```

long Points;
};

```

Sample content of the array (before sorting)

PNo	PName	Points
103	Ritika Kapur	3001
104	John Philip	2819
101	Razia Abbas	3451
105	Tarun Kumar	2971

Sample content of the array (after sorting)

PNo	PName	Points
101	Razia Abbas	3451
103	Ri tika Kapur	3001
105	Tarun Kumar	2971
104	John Philip	2819

Ans)

```

void SORTPOINTS(Game G[], int N)
{
  Game Temp;
  for (int I = 0; I < N-1; I++)
    for (int J = 0; J < N-I-1; J++)
      if(G[J].Points < G[J+1].Points)
      {
        Temp = G[J];
        G[J] = G[J+1];
        G[J+1] = Temp;
      }
}

```

(b) An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200. 4

Ans)

```

Loc(S[I][J]) = Base(S)+W(I+J*N)
Loc(S[15][10]) =
  Base(S)+4(15+10*40)
Base(S) = 7200-4*415
Base(S) = 7200-1660
Base(S) = 5540

```

$$\begin{aligned} \text{Loc}(S[20][15]) &= \\ &\text{Base}(S)+4(20+15*40) \\ \text{Loc}(S[20][15]) &= 5540 + 4(20+15*40) \\ &= 5540 + 4(20+600) \\ &= 5540 + 4*620 \\ &= 5540 + 2480 \\ &= 8020 \end{aligned}$$

OR

$$\begin{aligned} \text{Address of } S[i][j] &= \text{BaseAddress} + \\ &W[(i-L1) + (j - L2) * M] \\ \text{Address of } S[15][10] &= \\ &\text{BaseAddress} + 4[(15-0)+(10 - 0)*40] \\ 7200 &= \text{Base Address} + 4 [415] \\ \text{Base Address} &= 7200 - 4 * 415 \\ &= 7200 - 1660 \\ &= 5540 \end{aligned}$$

$$\begin{aligned} \text{Address of } S[20][15] &= \\ &= 5540 + 4 [(20 - 0) + (15 - 0) \times 40] \\ &= 5540 + 4 \times 620 \\ &= 5540 + 2480 \\ &= 8020 \end{aligned}$$

OR

$$\begin{aligned} \text{Address of } S[i][j] \text{ along the column} &= \\ &\text{Base Address} + W [(i - L1) + (j - L2) * M] \\ \text{Address of } S[15][10] &= \\ &\text{BaseAddress} + 4[(15 - 1)+(10-1) \times 40] \\ 7200 &= \text{Base Address} + 4 [374] \\ \text{Base Address} &= 7200 - 4 \times 374 \\ &= 7200 - 1496 \\ &= 5704 \\ \text{Address of } S[20][15] &= \\ &= 5704 + 4 [(20 - 1) + (15 - 1) \times 40] \\ &= 5704 + 4 \times 579 \\ &= 5704 + 2316 \\ &= 8020 \end{aligned}$$

(d) Define a function SWAPCOL () in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function. 3

Example: If the two dimensional array contains

2	1	4	9
1	3	7	7
5	8	6	3
7	2	1	2

After swapping of the content of 1st column and last column, it should be

9	1	4	2
7	3	7	1
3	8	6	5
2	2	1	7

Ans)

```
void SWAPCOL(int A[][100], int M, int N)
{
    int Temp, I;
    for(I=0; I<M; I++)
    {
        Temp = A [I][0] ;
        A[I][0] = A[I][N-1];
        A[I][N-1] = Temp;
    }
}
```

OR

```
void SWAPCOL(int A[4][4])
{
    int Temp, I;
    for(I=0; I<4; I++)
    {
        Temp = A[I][0];
        A[I][0] = A[I][3];
        A[I][3] = Temp;
    }
}
```

OUTSIDE DELHI 2009:

3. (a) Write a function SORTSCORE() in C++ to sort an array of structure Examinee in descending order of Score using Bubble Sort. 3

Note: Assume the following definition of structure Examinee

```
struct Examinee
{
    long RollNo;
```

```
char Name[20] ;
float Score;
};
```

Sample Content of the array (before sorting)

RollNo	Name	Score
1001	Ravyank Kapur	300
1005	Farida Khan	289
1002	Anika Jain	345
1003	George Peter	297

Sample Content of the array (after sorting)

RollNo	Name	Score
1002	Anika Jain	345
1001	Ravyank Kapur	300
1003	George Peter	297
1005	Farida Khan	289

Ans)

```
void SORTSCORE (Examinee E[ ], int N)
{
    Examinee Temp;
    for (int I = 0; I<N-1; I++)
        for (int J = 0; J<N-I-1; J++)
            if(E[J].Score < E[J+1].Score)
            {
                Temp = E[J];
                E[J] = E[J+1];
                E[J+1] = Temp;
            }
}
```

(b) An array T[50][20] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the base address and address of element T[30][15], if an element T[25][10] is stored at the memory location 9800.

4

Ans)

$Loc(T[I][J]) = Base(T) + W(I + J * N)$

Prepared By: Mr.M.Ravi Kiran.

$Loc(T[25][10]) = Base(T) + 4(25 + 10 * 50)$
 $Base(T) = 9800 - 4 * 525$
 $Base(T) = 9800 - 2100$
 $Base(T) = 7700$
 $Loc(T[30][15]) =$
 $Base(T) + 4(30 + 15 * 50)$
 $Loc(T[30][15])$
 $= 7700 + 4(30 + 15 * 50)$
 $= 7700 + 4(30 + 750)$
 $= 7700 + 4 * 780$
 $= 7700 + 3120$
 $= 10820$

OR

Address of T[i][j]
 $= BaseAddress + W [(i - L1) + (j - L2) * M]$
 Address of T[25][10] =
 $BaseAddress + 4[(25 - 0) + (10 - 0) * 50]$
 $9800 = Base Address + 4 [525]$
 $Base Address = 9800 - 4 * 525$
 $= 9800 - 2100$
 $= 7700$
 Address of T[30][15]
 $= 7700 + 4 [(30 - 0) + (15 - 0) * 50]$
 $= 7700 + 4 * 780$
 $= 7700 + 3120$
 $= 10820$

OR

Address of T[i][j] along the column
 $= Base Address + W[(i - L1) + (j - L2) * M]$
 Address of T[25][10]
 $= BaseAddress + 4[(25 - 1) + (10 - 1) * 50]$
 $9800 = Base Address + 4 [474]$
 $Base Address$
 $= 9800 - 4 * 474$
 $= 9800 - 1896$
 $= 7904$
 Address of T[30][15]
 $= 7904 + 4 [(30 - 1) + (15 - 1) * 50]$
 $= 7904 + 4 * 729$
 $= 7904 + 2916$
 $= 10820$

(d) Define a function SWAPARR() in C++ to swap (interchange) the first row elements with the last row elements, for a two dimensional integer array passed as the argument of the function.

3

Example: If the two dimensional array contains

5	6	3	2
1	2	4	9
2	5	8	1
9	7	5	8

After swapping of the content of first row and last row, it should be as follows:

9	7	5	8
1	2	4	9
2	5	8	1
5	6	3	2

Ans)

```
void SWAPARR(int A[][100], int M, int N)
{
    int Temp, Ji
    for (J=0; J<N; J++)
    {
        Temp = A[0][J] ;
        A[0][J] = A[M-1][J];
        A[M-1][J] = Temp;
    }
}
```

OR

```
void SWAPARR(int A[4][4])
{
    int Temp, J;
    for (J=0; J<4; J++)
    {
        Temp = A[0][J];
        A[0][J] = A[3][J];
        A[3][J] = Temp;
    }
}
```

DELHI 2008:

3.a) Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse.

Example:

If an array of nine elements initially contains the elements as 4, 2, 5, 1, 6, 7, 8, 12, 10

Then the function should rearrange the array as

10,12, 8, 7, 6, 1, 5, 2, 4

Solution:

```
void receive(int A[ ], int size)
{
    int temp;
    for(i=0,j=size-1;i<size/2;i++,j--)
    {
        temp=A[i];
        A[i]=A[j];
        A[j]=temp;
    }
} //end of receive function.
```

3.b) An array Arr[40][10] is store in the memory along the column with each element occupying 4 bytes. Find out the base address of the location Arr[3][6] if the location Arr[30][10] is stored at the address 9000.

Solution:

Address of Array[i][j] along the column
=Base Address + W [(i - L1) + (j - L2) * M]

where,

- W = size of each location in bytes = 4
- L1 = Lower Bound of rows = 0
- L2 = Lower Bound of columns = 0
- M = Number of rows per column = 40

Address of Array[30][10]
= Base Address + 4 * (30 + 10 * 40)
9000 = Base Address + 4 * 430

Base Address = 9000 - 4 x 430
= 9000 -1720
= 7280

Address of Array[3][6]
= 7280 + 4 * (3 + 6 * 40)
= 7280 + 4 * 243
= 7280 + 972
= 8252

OR

Address of Array[i][j] along the column
= Base Address + W ((i - L1) + (j - L2) * M)

where,

W = size of each location in bytes = 4

L1 = Lower Bound of rows = 1
 L2 = Lower Bound of columns = 1
 M = Number of rows per column = 40

Address of Array[30][10]
 = Base Address + 4 * ((30 - 1) + (10 - 1) * 40)
 9000 = Base Address + 4 * (29+9*40)
 9000 = Base Address + 4 * (29+360)
 9000 = Base Address + 4 * (389)

Base Address
 = 9000 - 4 * 389
 = 9000 - 1556
 = 7444

Address of Array[3][6]
 = 7444 + 4 * ((3 - 1) + (6 - 1) * 40)
 = 7444 + 4 * (2+5 * 40)
 = 7444 + 4 * (2+200),
 = 7444 + 4 * 202
 = 7444 + 808
 = 8252

OR

Address of Array[i][j] along the column
 = Address of Array[x][y] + W [(i-x) + (j-y) * M]

where,

W = size of each location in bytes = 4
 M = Number of rows per column = 40
 i, j = Index value of the unknown element
 x, y = Index value of the known element

Address of Array[3][6]
 = Address of Array[30][10] + 4 [(3 - 30)
 + (6 - 10) * 40]
 = 9000 + 4 [-27 - 160]
 = 9000 - 4 x 187
 = 9000 - 748
 = 8252

3.d) Write a function in C++ to print the product of each column of a two dimensional array passed as the arguments of the function.

Example : If the two dimensional array contains

1	2	4
3	5	6
4	3	2
2	1	5

Then the output should appear as:

Product of Column 1 = 24
 Product of Column 2 = 30
 Product of Column 3 = 240

```
void receive(int A[ ][ ],int r,int c)
{ int i,j,B[c];
  for(i=0;i<c;i++)
    B[i]=1;
  for(i=0;i<r;i++)
    for(j=0;j<c;j++)
      B[j]=B[j]*A[i][j];
  for(i=0;i<c;i++)
    cout<<"\nProduct of Columnn
      "<<i+1<<" = "<<B[i];
}
```

OR

```
void ProdCol(int Arr[ ][100], int Row, int Col)
{
  int i, j, Prod;
  for (j = 0; j < Col; j++)
  {
    Prod=1;
    for (i = 0; i < Row; i++)
      Prod * = Arr[i][j];
    cout<<"Product of Columnn
      "<<j<<" = "<<Prod<<endl;
  }
}
```

OUTSIDE DELHI 2008:

3.a) Write a function in C++, which accepts an integer array and its size as arguments and swap the elements of every even location with its following odd location.

Example :

If an array of nine elements initially contains the elements as
 2,4,1,6,5,7,9,23,10
 then the function should rearrange the array as
 4,2,6,1,7,5,23,9,10

```
void SwapArray(int A[ ], int N)
{
  int i,j,temp;

  /* cout<<"\nThe elements before doing the desired
  alterations...";
  for(i=0;i<N;i++)
    cout<<A[i]<<'t'; */

  for(i=0;i<N-1;i+=2)
  {
```

```

temp=A[i];
A[i]=A[i+1];
A[i+1]=temp;
}

/* cout<<"\nThe elements after completed the
desired alterations...";
for(i=0;i<N;i++)
    cout<<A[i]<<'\\t'; */
}

```

3.b) An array Arr[50][10] is store in the memory along the row with each element occupying 2 bytes. Find out the Base address of the location Arr[20][50], if the location Arr[10][25] is stored at the address 10000.

Ans)

Assuming LBR=LBC=0
S=2 bytes
Number of Rows (N)=50
Number of Columns (M)=100

LOC (Arr [I] [J]) = B + (I*M+J)*S
LOC (Arr [10] [25]) = B +(10*100+25)*2
10000 = B +(1000+25)*2
B = 10000-2050
B = 7950

LOC (Arr [20] [50])
= 7950+(20*100+50)*2
= 7950 + (2050*2)
= 7950+4100
= 12050

OR

Assuming LBR=LBC=1
S=2 bytes
Number of Rows (N) = 50
Number of Columns (M) =100

LOC (Arr [I] [J])
=B +((I-LBR)*M+(J-LBC))*S
LOC (Arr [10] [25])
=B +((10-1)*100+(25-1))*2
10000 = B +(900+24)*2
B = 10000-1848
B = 8152

LOC (Arr [20] [50])
= 8152+ ((20-1)*100+ (50-1))*2
= 8152 + (1949*2)

Prepared By: Mr.M.Ravi Kiran.

= 8152+3898
=12050

3.d)Write a function in C++ to print the product of each row of a two dimensional array passed as the arguments of the function

Example: if the two imensional array contains

20	40	10
40	50	30
60	30	20
40	20	30

Then the output should appear as:

Product of Row 1 = 8000
Product of Row 2 = 6000
Product of Row 3 =3600
Product of Row 4 = 2400

```

void receive(int A[ ][ ],int r,int c)
{ int i,j,B[r];
  for(i=0;i<r;i++)
    B[i]=1;
  for(i=0;i<r;i++)
    for(j=0;j<c;j++)
      B[i]=B[i]*A[i][j];
  for(i=0;i<r;i++)
    cout<<"\nProduct of Row "<<i+1<<
      " = "<<B[i];
}

```

DELHI 2007:

3.a)Write function in C++ which accepts an integer array and size as arguments and replaces elements having odd values with thrice its value and elements having even values with twice its value.

Example : if an array of five elements initially contains elements as 3, 4, 5, 16, 9

The the function should rearrange the content of the array as 9, 8, 75, 32, 27

Solution:

```

void manipulate (int a[ ],int size)

```

```

{
for (i=0;i<size;i++)
{
if (a[i]%2= =1)
a[i]=a[i]*3;
else
a[i]=a[i]*2;
cout<<a[i]<<',';
}
}

```

3.b)An array Array[20][15] is stored in the memory along the **column** with each element occupying 8 bytes. Find out the base address of the element Array[2][3] if the element Array[4][5] is stored at the address 1000.

Solution:

Given Data: Aray [20][15] W=8
B=? R=20 C=15 L_r=0 L_c=0
Address of Array [2][3] =?
Address of Array[4][5] =1000.

Address of an element (I,J) in column major

$$=B + W ((I-L_r) + R(J-L_c))$$

Therefore

$$1000=B+8*((4-0)+20(5-0))$$

$$1000=B+8*(4+20*5)$$

$$1000 =B+8*104$$

$$1000=B+832$$

$$B =1000-832$$

$$B =168$$

Therefore Address of

$$\text{Array}[2][3]=168+8*((2-0)+20(3-0))$$

$$=168+8*(2+20*3)$$

$$=168+8*62$$

$$=168+496$$

$$=664$$

3.d)Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements which lie on diagonals. [Assuming the 2D Array to be a square matrix with odd dimension i.e., 3x3, 5x5 ,7x7 etc...]

Example : if the array content is

5 4 3

6 7 8

1 2 9

Out put through the function should be :

Diagonal One : 5 7 9

Diagonal Two : 3 7 1

Solution:

```

void accept(int a[ ][ ],int size)
{
int i,j;
cout<<"Diagonal One:";
for (int i=0;i<size;i++)
for(int j=0;j<size;j++)
if (i= =j)
cout<<a[i][j]<<'\t';
cout<<"\n Diagonal Two:";
for (i=0;i<size;i++)
for(j=0;j<size;j++)
if((i+j)= =(size-1))
cout<<a[i][j]<<'\t';
}

```

OUTSIDE DELHI 2007:

3.a)Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having even values with its half and elements having odd values with twice its value .

Example : If an array of five elements initially contains the elements as 3, 4, 5, 16, 9 then the function should rearrange content of the array as 6, 2, 10, 8, 18

Solution:

```

void accept(int a[ ],int size)
{
for (int i=0;i<size;i++)
{
if (a[i]%2= =0)
a[i]=a[i]/2;
else
a[i]=a[i]*2;
cout<<a[i]<<',';
}
}

```

3.b) An array Arr[15][20] is stored in the memory along the **row** with each element occupying 4 bytes. Find out the Base address of the location Arr[3][2], if the location Arr[5][2] is stored at the address 1500.

Solution:

Given Data: Arr[15][20] W=4
 B=? R=15 C=20 L_r=0 L_c=0
 Address of Arr[3][2] = ?
 Address of Arr[5][2] = 1500.

Address of an element (I,J) in row major = B+W(C(I-L_r)+(J-L_c))

Therefore,

$$1500 = B + 4(20(5-0) + (2-0))$$

$$1500 = B + 4(20*5 + 2)$$

$$1500 = B + 4*102$$

$$1500 = B + 408$$

$$B = 1500 - 408$$

$$B = 1092$$

Address of Arr[3][2]

$$= 1092 + 4(20*3 + 2)$$

$$= 1092 + 4(62)$$

$$= 1092 + 248$$

$$= 1340.$$

3.d) Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements of middle row and the elements of middle column. [Assuming the 2D Array to be a square matrix with odd dimension i.e., 3x3, 5x5, 7x7 etc...]

Example : If the array content is

```
3 5 4
7 6 9
2 1 8
```

Output through the function should be :

Middle Row : 7 6 9

Middle Column : 5 6 1

Solution:

```
void accept(int a[ ][ ],int size)
{
  int i,j;
  cout<<"Middle Row:";
  for (int i=0;i<size;i++)
```

```
    for(int j=0;j<size;j++)
      if (i== size/2)
        cout<<a[i][j]<<'\\t';
  cout<<"\\n Middle Column:";
  for (i=0;i<size;i++)
    for(j=0;j<size;j++)
      if(j==size/2)
        cout<<a[i][j]<<'\\t';
}
```

DELHI 2006:

3.a) Write function in C++ which accepts an integer array and size as arguments and assign values into a 2D array of integers in the following format :

If the array is 1, 2, 3, 4, 5, 6

The resultant 2D array is given below

```
1 2 3 4 5 6
1 2 3 4 5 0
1 2 3 4 0 0
1 2 3 0 0 0
1 2 0 0 0 0
1 0 0 0 0 0
```

If the array is 1, 2, 3

The resultant 2D array is given :

```
1 2 3
1 2 0
1 0 0
```

Solution:

```
void input (int a[ ],int size)
{ int b[size] [size];
  for (int i=0;i<size;i++)
  {
    for (int j=0;j<size;j++)
    {
      if(( i+j)>=size)
        b[i][j]=0;
      else
        b[i][j]=a[j];
      cout<<b[i][j]<<'\\t';
    }
    cout<<endl;
```

```

}
}

```

3.b) An array MAT[30][10] is stored in the memory along column wise with each element occupying 8 bytes of the memory. Find out the Base address and the address of element MAT[20][5], if the location MAT[3][7] is stored at the address 1000.

Ans)

For Column wise allocation

$$\text{Address of A[I][J]} = \text{BA} + \text{W}[(\text{J} - \text{LBC}) \times \text{M} + (\text{I} - \text{LBR})]$$

Where

BA = Base Address

W = Size of each element in bytes
= 8 bytes (given)

M = No. of rows in the 2D Array = 30
(given)

Address of MAT[5][7] given is 1000.

Assumption 1 : LBR=LBC=0

Therefore

$$\begin{aligned} 1000 &= \text{BA} + 8(7 \times 30 + 5) \\ &= \text{BA} + 8 \times 215 \\ &= \text{BA} + 1720 \end{aligned}$$

$$\begin{aligned} \text{BA} &= 1000 - 1720 \\ &= -720 \end{aligned}$$

Therefore, Base Address = - 720

$$\begin{aligned} \text{Thus, Address of MAT[20][5]} &= -720 + \\ &8(5 \times 30 + 20) \\ &= -720 + 8 \times 170 \\ &= -720 + 1360 \\ &= 640 \end{aligned}$$

Assumption 2 : LBR=LBC=1

Therefore

$$\begin{aligned} 1000 &= \text{BA} + 8[(7-1) \times 30 + (5-1)] \\ &= \text{BA} + 8[6 \times 30 + 4] \\ &= \text{BA} + 8 \times 184 \\ &= \text{BA} + 1472 \end{aligned}$$

$$\begin{aligned} \text{BA} &= 1000 - 1472 \\ &= -472 \end{aligned}$$

Therefore, Base Address = - 472

$$\begin{aligned} \text{Thus, Address of MAT[20][5]} &= -472 + 8(4 \times 30 + 19) \\ &= -472 + 8 \times 139 \\ &= -472 + 1112 \\ &= 640 \end{aligned}$$

OUTSIDE DELHI 2006:

3.a) Write function in C++ which accepts an integer array and size as arguments and assign values into a 2D array of integers in the following format :

If the array is 1, 2, 3, 4, 5, 6

The resultant 2D array is given below :

```

1  0  0  0  0  0
1  2  0  0  0  0
1  2  3  0  0  0
1  2  3  4  0  0
1  2  3  4  5  0
1  2  3  4  5  6

```

If the array is 1, 2, 3

The resultant 2D array is given:

```

1  0  0
1  2  0
1  2  3

```

Solution:

```

void input (int a[ ],int size)
{
    int b[size] [size];
    for (int i=0;i<size;i++)
    {
        for (int j=0;j<size;j++)
        {
            if(( i<j)
                b[i][j]=0;
            else
                b[i][j]=a[j];
            cout<<b[i][j]<<'\t';
        }
        cout<<endl;
    }
}

```

```
}
```

OR

```

const int R = 100, C = 100;
void Arrayconvert(int A1D[ ], int N)
{
    int A2D[R][C]={0};
    for(int I = 0; I<N; I++)
        for (int J = 0; J <=I; J++)
            A2D[I][J] = A1D[J];
}

```

3.b)An array MAT[20][10] is stored in the memory along the row with each element occupying 4 bytes of the memory. Find out the Base address and the address of element MAT[10][5], if the location MAT[3][7] is stored at the address 1000.

Ans)

For Row wise allocation

Address of A[I][J]
= BA + W((I-LBR) x N + (J-LBC))

Where

BA = Base Address

W = Size of each element in bytes
= 4 bytes (given)

N = No. of columns in the 2D Array
= 10 (given)

Address of MAT[3][7] given is 1000.

Therefore

(Assumption 1: LBR = LBC = 0)

MAT[3][7]=1000 = BA + 4 (10 (3-0) + (7-0))
= BA + 148

BA = 1000 - 148 = 852

Therefore, Base Address = 852

Thus, Address of MAT[10][5] = 852 + 4
(10 (10-0) + (5-0))
= 852+420
= 1272

OR

(Assumption 2: LBR = LBC = 1)

MAT[3][7]=1000 = BA + 4 (10 (3-1) + (7-1))
= BA + 104

BA = 1000 - 104
= 896

Therefore, Base Address = 896

Thus, Address of MAT[10][5]
= 896 + 4 (10 (10-1) + (5-1))
= 896+376
= 1272

DELHI 2005:

3.a)Write a function in C++ which accepts an integer array and its size as arguments and exchanges the values of first half side elements with the second half side elements of the array.

Example :

If an array of 8 elements initial content as
2, 4, 1, 6, 7, 9, 23, 10

The function should rearrange array as
7, 9, 23, 10, 2, 4, 1, 6

Solution:

```

void change(int a[ ],int size)
{
    int i,j,temp;
    for(i=0,j=size/2;j<size;i++,j++)
    {
        temp=a[i];
        a[i]=a[j];
        a[j]=temp;
    }
}

```

OR

```

void Exchange (int A [ ], int N)
{
    for (int I=0;I<N/2;I++)
    {
        int Temp=A[I];
        A[I]=A[N/2+I];
        A[N/2+I]=Temp;
    }
}

```

OR

```

void Exchange(int A[], int N)
{
    int M=(N%2==0)?N:N+1;

```

```

for (int I=0; I<M/2; I++)
{
    int Temp=A[I];
    A[I]=A[M/2+I];
    A[M/2+I]=Temp;
}
}

```

3.b) An array Arr[15][35] is stored in the memory along the row with each of its element occupying 4 bytes. Find out the Base address and the address of element Arr[2][5], if the location Arr[5][10] is stored at the address 4000.

Ans)

```

LOC(Arr[I][J])
    =Base(Arr)+W*(I + No.of Rows * J)
LOC(Arr[5][10])
    =Base(Arr)+8*(5+15*10)
4000 =Base(Arr)+8*(155)
4000 =Base(Arr)+1240
Base(Arr) =4000-1240
Base(Arr)      =2760

```

```

LOC(Arr[2][5]) =Base(Arr)+8*(2 + 15*5)
                =2760+8*(77)
                =2760+616
                =3376

```

OR

```

LOC(Arr[I][J])
    =Base(Arr)+W*( (I-1) + No. of Rows * (J-1) )
LOC(Arr[5][10])
    =Base(Arr)+8*[(5-1)+15*(10-1)]
4000    =Base(Arr)+8*(139)
4000    =Base(Arr)+1112
Base(Arr) =4000-1112
Base(Arr) =2888

```

```

LOC(Arr[2][5])
    =Base(Arr)+ 8*[(2-1)+15*(5-1)]
    =2888+8*(61)
    =2888+488
    =3376

```

3.d) Write a function in C++ to print sum of all values which either are divisible by 2 or divisible by 3 present

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in a 2D array passed as the argument of the function.

Solution:

```

void Sum(int A[ ][ ],int R,int C)
{
    int i,j,S=0;
    for(i=0;i<R;i++)
        for(j=0;j<C;j++)
            if(A[i][j]%2== 0 || A[i][j]%3== 0)
                S=S+A[i][j];
    cout<<"\n\nThe Sum of all the values
    which are divisible by 2 or 3 in
    the array = "<<S;
}

```

OUTSIDE DEHI 2005:

3.a) Write a function in C++ which accepts an integer array and its size as arguments and exchanges the values of first half side elements with the second half side elements of the array.

Example :

If an array of 8 elements initial content as
8, 10, 1, 3, 17, 90, 13, 60

The function should rearrange array as
17, 90, 13, 60, 8, 10, 1, 3

Ans)

```

void Exchange(int A[],int N)
{
    for (int I=0;I<N/2;I++)
    {
        int Temp=A[I];
        A[I]=A[N/2+I];
        A[N/2+I]=Temp;
    }
}

```

OR

```

void Exchange(int A[],int N)
{
    for (int I=0,J=N/2;I<N/2;I++,J++)
    {
        int Temp=A[J];
        for (int K=J;K>I;K--)
            A[K]=A[K-1];
        A[I]=Temp;
    }
}

```

```
}  
}
```

=2936+1156
=4092

OR

```
void Exchange(int A[],int N)  
{  
    int M=(N%2=0)?N:N+1;  
    for (int I=0;I<M/2;I++)  
    {  
        int Temp=A[I];  
        A[I]=A[M/2+I];  
        A[M/2+I]=Temp;  
    }  
}
```

3.b) An array Arr[35][15] is stored in the memory along the row with each of its element occupying 4 bytes. Find out the Base address and the address of element Arr[20][5], if the location Arr[2][2] is stored at the address 3000.

Ans)

```
LOC(Arr[I][J])  
    =Base(Arr)+W*(No. of Cols*I+J)  
LOC(Arr[2][2]) =Base(Arr)+4*(15*2+2)  
3000          =Base(Arr)+4*(32)  
3000          =Base(Arr)+128  
Base(Arr) =3000-128  
Base(Arr) =2872
```

```
LOC(Arr[20][5])  
    =Base(Arr)+4*(15*20+5)  
    =2872+4*(300+5)  
    =2872+4*305  
    =2872+1220  
    =4092
```

OR

```
LOC(Arr[I][J])  
    =Base(Arr)+W*(No. of Cols*(I-1)+(J-1))  
LOC(Arr[2][2])  
    =Base(Arr)+4*(15*(2-1)+(2-1))  
3000    =Base(Arr)+4*(16)  
3000    =Base(Arr)+64  
Base(Arr) =3000-64  
Base(Arr) =2936
```

```
LOC(Arr[20][5])  
    =Base(Arr)+4*(15*(20-1)+(5-1))  
    =2936+4*(289)
```

3.d) Write a function in C++ to print sum of all values which either are divisible by 3 or divisible by 5 present in a 2D array passed as the argument of the function.

Ans)

```
void Sum(int A[ ][ ],int R,int C)  
{ int S=0,i,j;  
  for(i=0;i<R;i++)  
    for(j=0;j<C;j++)  
      if((a[i][j]%3==0) || (a[i][j]%5==0))  
        S=S+A[i][j];  
  cout<<" nThe Sum of all the values  
    which are divisible by 3 or 5 in  
    the array = "<<S;  
}
```

DELHI 2004:

3.a) Define the function **SwapArray(int[], int)**, that would expect a 1D integer array NUMBERS and its size N. the function should rearrange the array in such a way that the values of that locations of the array are exchanged. (Assume the size of the array to be even).

Example :

If the array initially contains
{2, 5, 9, 14, 17, 8, 19, 16}
Then after rearrangement the array
should contain
{5, 2, 14, 9, 8, 17, 16, 19}

Solution:

```
void SwapArray(int NUMBERS[ ], int N)  
{  
    int i,j,temp;  
    /* cout<<" nThe elements before doing the desired  
    alterations...";  
    for(i=0;i<N;i++)  
        cout<<NUMBERS[i]<<'t'; */  
    for(i=0;i<N-1;i+=2)  
    {  
        temp=NUMBERS[i];  
        NUMBERS[i]=NUMBERS[i+1];  
        NUMBERS[i+1]=temp;
```

```

}
/* cout<<"\n\nThe elements after completed the
desired alterations...";
for(i=0;i<N;i++)
    cout<<NUMBERS[i]<<'\\t'; */
}

```

3.b) An array ARR[5][5] is stored in the memory with each element occupying 3 bytes of space. Assuming the base address of ARR to be 1500, compute the address of ARR[2][4], when the array is stored :

Solution: Children, Try this answer as an assignment.

3.c) Write a function in C++ to find the sum of diagonal elements from a 2D array of type float. Use the array and its size as parameters with float as its return type.

Solution:

```

float diasum(float A[ ][ ],int R,int C)
{
    int i,j;
    float Dsum=0.0;
    for(i=0;i<R;i++)
        for(j=0;j<C;j++)
            if((i= j) | | (i+j)= =(size-1))
                Dsum=Dsum+A[i][j];
    return Dsum;
}

```

DELHI 2003:

3.a) Assume a array E containing elements of structure Employee is required to be arranged in descending order of Salary. Write a C++ function to arrange same with the help of bubble sort, the array and its size is required to be passed as parameters to the function. Definition of structure Employee is as follows:

```

Struct Employee
{
    int Eno;
    char name[25];
    float Salary;
};

```

Solution:

```

void bubble(Employee E[ ],int n)
{

```

```

    int i,j;
    Employee Etemp;
    for(i=0;i<n; i++)
        for(j=0;j<(n-1)-i ;j++)
            if(E[j].salary<E[j+1].salary)
                {
                    Etemp=E[j];
                    E[j]=E[j+1];
                    E[j+1]=temp;
                }
    cout<<"The details of the employee
in ascending order of salary ";
    for(i=0;i<n;i++)
        cout<<E[i].Eno<<'\\t'<<E[i].name
        <<'\\t'<<E[i].Salary<<endl;
}

```

3.b) An array X[30][10] is stored in the memory with each element requiring 4 bytes storage. Find out the Base address of X is 4500, find out memory locations of X[12][8] and X[2][14], if the content is stored along the row.

Solution: Children, Try this answer as an assignment.

3.c) Write a user-defined function in C++ to display those elements of 2D array T[4][4] which are divisible by 100. Assume the content of the array is already present and the function prototype is as follows: void showhundred(int T[4][4]);

```

void showhundred(int T[4][4])
{
    int i,j;
    cout<<"\n\nThe elements in the array
which are divisible by 100 .....";
    for(i=0;i<4;i++)
        for(j=0;j<4;j++)
            if(T[i][j]%100= =0)
                cout<<T[i][j]<<'\\t';
}

```

DELHI 2002:

3.a) Define array and pointer.

Solution: An array refer to a named list of a finite number n of similar data elements. Each of the data elements

can be referenced respectively by a set of consecutive numbers.

Arrays can be one dimensional, two dimensional or multi dimensional.

An array can be declared as :

Syntax: data_type Array_name[size];

Eg: int A[10]; //Then location of
//the array are A[0], A[1],.....A[9].
int B[5][4];
//This array can holds 5 X 4 = 20 elements.

3.d) The array A[20][10] is stored in the memory with each element requiring one byte of storage if the base address of a is 0, determine the location of A[10][5] when the array A is stored by column major.

Solution: Children, Try this answer as an assignment.

3.c) Considering the following key set: 42,29,74,11,65,58, use insertion sort to sort the data in ascending order and indicate the sequences of steps required.

Solution:

In this, Suppose an array A with n elements A[1],A[2],...A[N] is in memory. The insertion sort algorithm scans A from A[1] to A[N], insertion each element A[K] into its proper position in the previously sorted subarray A[1],A[2],...,A[K-1].

This sorting algorithm is frequently used when n is small.

The array contains 6 elements as follows: 42,29,74,11,65,58

Pass	A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
K=1	-32768	42	29	74	11	65	58
K=2	-32768	42	29	74	11	65	58
K=3	-32768	29	42	74	11	65	58
K=4	-32768	29	42	74	11	65	58
K=5	-32768	11	29	42	74	65	58
K=6	-32768	11	29	42	65	74	58
Sorted	-	11	29	42	58	65	74

DELHI 2001:

3.a) Given two arrays of integers X and Y of sizes m and n respectively. Write a function named MERGE() which will third array named Z, such that the following sequence is followed.

- (i) All odd numbers of X from left to right are copied into Z from left to right.
- (ii) All even numbers of X from left to right are copied into Z from right to left.
- (iii) All odd numbers of Y from left to right are copied into Z from left to right.
- (iv) All even numbers of Y from left to right are copied into Z from right to left.

X, Y and Z are passed as arguments to MERGE().

Eg. X is {3, 2, 1, 7, 6, 3} and {9, 3, 5, 6, 2, 8, 10}

The resultant array Z is

{3, 1, 7, 3, 9, 3, 5, 10, 8, 2, 6, 6, 2}

Ans)

```
void MERGE(int X[ ], int m,int Y[ ],
           int n,int Z[ ])
{
    int mn,i,,left=0,right=mn-1;
    mn=m+n;
    for(i=0;i<m;i++)
        if (X[i]%2== 1)
            Z[left++]=X[i];
            //For copying odd numbers of
            //X into Z from left to right
    else
        Z[right- ]=X[i];
        //For copying even number of
        //X into Z from right to left
    for(i=0;i<n;i++)
        if (X[i]%2== 1)
            Z[left++]=Y[i];
            //For copying odd numbers of
            //Y into Z from left to right
    else
        Z[right- ]=Y[i];
        //For copying even number of
        // X into Z from right to left
```

```
}
```

3.b) An array X[10][20] is stored in the memory with each element requiring 4 bytes of storage. If the Base address of the array is 1000, calculate location of X[5][15] when the array X is stored using column major order.

NOTE: X[10][20] means valid row indices are 0 and 9 and valid column indices are 0 and 19

Solution: Children, Try this answer as an assignment.

3.c) Write a user-defined function named Lower_half() which takes 2D array A, with size N rows and N columns as argument and prints the lower half of the array.

Eg:

Input:

```
2  3  1  5  0
7  1  5  3  1
2  5  7  8  1
0  1  5  0  1
3  4  9  1  5
```

Output:

```
2
7 1
2 5 7
0 1 5 0
3 4 9 1 5
```

Solution:

```
void Lower_half( int A[ ][ ],int N)
{ int i,j;
  for(i=0;i<N;i++)
    for(j=0;j<N;j++)
      { if(i<j)
          cout<<A[i][j]<<'\t';
        cout<<endl;
      }
}
```

DELHI 2000:

3.a) Suppose A, B, C are arrays of integers of size M, N and M+N

respectively. The numbers in array A appear in ascending order while numbers in array in descending order. Write user defined function in C++ to produce third array C by merging array A by B in ascending order. Use A, B and C as arguments in the function.

```
void Merge(int A[ ],int M,int B[ ],
           int N,int C[ ])
{
  int a,b,c;
  for(a=0,b=N-1,c=0;a<M&&b>=0;
  {
    if(A[a]<=B[b])
      C[c++]=A[a++];
    else
      C[c++]=B[b--];
  }
  if(a<M)
  {
    while(a<M)
      C[c++]=A[a++];
  }
  else
  {
    while(b>=0)
      C[c++]=B[b--];
  }
}
```

3.b) An array VAL[1...15][1...10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored (i) Row wise (ii) Column wise.

Solution:

Given Data:

VAL[1...15][1...10]

Word Length (W) = 4 Bytes

Base Address of VAL(B) = 1500

VAL[12][9] = ?

C = Total No of Columns

R = Total No of Rows

L_r = Least Row=1

L_c = Least Column=1

(i) Row Major:

Address of an element (I,J) in row major = B + W (C (I-L_r) + (J - L_c))

```
VAL [12][9] = 1500 + 4 (10 * (12-1) + (9-1))
            = 1500 + 4 (10 * 11+8)
            = 1500 + 4 (118)
            = 1500 + 472
            = 1972.
```

(i) Column Major:

Address of an element (I,J) in column major

$$= B + W ((I-L_r) + R(J - L_c))$$

```
VAL [12][9] = 1500 + 4 ((12-1) + 15 * (9-1))
            = 1500 + 4 (11 + 15 * 8)
            = 1500 + 4 ( 11+ 120)
            = 1500 + 4 * 131
            = 1500 + 524
            = 2024.
```

3.c) Write a user-defined function in C++ to find and display the sum of diagonal elements from a 2D array MATRIX[6][6] containing integers.

```
void displaysum( )
{
    int i,j,D1=0,D2=0,MATRIX[6][6];
    cout<<"\nEnter any 36 values....";
    for(i=0;i<6;i++)
        for(j=0;j<6;j++)
            { cin>>MATRIX[i][j];
              if(i= j)
                  D1=D1+MATRIX[i][j];
              else if ((i+j)= =(size-1))
                  D2=D2+MATRIX[i][j];
            }
    cout<<"\nThe sum of the elements of
    the Main Diagonal = "<<D1;
    cout<<"\nThe sum of the elements of
    the Other Diagonal = "<<D2;
}
```

DELHI 1999:

3.a) Suppose a 1D array AR containing integers is arranged in ascending order. Write a user defined function in C++ to search for one integer from AR with the help of binary search method, to show presence of the number in the array. The function should have three parameters: (1) an array AR (2) the

number to be searched and (3) the number of elements N in the array.

```
void BinSearch(int AR[ ], int Sno, int N)
{
    int l=0,u=N-1,m,flag=0;
    while(l<=u)
    {
        m=(l+u)/2;
        if (Sno== AR[m])
            {
                flag=1;
                break;
            }
        else if(Sno<AR[m])
            u=m-1;
        else
            l=m+1;
    }
    if( flag == 0)
        cout<<"\nThe Search Element
        "<<Sno<<" is not available";
    else
        cout<<"\nThe Search Element
        "<<Sno<<" is available";
}
```

3.b) An array A[10][20] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array in the memory is 400, determine the location of A[8][13] when the array VAL is stored (i) Row major (ii) Column major.

Solution: Children, Try this answer.

3.c) Write a user-defined function in C++ to find and display the multiplication of row elements of two dimensional array A[4][6] containing integers.

```
void rowmul( )
{
    int A[4][6],i,j,rowmul;
    cout<<"\nEnter any 24 values...";
    for(i=0;i<4;i++)
        for(j=0;j<6;j++)
            cin>>A[i][j];
    for(i=0;i<4;i++)
    {
        rowmul=1;
        for(j=0;j<6;j++)
            rowmul=rowmul*A[i][j];
    }
```

```

cout<<"\n\nThe multiplication of
    "<<i+1<<" row = "<<rowmul;
}
}

```

DELHI 1998:

3.a) Suppose an array P containing float is arranged in ascending order. Write a user defined function in C++ to search for one float from p with the help of binary search method. The function should return an integer 0 to show absence of the number in the array. The function should have the parameters as (1) an array P (2) the number DATA to be searched (3) number of elements N.

```

int BinSearch(float P[ ], float DATA, int N)
{
    int l=0,u=N-1,m;
    while(l<=u)
    {
        m=(l+u)/2;
        if (DATA= P[m])
            return 1;
        else if(DATA<P[m])
            u=m-1;
        else
            l=m+1;
    }
    return 0;
}

```

3.b) An array T[15][10] is stored in the memory with each element requiring 2 bytes of storage. If the base address of T is 2000, determine the location of T[7][8] when the array VAL is stored (i) Row major (ii) Column major.

Solution: Children, Try this as an assignment.

3.c) Write a user-defined function in C++ to find and display the sum of diagonal elements from a 2D array R[7][7] containing integers.

```

void displaysum( )
{

```

```

int i,j,D1=0,D2=0,R[7][7];
cout<<"\nEnter any 49 values....";
for(i=0;i<7;i++)
    for(j=0;j<7;j++)
    {
        cin>>R[i][j];
        if(i= j)
            D1=D1+R[i][j];
        else if ((i+j)= =(size-1))
            D2=D2+R[i][j];
    }
cout<<"\nThe sum of the elements of
    the Main Diagonal = "<<D1;
cout<<"\nThe sum of the elements of
    the Other Diagonal = "<<D2;
}

```

MODEL PAPER 1 FOR 2009-10:

3.a) Write a function in C++ to merge the contents of two sorted arrays A & B into third array C. Assuming array A and B are sorted in ascending order and the resultant array C is also required to be in ascending order. 3

Ans)

```

void AddNSave(int A[ ],int B[ ],int C[ ],
    int N,int M, int &K)
{
    int I=0,J=0;
    K=0;
    while (I<N && J<M)
        if (A[I]<B[J])
            C[K++]=A[I++];
        else if (A[I]>B[J])
            C[K++]=B[J++];
        else
        {
            C[K++]=A[I++];
            J++;
        }
    for (;I<N;I++)
        C[K++]=A[I];
    for (;J<M;J++)
        C[K++]=B[J];
}

```

b) An array S[40][30] is stored in the memory along the row with each of the element occupying 2 bytes, find out the memory location for the element

S[20][10], if the Base Address of the array is 5000. **3**

Ans)

Given,

W=2
N=40
M=30
Base(S)=5000

Row Major Formula:

Loc(S[I][J])
=Base(S)+W*(M*I+J)

Loc(S[20][10])
=5000+2*(30*20+10)
=5000+2*(600+10)
=5000+1220
=6220

d) Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (matrix).

2

Ans)

```
void DiagSum(int M[][4],int N,int M)
{
    int SumD1=0,SumD2=0;
    for (int I=0;I<N;I++)
    {
        SumD1+=M[I][I];SumD2+=M[N-I-1][I];
    }
    cout<<"Sum of Diagonal 1:"
        <<SumD1<<endl;
    cout<<"Sum of Diagonal 2:"
        <<SumD2<<endl;
}
```

MODEL PAPER 2 FOR 2009-10:

3.a) Write a function in C++ to combine the contents of two equi-sized arrays A and B by adding their corresponding elements as the formula A[i]+B[i]; where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array C. **3**

Ans)

```
void AddNSave(int A[],int B[],int C[],int N)
{
    for (int i=0;i<N;i++)
        C[i]=A[i]+B[i];
}
```

b) An array P[20][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the Base Address of the array, if an element P[2][20] is stored at the memory location 5000. **3**

Ans)

Given,

W=4
N=20
M=30
Loc(P[2][20]) =5000

Column Major Formula:

Loc(P[I][J]) = Base(P)+W*(N*J+I)

Loc(P[2][20]) = Base(P)+4*(20*20+2)
Base(P) = 5000 -4*(400+2)
=5000-1608
=3392

d) Write a function in C++ to find sum of rows from a twodimensional array.2

Ans)

```
void MatAdd(int M[][4],int N,int M)
{
    for (int R=0;R<N;R++)
    {
        int SumR=0;
        for (int C=0;C<M;C++)
            SumR+=M[C][R];
        cout<<SumR<<endl;
    }
}
```

MODEL PAPER 1 FOR 2008-09:

Q3. Write a function in C++ to merge the contents of two sorted arrays A & B into third array C. Assuming array A is sorted in ascending order, B is sorted in descending order, the

resultant array is required to be in ascending order. 4

Answer:

```
void AddNSave(int A[],int B[],int C[],int
N,int M, int &K)
{
    int I=0,J=M-1;
    K=0;
    while (I<N && J>=0)
    {
        if (A[I]<B[J])
            C[K++]=A[I++];
        else if (A[I]>B[J])
            C[K++]=B[J--];
        else
        {
            C[K++]=A[I++];
            J--;
        }
    }
    for (int T=I;T<N;T++)
        C[K++]=A[T];
    for (T=J;T>=0;T--)
        C[K++]=B[T];
}
```

f) An array S[40][30] is stored in the memory along the row with each of the element occupying 2 bytes, find out the memory location for the element S[20][10], if an element S[15][5] is stored at the memory location 5500.4

Ans)

```
Given,
    W=2
    N=40
    M=30
    Loc(S[15][5])=5500
Row Major Formula:
    Loc(S[I][J])      =Base(S)
+W*(M*I+J)
    Loc(S[15][5] =Base(S)
+2*(30*15+5)
5500 =Base(S)+2*(450+5)
Base(S)      =5500- 910
Base(S)      =4590
Loc(S[20][10])
    =4590+2*(30*20+10)
    =4590+2*(600+10)
    =4590+1220
```

= 5810

h) Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (matrix).

2

Ans)

```
void DiagSum(int A[100][100],int N)
{
    int SumD1=0,SumD2=0;
    for (int I=0;I<N;I++)
    {
        SumD1+=A[I][I];SumD2+=A[N-I-1][I];
    }
    cout<<"Sum of Diagonal 1:"
    <<SumD1<<endl;
    cout<<"Sum of Diagonal 2:"
    <<SumD2<<endl;
}
```

MODEL PAPER 2 FOR 2008-09:

3.a) Write a function in C++ to combine the contents of two equi-sized arrays A and B by computing their corresponding elements with the formula $2*A[i]+3*B[i]$; where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array. **4**

Ans)

```
void AddNSave(int A[ ],int B[ ],int C[ ],int N)
{
    for (int i=0;i<N;i++)
        C[i]=2*A[i]+3*B[i];
}
```

3.b) An array P[20][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the memory location for the element P[5][15], if an element P[2][20] is stored at the memory location 5000. **4**

Ans)

```
Given,
    W=4
```

N=20
M=30
Loc(P[2][20])=5000

Column Major Formula:

Loc(P[I][J])=Base(P)+W*(N*J+I)

Loc(P[2][20])=Base(P)+4*(20*20+2)5000
=Base(P)+4*(400+2)

Base(P) = 5000- 1608

Base(P) = 3392

Loc(P[5][15])=3392+4*(20*15+5)
=3392+4*(300+5)
=3392+1220
=4612

3.d) Write a function in C++ to find sum of rows from a two dimensional array. **2**

Ans)

```
void MatAdd(int A[100][100], int N,int M)
{
    for (int R=0;R<N;R++)
    {
        int SumR=0;
        for (int C=0;C<M;C++)
            SumR+=A[C][R];
        cout<<SumR<<endl;
    }
}
```

***”If WEALTH is lost,
nothing is lost.
If HEALTH is lost,
something is lost.
If CHARACTER is lost,
everything is lost.”***

10. LINKED LISTS , STACKS AND QUEUES

DELHI 2010:

3.d) Write a complete program in c++ to implement a dynamically allocated Stack containing names of Countries.**4**

Ans)

```
#include<iostream.h>
#include<stdio.h>
struct Node
{
    char Country [20] ;
    Node *Link;
};
class Stack
{
    Node *Top;
public:
    Stack( )
    {
        Top = NULL;
    }
    void Push() ;
    void Pop() ;
    void Display() ;
    ~Stack () ;
};
void Stack::Push( )
{
    Node *Temp = new Node;
    gets(Temp -> Country);
    Temp -> Link = Top;
    Top = Temp;
}
void Stack::Pop( )
{
    if (Top !=NULL)
    {
        Node *Temp = Top;
        Top = Top -> Link;
        delete Temp;
    }
    else
        cout<<“stack Empty”;
}
void Stack::Display( )
{
```

```

Node *Temp = Top;
while (Temp != NULL)
{
    cout<<Temp -> Country <<endl;
    Temp = Temp -> Link;
}
Stack::~~Stack ()
{
    while (Top!=NULL)
    {
        NODE *Temp=Top;
        Top=Top->Link;
        delete Temp;
    }
}
void main ()
{
    Stack ST;
    char Ch;
    do
    {
        cout<<"p/O/D/Q" ;
        cin>>Ch;
        switch (Ch)
        {
            case 'P' : ST.Push(); break;
            case 'O' :ST.Pop(); break;
            case 'D' :ST.Disp();
        }
    } while (Ch!='Q');
}

```

(e) Evaluate the following postfix notation of expression: 2
 (Show status of Stack after each operation)
 False, True, NOT, OR, True, False, AND, OR

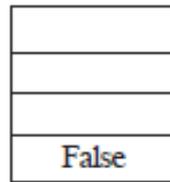
Ans.

Element Scanned	Stack
False	False
True	False, True
NOT	False, False
OR	False
True	False, True
False	False, True, False
and	False, False
OR	False

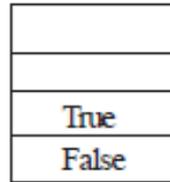
RESULT=False

OR

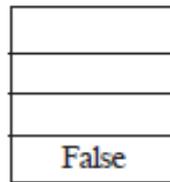
Step 1: Push



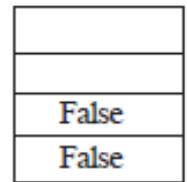
Step 2: Push



Step 3: NOT

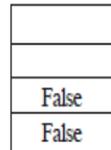


Push

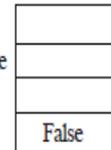


Pop
Op2=True

Step 4 OR

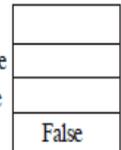


Pop
Op2=False

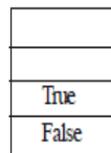


Pop
Op1=False
Op2=False

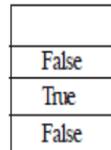
Push



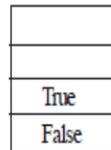
Step 5: Push



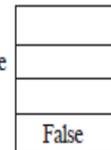
Step 6: Push



Step 7: AND

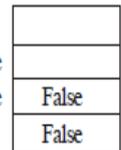


Pop
Op2=False



Pop
Op1=False
Op2=False

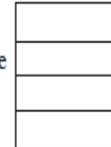
Push



Step 8: OR

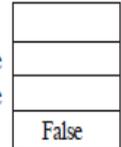


Pop
Op2=False



Pop
Op1=False
Op2=False

Push



Step 9: Pop



Result
False

OUTSIDE DELHI 2010:

(c) Write a complete program in C++ to implement a dynamically allocated Queue containing names of Cities. 4

Ans)

```
#include <iostream.h>
#include <conio.h>
struct NODE
{
    char City[20];
    NODE *Next;
};
class Queue
{
    NODE *Rear,*Front;
public:
    Queue()
    {
        Rear=NULL;Front=NULL;
    }
    void Qinsert();
    void Qdelete();
    void Qdisplay();
    ~Queue();
};
void Queue::Qinsert()
{
    NODE *Temp;
    Temp=new NODE;
    cout<<"Data:";
    gets (Temp->City);
    Temp->Next=NULL;
    if (Rear==NULL)
    {
        Rear=Temp;
        Front=Temp;
    }
    else
    {
        Rear->Next=Temp;
        Rear=Temp;
    }
}
void Queue::Qdelete()
{
    if (Front!=NULL)
    {
        NODE *Temp=Front;
        cout<<Front->City<<"Deleted \n";
        Front=Front->Next;
        delete Temp;
        if (Front==NULL)
```

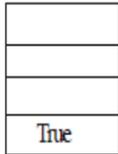
```
        Rear=NULL;
    }
    else
        cout<<"Queue Empty..";
}
Queue:: Qdisplay()
{
    NODE *Temp=Front;
    while (Temp!=NULL)
    {
        cout<<Temp->City<<endl;
        Temp=Temp->Next;
    }
}
Queue::~ ~Queue()//Destructor Function
{
    while (Front!=NULL)
    {
        NODE *Temp=Front;
        Front=Front->Next; delete Temp;
    }
}
void main()
{
    Queue QU;
    char Ch;
    do
    {
        :
        :
    } while (Ch!='Q');
}
```

(e) Evaluate the following postfix notation of expression: 2
(Show status of Stack after each operation True, False, NOT, OR, False, True, OR, AND)

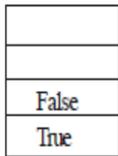
Element Scanned	Stack Content
True	True
False	True, False
NOT	True, True
OR	True
False	True, False
True	True, False, True
OR	True, True
AND	True

OR

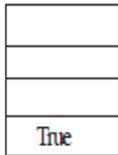
Step 1: Push



Step 2: Push

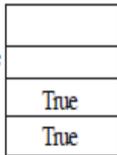


Step 3: NOT

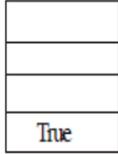


Pop
Op2=False

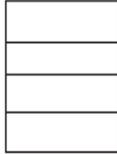
Push



Step 4 OR

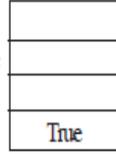


Pop
Op2=True

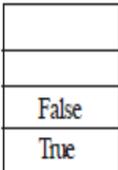


Pop
Op1=True
Op2=True

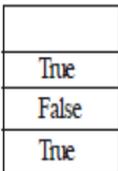
Push



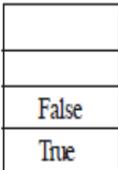
Step 5: Push



Step 6: Push



Step 7: OR

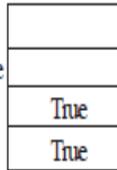


Pop
Op2=True



Pop
Op1=False
Op2=True

Push



Step 8: AND

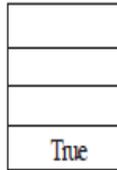


Pop
Op2=True



Pop
Op1=True
Op2=True

Push



Step 9: Pop



Result
True

(c) Write a function QUEINS() in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure: 4
struct Node

```
{
    int PId ; //Product Id
    char Pname [20] ;
    NODE *Next ;
};
```

Ans)

```
class Queue
{
    Node *Front, *Rear;
public:
    QUEUE( )
        //Constructor to initialize Front and Rear
    {
        Front = NULL;
        Rear = NULL;
    }
    void QUEINS( ); //Function to insert a node
    void QUEDEL( ); //Function to delete a node
    void QUEDISP( ); //Function to display nodes
    ~Queue( ); //Destructor to delete all nodes
};
void Queue::QUEINS( )
{
    Node *Temp;
    Temp = new Node;
    cin>>Temp->Pid;
    gets(Temp->Pname);
    //Or cin>>Temp->Pname;
    //cin.getLine(Temp->Pname);
    Temp->Next = NULL;
    if (Rear == NULL)
    {
        Front = Temp;
        Rear = Temp;
    }
    else
    {
        Rear->Next = Temp;
        Rear = Temp;
    }
}
```

OR

```
void QUEINS (Node *&Front, Node *&Rear)
{
```

DELHI 2009:

```

Node *Temp = new Node;
cin>>Temp->Pid;
gets (Temp->Pname);
    //or cin>>Temp->Pname;
    //cin.getline(Temp->Pname);
Temp->Next = NULL;
if(Rear == NULL)
    Front = Temp;
else
    Rear -> Next = Temp;
Rear = Temp;
}

```

(e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: **2**
 $X - Y / (Z + U) * V$

Ans)

$$X - Y / (Z + U) * v$$

$$= (X - ((Y / (Z + U)) * v))$$

Element Scanned	Stack	Postfix
(
X		X
-	-	
(
(
Y		XY
/	-/	
(

Z		XYZ
+	-/+	
U		XYZU
)	-/	XYZU+
)	-	XYZU+ /
*	-*	
V		XYZU+ / V
)	-	XYZU+ / V *
)		XYZU+ / V * -

OR

Element Scanned	Stack	Postfix
((
X	(	X
-	(-	X
Y	(-	XY
/	(-/	XY
(	(-/ (	XY
Z	(-/ (	XYZ
+	(-/ (+	XYZ
U	(-/ (+	XYZU
)	(-/	XYZU+
*	(-*	XYZU+ /
V	(-*	XYZU+ / V
)		XYZU+ / V * -

OUTSIDE DELHI 2009:

(c) Write a function QUEDEL() in C++ to display and delete an element from a dynamically allocated Queue containing nodes of the following given structure: **4**

```

struct NODE
{
    int Itemno;
    char Itemname[20];
    NODE *Link;
};

```

Ans)

```

class Queue
{
    Node *Front, *Rear;
public:
    QUEUE( )
        //Constructor to initialize Front and Rear
    {
        Front = NULL;
        Rear = NULL;
    }
    void QUEINS( );
    void QUEDEL( );
    void QUEDISP( );
    ~Queue();
        //Destructor to delete all nodes

```

```
};

void Queue::QUEDEL( )
{
    if (Front!=NULL)
    {
        NODE *Temp=Front;
        cout<<Front->Itemno<<" ";
        cout<<Front->Itemname<<"Deleted";
        Front=Front->Link;
        delete Temp;
        if (Front NULL)
            Rear=NULL;
    }
    else
        cout<<"Queue Empty..";
}

```

OR

```
void QUEDEL(Node *&Front, Node *&Rear)
{
    if (Front !=NULL)
    {
        NODE *Temp=Front;
        cout<<Front->Itemno<<" ";
        cout<<Front->Itemname<<"Deleted";
        Front=Front->Link;
        delete Temp;
        if (Front == NULL)
            Rear=NULL;
    }
    else
        cout<<"Queue Empty..";
}

```

(e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: **2**

$$A + B * (C - D) / E$$

Ans)

$$A + B * (C - D) / E = (A + (B * (C - D)) / E)$$

Element Scanned	Stack	Postfix
(
A		A
+	+	
(
B		AB
*	+	AB
(
C		ABC
-	+	ABC
D		ABCD
)	+	ABCD-
)	+	ABCD-*
/	+/	
E		ABCD-*E
)	+	ABCD-*E/
)		ABCD-*E/+

OR

Element Scanned	Stack	Postfix
((
A	(	A
+	(+	A
B	(+	AB
*	(+*	AB
(	(+*(	AB
C	(+*(	ABC
-	(+*(-	ABC
D	(+*(-	ABCD
)	(+*	ABCD-
/	(+(/	ABCD-*
E	(+(/	ABCD-*E
)		ABCD-*E/+

DELHI 2008:

3.c) Write a function in C++ to **insert** an element into a **dynamically allocated Queue** where each node contains a name (of type string) as data.

Assume the following definition of THENODE for the same.

struct THENODE

```
{
char Name[20];
THENODE *Link;
};
```

Solution:

```
struct THENODE
{
char Name[20];
THENODE *Link;
};

class Queue
{
THENODE *front,*rear;
public:
Queue( )
{
front = rear = NULL;
}
void Insert( );
void Delete( );
void Display( );
};

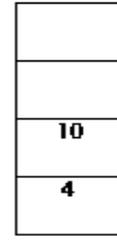
void Queue::Insert( )
{
THENODE *ptr;
ptr=new THENODE;
if(ptr= = NULL)
{
cout<<"\nNo memory to create a
new node....";
exit(1);
}
cout<<"\nEnter the name....";
gets(ptr->Name);
ptr->Link=NULL;
if(rear= = NULL)
front=rear=ptr;
else
{
rear->Link=ptr;
rear=ptr;
}
}
```

3.e) Evaluate the following postfix notation of expression (Show status of stack after execution of each operation): 2
4, 10, 5, +, *, 15, 3, /, -

Step 1: Push 4



Step 2: Push 10



Step 3: Push 5



Step 4: +

	Pop		Pop Op1=10	
5	Op2=3		Then performs 10+5=15	
10		10		15
4		4	Then push the result.	4

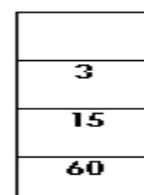
Step 5: *

	Pop		Pop Op1=4	
	Op2=15		Then performs 4*15=60	
15				
4		4	Then push the result.	60

Step 6: Push 15



Step 7: Push 3



Step 8: - /

	Pop		Pop Op1=15	
3	Op2=3		Then performs 15/3=5	
15		15		5
60		60	Then push the result.	60

Step 9: -

	Pop		Pop Op1=60	
	Op2=5		Then performs 60-5=55	
5				
60		60	Then push the result.	55

OUTSIDE DELHI 2008:

3.c) Write a function in C++ to **Delete** an element into a **dynamically allocated Queue** where each node contains a real number as data. 4

Assume the following definition of MYNODE for the same:

```
struct MYNODE
{
    float NUM;
    MYNODE * Link;
};
```

Solution:

```
struct MYNODE
{
    float NUM;
    MYNODE *Link;
};
class Queue
{
    MYNODE *front,*rear;
public:
    Queue( )
```

```
{ front=rear=NULL; }
void Insert( );
void Delete( );
void Display( );
};
void Queue::Delete( )
{
    MYNODE *temp;
    if(front= = NULL)
        cout<<"Queue Underflow";
    else
    {
        cout<<"\n\nThe content of the
        element to delete: "<<front->NUM;
        temp=front;
        front=front->Link;
        delete temp;
    }
}
```

3.e) Evaluate the following **postfix** notation of expression (Show status of stack after execution of each operations):

5, 20, 15, -, *, 25, 2, *, + 2

Ans)

Operator Scanned	Stack Content
5	5
20	5, 20
15	5, 20, 15
-	5, 5
*	25
25	25, 25, 2
2	25, 25, 2
*	25, 50,
+	75

DELHI : 2007

3.c) Write a function in C++ to **delete** a node containing Book's information, from a **dynamically allocated Stack** of Books implemented with the help of the following structure.

```
struct Book
{
```

```

    int BNo ;
    char BName[20] ;
    Book *Next ;
};

```

Solution:

```

struct Book
{
    int BNo ;
    char BName[20] ;
    Book *Next ;
};
class Stack
{
    Book *Top;
public:
    Stack( )
    {
        Top = NULL;
    }
    void Push( );
    void Pop( );
    void Display( );
};
void Stack::Pop( )
{
    Book *Temp;
    if( Top== NULL)
        cout<<"Stack Underflow...";
    else
    {
        cout<<"\n\nThe Book number of the
        element to delete: "<<Top->BNo;
        cout<<"\n\nThe Book name of the
        element to delete: "<<Top->BName;
        Temp=Top;
        Top=Top->Next;
        delete Temp;
    }
}

```

3.e) Evaluate the following **postfix**

notation of expression : $25 \ 8 \ 3 \ - \ / \ 6 \ * \ 10 \ +$

Operator Scanned	Stack Content
25	25
8	25, 8
3	25, 8, 3
-	25, 5
/	5
6	5, 6
*	30
10	30, 10
+	40

OUTSIDE DELHI : 2007

3.c) Write a function in C++ to **delete** a node containing customer's information, from a **dynamically allocated Queue** of Customers implemented with the help of the following structure:

```

struct Customer
{
    int CNo ;
    char CName[20] ;
    Customer *Link ;
};

```

Solution:

```

struct Customer
{
    int CNo ;
    char CName[20] ;
    Customer *Link ;
};
class Queue
{
    Customer *front,*rear;
public:
    Queue( )
    {
        front=rear=NULL;
    }
    void Insert( );
    void Delete( );
};

```

```

void Display( );
};
void Queue::Delete( )
{
    Customer *Temp;
    if(front==NULL)
        cout<<"Queue Underflow. No
            element to delete";

    else
    {
        cout<<"\n The customer number for the
            element to delete"<<front->CNo;
        cout<<"\n The customer name for the
            element to delete"<<front->CName;
        Temp=front;
        front = front->Link;
        delete Temp;
    }
}

```

3.e) Evaluate the following **postfix** notation of expression : $15\ 3\ 2\ +\ /\ 7\ +\ 2.\ *$

Ans)

Operator Scanned	Stack Content
15	15
3	15, 3
2	15, 3, 2
+	15, 5
/	3
7	3, 7
+	10
2	10, 2
*	20

DELHI : 2006

3.c)

```

class queue
{
    int data[10] ;
    int front, rear;
public :
    queue( )
    {
        front = - 1;

```

```

        rear = - 1 ;
    }
    void add( );
        //to add an element into the queue
    void remove( );
        //to remove an element from the queue
    void Delete(int ITEM( );
        //to delete all elements which are equal to
        ITEM
};

```

Complete the class with all function definitions for a circular array Queue. Use another queue to transfer data temporarily.

Solution:

```

void queue::add( )
{
    if((front== 0 && rear == 9) | |
        (front== rear+1)
        cout<<"\nQueue Overflow";
    else if (rear== -1)
    {
        front=rear=0;
        cout<<"\nEnter the element to be inserted";
        cin>>data[rear];
    }
    else if(rear== 9)
    {
        rear=0;
        cout<<"\nEnter the element to be inserted";
        cin>>data[rear];
    }
    else
    {
        rear++;
        cout<<"\nEnter the element to
            be inserted";
        cin>>data[rear];
    }
}

void queue::remove( )
{
    if(front== -1)
        cout<<"\nQueue Underflow...";
    else
    {
        cout<<"\nThe element to be
            deleted"<<data[front];
        if(front== rear)
            front=rear=-1;
        else if (front== 9)
            front=0;
        else

```

```

        front++;
    }
}
void queue::Delete(int ITEM )
{
    //Children, try to complete this
    function.
}

```

OR

```

void queue::add( )
{
    if ( (rear + 1) % 10 != front )
    {
        if (rear == -1 )
            front = rear = 0 ;
        else
            rear = (rear + 1) %10;
        cin>>data[rear];
    }
    else
        cout<<"Queue full !! Overflow Error !!\n";
}
void queue::remove( )
{
    if (front != -1)
    {
        cout<< data[front]<<" deleted ";
        if(front==rear)
            front=rear=-1;
        else
            front = (front+1)%10;
    }
    else
        cout<<"Queue empty ! Underflow Error!!\n";
}

```

OR

```

void queue::add( )
{
    if ( (rear + 1) % 10 != front )
        //Ignoring -1 initial values
    {
        rear = (rear + 1) %10;
        cin>>data[rear];
    }
    else
        cout<<"Queue full !! Overflow Error !!\n";
}
void queue::remove()
{

```

```

if (front != rear) //Ignoring -1 initial values
{
    front = (front+1)%10;
    cout<< data[front]<<" deleted...";
}
else
    cout<<"Queue empty ! Underflow Error!!\n";
}

```

OR

```

void queue::add( )
{
    int item;
    if((front==0 && rear==9) ||
        front==rear+1)
        cout<<"\nQueue overflow error";
    else
    {
        cout<<"\nEnter an item to add : ";
        cin>>item;
        if(front==-1)
        {
            front=0;rear=0;
        }
        else
            rear=rear+1;
        if(rear==10)
            rear=0;
        data[rear]=item;
    }
}

```

OR

```

void queue::remove( )
{
    if((front== -1 )
        cout<<"\nQueue Underflow Error";
    else
    {
        int item=data[front];
        if(front==rear)
            front=rear=-1;
        else if(front==9)
            front=0;
        else
            front=front+1;
        cout<<"\nDeleted item is : "<<item;
    }
}

```

3.d) Write a function in C++ to perform a PUSH operation on a dynamically allocated stack containing real number.

```

struct Node
{
    float Number ;
    Node *Link ;
};
class STACK
{
    Node *Top ;
public :
    STACK( )
    {
        Top = NULL;
    }
    void PUSH( ) ;
    void POP( ) ;
    ~STACK( ) ;
};

```

Solution:

```

struct Node
{
    float Number ;
    Node *Link ;
};
class STACK
{
    Node *Top ;
public :
    STACK( )
    {
        Top = NULL;
    }
    void PUSH( ) ;
    void POP( ) ;
    ~STACK( ) ;
};
void STACK::PUSH( )
{
    Node *Temp;
    Temp=new Node;
    if(Temp==NULL)
    {
        cout<<"\nNo memory to create the
                node...";
        exit(1);
    }
    cout<<"\nEnter the Number to be
                inserted: ";
    cin>>Temp->Number;
    Temp->Link=Top;
    Top=Temp;
}

```

3.e) Write the equivalent infix expression for
a, b, AND, a, c, AND, OR.

Ans) a, b, AND, a, c, AND, OR
(a AND b), (a AND c), OR
(a AND b) OR (a AND c)

S.No.	Element scanned	Operation	Infix Expression
1	A	Push a	a
2	B	Push b	a, b
3	AND	Pop, Pop, Push (a AND b)	a AND b
4	A	Push a	a AND b, a
5	C	Push c	a AND b, a, c
6	AND	Pop, Pop, Push(aANDc)	a AND b, a AND c
7	OR	Pop, Pop, a AND b OR a AND c	Push (a AND b OR a AND c)

OUTSIDE DELHI : 2006

3.c) Introduction

```

class stack
{
    int data[10] ;
    int top ;
public :
    stack( )
    {
        top = - 1;
    }
    void push( ) ;
        //to push an element into the stack
    void pop( ) ;
        //to pop an element from the stack
    void Delete(int ITEM) ;
        //To delete all elements which are
        //equal to ITEM.
};

```

Complete the class with all function definitions. Use another stack to transfer data temporarily.

Solution:

```

void stack::push( )
{
    if(top>=9)
        cout<<"Stack Overflow...";
}

```

```

else
{
    top++;
    cout<<"\nEnter the element to be
        inserted...";
    cin>>data[top];
}
}
void stack::pop( )
{
    if(top== -1)
        cout<<"\nStack Underflow";
    else
    {
        cout<<"\nThe element to be
            deleted = "<<data[top];
        top--;
    }
}
void stack::Delete(int ITEM)
{
    //Dear children, try to complete this function.
}

```

OR

```

void stack::push( )
{ int n;
  cout<<"Enter a value";cin>>n;
  if (top==10)
    cout<<"Stack Overflow";
  else
    data[++top]=n;
}
void stack::pop( )
{
  if (top== -1)
    cout<<"Stack Underflow";
  else
    cout<<data[top--];
}

```

```

void stack::Delete(int ITEM);
//Ignore this part

```

3.d) Write a function in C++ to perform **Insert** operation in **dynamically allocated Queue** containing names of students.

Struct NODE

Prepared By: Mr.M.Ravi Kiran.

```

{ char Name[20];
  NODE *Link;
};

```

Solution:

```

class Queue
{
    NODE *front,*rear;
public:
    Queue( )
    {
        front = rear = NULL;
    }
    void Insert( );
    void Delete( );
    void Display( );
};
void Queue::Insert( )
{
    NODE *ptr;
    ptr=new NODE;
    if(ptr== NULL)
    {
        cout<<"\nNo memory to create a
            new node....";
        exit(1);
    }
    cout<<"\nEnter the name....";
    gets(ptr->Name);
    ptr->Link=NULL;
    if(rear== NULL)
        front=rear=ptr;
    else
    {
        rear->Link=ptr;
        rear=ptr;
    }
}

```

3.e) Write the **equivalent infix** expression for **10, 3, *, 7, 1, --, *, 23, +**

Solution:

10, 3, *, 7, 1, - , *, 23, +

This is in Postfix form

(ie Operator will come after the operand(s)).

Infix form means Operator must come in between the operands.

10, 3, *, 7, 1, - , *, 23, +

Prefix:

10 * 3, 7 - 1, *, 23, +
 (10 * 3) * (7 - 1), 23, +
 (10 * 3) * (7 - 1) + 23

(Infix form)
OR
 $10*3*(7-1)+23$

DELHI : 2005

3.c) Write a function in C++ to perform a **PUSH** operation in a **dynamically allocated stack** considering the following :

```
struct Node
{
    int X,Y ;
    Node *Link ;
};

class STACK
{
    Node *Top ;
public :
    STACK()
        {Top = Null ;}
    void PUSH() ;
    void POP() ;
    ~STACK() ;
};
```

Solution:

```
struct Node
{
    int X,Y ;
    Node *Link ;
};

class STACK
{
    Node *Top ;
public :
    STACK()
        { Top = NULL;
        }
    void PUSH() ;
    void POP() ;
    ~STACK() ;
};

void STACK::PUSH()
{
    Node *Temp;
    Temp=new Node;
    if(Temp= =NULL)
    {
```

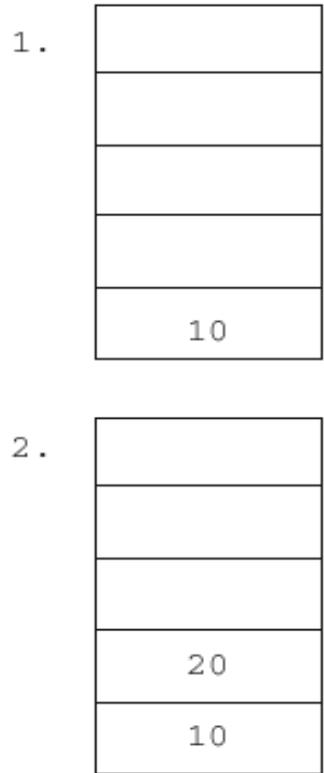
```
        cout<<"\nNo memory to
        create the node...";
        exit(1);
    }
    cout<<"Enter the value of X and Y";
    cin>>Temp→X>>Temp→Y;
    Temp→Link=Top;
    Top=Temp;
}
```

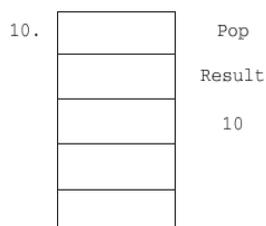
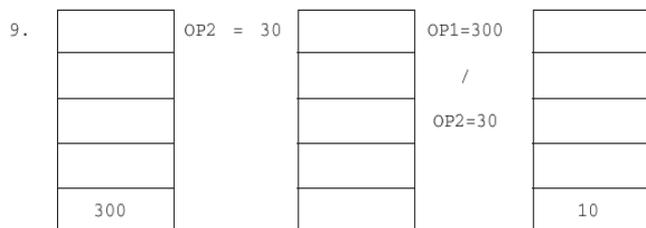
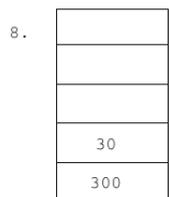
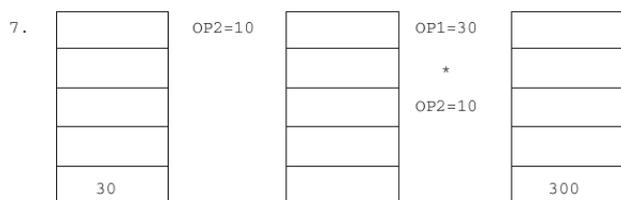
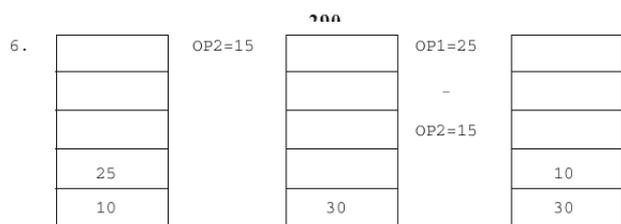
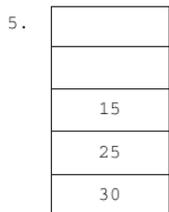
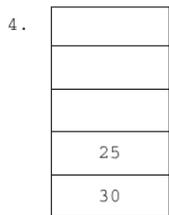
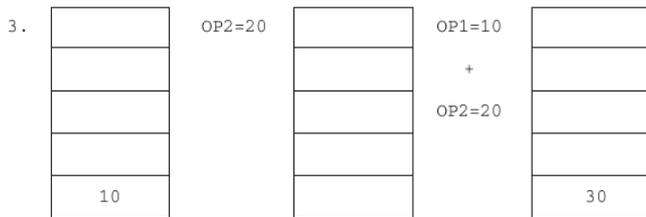
3.e) Evaluate the following postfix notation of expression :

10 20 + 25 15 - * 30 /

Ans)

10 20 + 25 15 - * 30 /





OR

Operand/Operator	Stack Status
10	10
20	10, 20
+	30
25	30, 25
15	30, 25, 15
-	30, 10
*	300
30	300, 30
/	10

Result : 10

OUTSIDE DELHI : 2005

3.c) Write a function in C++ to perform a **DELETE** operation in a **dynamically allocated queue** considering the following description :

```

struct Node
{
    float U, V ;
    Node *Link ;
};
class QUEUE
{
    Node *Rear, *Front ;
public :
    QUEUE( )
    {
        Rear = NULL;
        Front = NULL;
    }
    void INSERT( ) ;
    void DELETE( ) ;
    ~ QUEUE( ) ;
};

```

Solution:

```

void Queue::DELETE( )
{

```

```

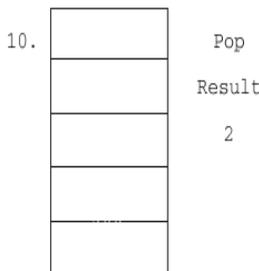
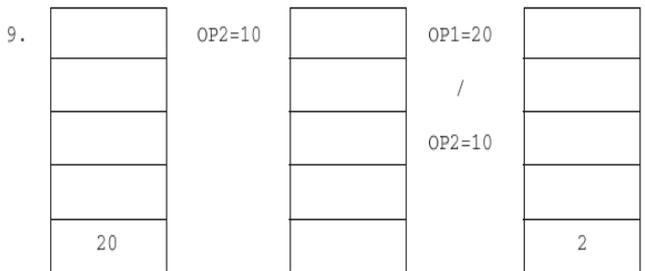
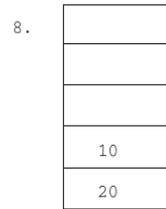
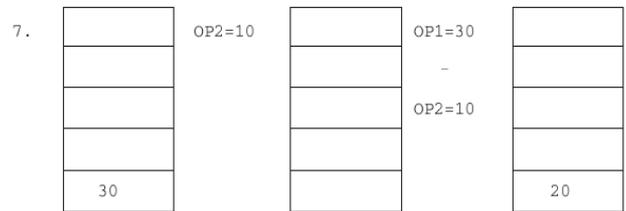
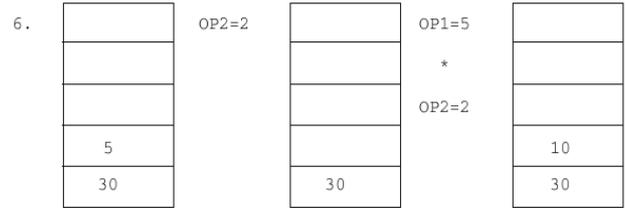
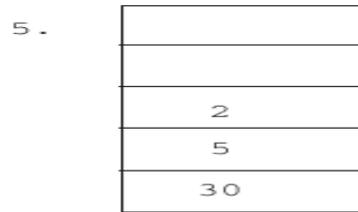
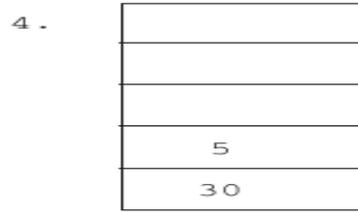
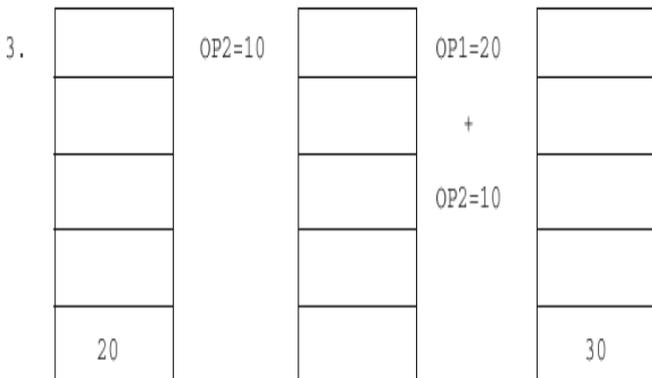
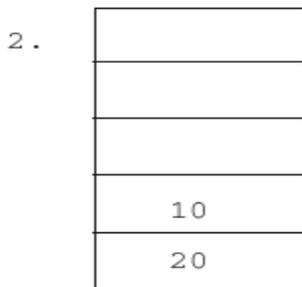
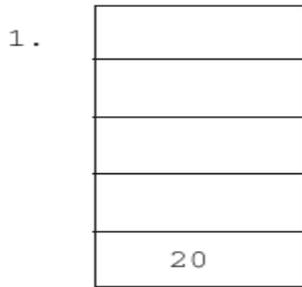
NODE *temp;
if(front == NULL)
    cout<<"\nQueue Underflow";
else
{
    cout<<"\nThe value of U of the
    element to delete: "<<Front->U;
    cout<<"\nThe value of V of the
    element to delete: "<<Front->V;
    temp=Front;
    Front=Front->Link;
    delete temp;
}
}

```

3.e) Evaluate the following **postfix** notation of expression :
20 10 + 5 2 * - 10 /

Ans)

20 10 + 5 2 * - 10 /



OR

20	20
10	20, 10
+	30
5	30, 5
2	30, 5, 2
+	30, 10
-	20
10	20, 10
/	2

Result : 2

2004:

3.d) Obtain the postfix notation for the following infix notation of expression showing the contents of the stack and postfix expression formed after each step of conversion :

$$(P-Q)/(R*(S-T)+U)$$

Ans) ((P-Q)/((R*(S-T))+U))

S No	Symbol Scanned	Stack	Expression Y
1	((
2	(((
3	P	((	P
4	-	((-	P
5	Q	((-	P Q
6	)	(	P Q -
7	/	(/	P Q -
8	(	(/(	P Q -
9	(	(/( (	P Q -
10	R	(/( (	P Q - R
11	*	(/((*	P Q - R
12	(	(/( ( * (	P Q - R
13	S	(/( ( * (	P Q - R S
14	-	(/((* (-	P Q - R S
15	T	(/((* (-	P Q - R S T
16	)	(/( ( *	P Q - R S T -
17	)	(/( (	P Q - R S T - *
18	+	(/((+	P Q - R S T - *
19	U	(/((+	P Q - R S T - * U
20	)	(/	P Q - R S T - * U +
21	)		P Q - R S T - * U + /

Postfix Form: PQ-RST-*U+/

3.e) Define member functions **queins()** to insert nodes and **quedel ()** to delete nodes of the **linked list implemented class queue**, where each node has the following structure:

```
struct node
{
    char name[20] ;
    int age ;
    node *Link ;
};
class queue
{
    node *rear, *front ;
public :
    queue( )
        { rear = NULL; front = NULL} ;
    void queins( ) ;
    void quedel( ) ;
};
```

Solution:

```
void queue::queins( )
{
    node *ptr;
    ptr=new node;
    if(ptr== NULL)
    {
        cout<<"\nNo memory to create a
            new node....";
        exit(1);
    }
    cout<<"\nEnter the name....";
    gets(ptr->name);
    cout<<"\nEnter the age...";
    cin>>ptr->age;
    ptr->Link=NULL;
    if(rear== NULL)
        front=rear=ptr;
    else
    {
        rear->Link=ptr;
        rear=ptr;
    }
}
void queue::quedel( )
{
    node *temp;
    if(front== NULL)
        cout<<"Queue Underflow";
    else
```

```

{
    cout<<"\nThe name of the
    element to delete: "<<front->name;
    cout<<"\nThe age of the element to
        delete: "<<front->age;
        temp=front;
        front=front->Link;
        delete temp;
    }
}

```

DELHI : 2003

3.c) Evaluate the following **postfix** expression using a stack and show the contents of stack after execution of each operation:
20, 45, +, 20, 10, -, 15, +, *

Ans) Children, Try this answer as an assignment.

3.e) Consider the following portion of a program, which implements passengers Queue for a train. Write the definition of function. **Insert** (whose prototype is shown below); to insert a new node in the queue with required information.

```

struct NODE
{
    long Ticketno;
    char PName[20]; //Passengers Name
    NODE * Next;
};
class Queueoftrain
{
    NODE * Rear, * Front;
public :
    Queueoftrain( )
    { Rear = NULL; Front = NULL;}
    void Insert( );
    void Delete( );
    ~Queueoftrain( );
};

```

Solution:

```

void Queueoftrain::Insert( )
{

```

```

NODE *ptr;
ptr=new NODE;
if(ptr= = NULL)
{
    cout<<"\nNo memory to create a
        new node....";
    exit(1);
}
cout<<"\nEnter the Ticket
        Number....";
cin>>ptr->Ticketno;
cout<<"\nEnter the Passenger
        Name..";
gets(ptr->PName);
ptr->Next=NULL;
if(rear= = NULL)
    front=rear=ptr;
else
{
    rear->Next=ptr;
    rear=ptr;
}
}

```

DELHI : 2002

3.b) Given the following class, **4**

```

char *msg[ ]={"over flow","under flow"};
class Stack
{
    int top; //the stack pointer
    int stk[5]; //the elements
    void err_rep(int e_num)
    {
        cout<<msg[e_enum];
        //report error message
    }
public:
    void init( )
    {
        top=0;
    } //initialize the stack pointer

    void push(int); //put new value in stk
    void pop( ); //get the top value.
};

```

Define pop outside the Stack. In your definition take care of under flow condition. Function pop should invoke err_rep to report under flow.

Solution:

```

void Stack::pop( )

```

```
{ //Dear children, try to complete this function.
```

```
}
```

3.c) Change the following **infix expression into postfix** expression.

$(A+B)*C+D/E-F$ 3

Ans) Children, Try this answer as an assignment.

DELHI : 2001

3.d) Write an algorithm to convert an infix expression to postfix expression.

Ans)

The following algorithm transforms the infix expression X into its equivalent postfix expression Y. The algorithm uses a stack to temporarily hold operators and left parentheses. The postfix expression Y will be constructed from left to right using the operands from X and the operators which are removed from STACK. We begin by pushing a left parenthesis onto STACK and adding a right parenthesis at the end of X. The algorithm is completed when STACK is empty.

Algorithm:

Suppose X is an arithmetic expression written in infix notation. This algorithm finds the equivalent postfix expression Y.

1. Push "(" onto STACK, and add ")" to the end of X.
2. Scan X from left to right and REPEAT Steps 3 to 6 for each element of X UNTIL the STACK is empty.
3. If an operand is encountered, add it to Y.
4. If a left parenthesis is encountered, push it onto STACK.
5. If an operator is encountered, then:
 - (a) Repeatedly pop from STACK and add to Y each operator (on the top of STACK) which has the same precedence as or higher precedence than operator.
 - (b) Add operator to STACK.

```
/* End of If structure */
```

6. If a right parenthesis is encountered, then:

(a) Repeatedly pop from STACK and add to Y each operator (on the top of STACK) until a left Parenthesis is encountered.

(b) Remove the left parenthesis.

(Do not add the left parenthesis to Y).

```
/* End of If structure */
```

7. End.

3.e) Each node of a STACK contains the following information, in addition to pointer field:

(i). Pin code of city

(ii). Name of city

Give the structure of node for the linked STACK in question. TOP is a pointer that points to the topmost node of the STACK. Write the following functions: 4

a) PUSH() – To push a node into the STACK, which is allocated dynamically.

b) POP() – To remove a node from the STACK, and release the memory.

Solution:

```
struct City
{
    long Cpin ;
    char CName[20] ;
    City *Next ;
};

class Stack
{
    City *Top;
public:
    Stack() { Top = NULL; }
    void Push( );
    void Pop( );
    void Display( );
};

void Stack::PUSH( )
{
    City *Temp;
    Temp=new City;
    if(Temp= =NULL)
    {
```

```

        cout<<"\nNo memory to create
            the node...";
        exit(1);
    }
    cout<<"\nEnter the City Pin Code
        to be inserted: ";
    cin>>Temp→Cpin;
    cout<<"\nEnter the City Name to
        be inserted: ";
    gets(Temp→CName);
    Temp→Next=Top;
    Top=Temp;
}
void Stack::POP( )
{
    City *Temp;
    if( Top= = NULL)
        cout<<"Stack Underflow...";
    else
    {
        cout<<"\nThe City Pin Code for
            the element to delete: "<<Top→Cpin;
        cout<<"\nThe City name of the element
            to delete: "<<Top→CName;
        Temp=Top;
        Top=Top→Next;
        delete Temp;
    }
}

```

DELHI : 2000

3.d) Evaluate the following **postfix** expression using a stack. Show the contents of stack after execution of each operation:

20, 8, 4, /, 2, 3, +, *, -

Ans) Children, Try this answer as an assignment.

3.e) Give necessary declarations for a queue containing float type numbers; also write a user defined function in C++ to insert a float type number in the queue. You should use linked representation of queue.

Solution:

```

struct NODE
{   float Number;
    NODE *Link;
};

```

```

class Queue
{
    NODE *front,*rear;
public:
    Queue( )
    {
        front = rear = NULL;
    }
    void Insert( );
    void Delete( );
    void Display( );
};
void Queue::Insert( )
{
    NODE *ptr;
    ptr=new NODE;
    if(ptr= = NULL)
    {
        cout<<"\nNo memory to
            create a new node....";
        exit(1);
    }
    cout<<"\nEnter the Number....";
    cin>>ptr→Number;
    ptr→Link=NULL;
    if(rear= = NULL)
        front=rear=ptr;
    else
    {
        rear→Link=ptr;
        rear=ptr;
    }
}

```

1999:

3 (d) Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation

5,11,-,6,8,+,12,*,/

Ans) Children, Try this answer as an assignment.

3 (e) Give the necessary declaration of a **linked list implemented queue** containing float type elements. Also write a user defined function in C++ to **delete** a float type number from the queue.

```
struct MYNODE
{
    float NUM;
    MYNODE * Link;
};
```

Solution:

```
struct MYNODE
{
    float NUM;
    MYNODE *Link;
};
class Queue
{
    MYNODE *front,*rear;
public:
    Queue()
    { front=rear=NULL; }
    void Insert();
    void Delete();
    void Display();
};
void Queue::Delete()
{ MYNODE *temp;
  if(front== NULL)
    cout<<"Queue Underflow";
  else
  {
    cout<<"\nThe content of the
    element to delete: "<<front->NUM;
    temp=front;
    front=front->next;
    delete temp;
  }
}
```

1998:

3 (d) Evaluate the following **postfix** expression using a stack and show the contents of stack after execution of each operation:

50, 40, +, 18, 14, -, 4, *, +

Ans) Children, Try this answer as an assignment.

3 (e) Give the necessary declaration of a **linked implemented stack** containing integer type numbers; also write a user defined function in C++ to **pop** a number from this stack.

Solution:

```
struct Node
{
    float Number;
    Node *Next ;
};
class Stack
{
    Node *Top;
public:
    Stack()
    {
        Top = NULL;
    }
    void Push( );
    void Pop( );
    void Display( );
};
void Stack::Pop( )
{
    Node *Temp;
    if( Top= = NULL)
        cout<<"Stack Underflow...";
    else
    {
        cout<<"\nThe Number of the element to
        delete: "<<Top->Number;
        Temp=Top;
        Top=Top->Next;
        delete Temp;
    }
}
```

MODEL PAPER 1 FOR 2009-10:

(c) Write a function in C++ to perform Insert operation in a dynamically allocated Queue containing names of students. **4**

Ans)

```
struct NODE
{
    char Name[20];
    NODE *Link;
};
class QUEUE
{
    NODE *R,*F;
public:
    QUEUE();
    void Insert();
    void Delete();
};
void QUEUE::Insert()
```

```

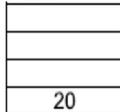
{
  NODE *Temp;
  Temp=new NODE;
  gets(Temp->Name);
  Temp->Link=NULL;
  if (Rear==NULL)
  {
    Rear=Temp;
    Front=Temp;
  }
  else
  {
    Rear->Link=Temp;
    Rear=Temp;
  }
}

```

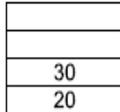
(e) Evaluate the following postfix notation of expression: 2

20, 30, +, 50, 40, -, *

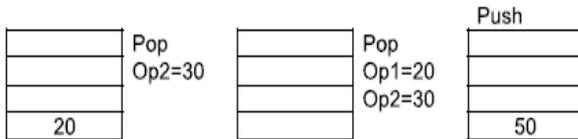
Step 1: Push



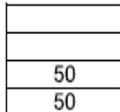
Step 2: Push



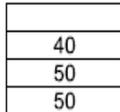
Step 3: +



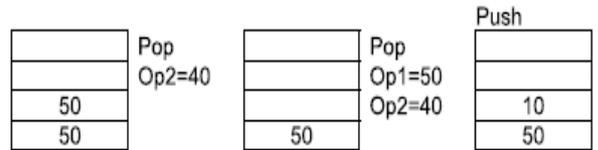
Step 4: Push



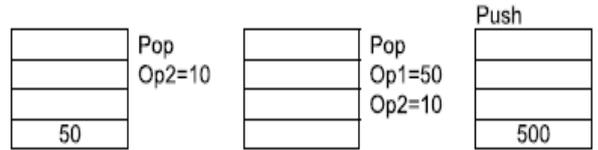
Step 5: Push



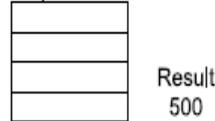
Step 6: -



Step 7: *



Step 8: Pop



MODEL PAPER 2 FOR 2009-10:

c) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. **4**

Ans)

```

struct NODE
{
  float Data;
  NODE *Link;
};
class STACK
{
  NODE *Top;
public:
  STACK( );
  void Push();
  void Pop();
  void Display();
  ~STACK();
};
void STACK::Push()
{
  NODE *Temp;
  Temp=new NODE;
  cin>>Temp->Data;
  Temp->Link=Top;
  Top=Temp;
}

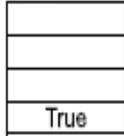
```

e) Evaluate the following postfix notation of expression:

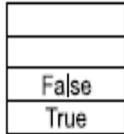
True, False, AND, True, True, NOT, OR, AND
2

Ans)

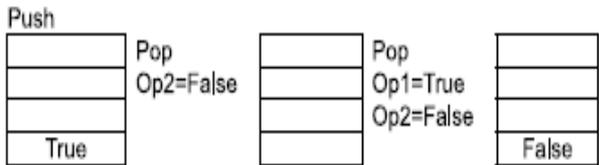
Step 1: Push



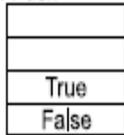
Step 2: Push



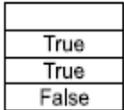
Step 3: AND



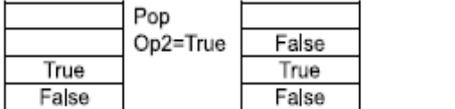
Step 4: Push



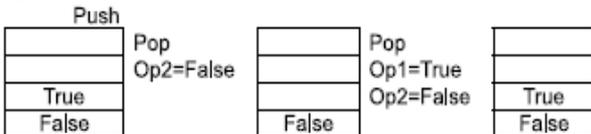
Step 5: Push



Step 6: NOT



Step 7: OR



Step 8: AND



Step 9: Pop



MODEL PAPER 1 FOR 2008-09:

c) Write a function in C++ to perform Insert operation in a dynamically allocated Queue containing names of students.
4

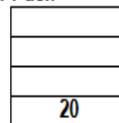
```

struct NODE
{
    char Name[20];
    NODE *Link;
};
class QUEUE
{
    NODE *R,*F;
public:
    QUEUE();
    void Insert();
    void Delete();
};
void QUEUE::Insert()
{
    NODE *Temp;
    Temp=new NODE;
    gets(Temp->Name);
    Temp->Link=NULL;
    if (Rear==NULL)
    {
        Rear=Temp;
        Front=Temp;
    }
    else
    {
        Rear->Link=Temp;
        Rear=Temp;
    }
}
    
```

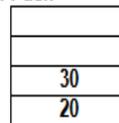
e) Evaluate the following postfix notation of expression: 2

20,30,+,50,40,-,*

Step 1: Push



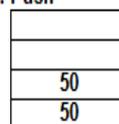
Step 2: Push



Step 3: +



Step 4: Push



Step 5: Push

40
50
50

Step 6: -

	Pop		Pop		Push
	Op2=40		Op1=50		
			Op2=40		
50		50		10	
50				50	

Step 7: *

	Pop		Pop		Push
	Op2=10		Op1=50		
			Op2=10		
50				500	

Step 8: Pop

	Result
	500

True, False, AND, True, True, NOT, OR, AND

Ans)

Step 1: Push

True

Step 2: Push

False
True

Step 3: AND

	Pop		Pop		Push
	Op2=True		Op1=False		
			Op2=True		
True				False	

Step 4: Push

True
False

Step 5: Push

True
True
False

Step 6: NOT

	Pop		Push
	Op2=True		False
			True
True			False
False			

Step 7: OR

	Pop		Pop		Push
	Op2=False		Op1=True		
			Op2=False		
True		False		True	
False				False	

Step 8: AND

	Pop		Pop		Push
	Op2=True		Op1=False		
			Op2=True		
False				False	

Step 9: Pop

	Result
	False

MODEL PAPER 2 FOR 2008-09:

c) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. **4**

Ans)

```

struct NODE
{
    float Data;
    NODE *Link;
};
class STACK
{
    NODE *Top;
public:
    STACK();
    void Push();
    void Pop();
};
void STACK::Push()
{
    NODE *Temp;
    Temp=new NODE;
    cin>>Temp->Data;
    Temp->Link=Top;
    Top=Temp;
}
    
```

11.DATA BASE CONCEPTS

DELHI 2010:

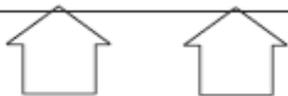
e) Evaluate the following postfix notation of expression: **2**

5. (a) What do you understand by Candidate Keys in a table? Give a suitable example of Candidate Keys from a table containing some meaningful data. **2**

Ans) A table may have more than one such attribute/group of attribute that identifies a tuple uniquely, all such attribute(s) are known as Candidate Keys.

Table: Item

Ino	Item	Qty
I01	Pen	560
I02	Pencil	780
I04	CD	450
I09	Floppy	700
I05	Eraser	300
I03	Duster	200



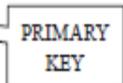
OUTSIDE DELHI 2010:

5. (a) What do you understand by Primary Key? Give a suitable example of Primary Key from a table containing some meaningful data **2**

Ans. An attribute or set of attributes which are used to identify a tuple uniquely is known as Primary Key.

Table: Item

Ino	Item	Qty
I01	Pen	300
I02	Pencil	780
I04	CD	450
I09	Floppy	700



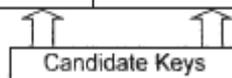
DELHI 2009:

5.(a)What are candidate keys in a table? Give a suitable example of candidate keys in a table. **2**

Ans A table may have more than one such attribute/group of attribute that identifies a tuple uniquely, all such attribute(s) are known as Candidate Keys.

Table:Item

Ino	Item	Qty
I01	Pen	560
I02	Pencil	780
I04	CD	450
I09	Floppy	700
I05	Eraser	300
I03	Duster	200



OUTSIDE DELHI 2009:

5. (a) What is the purpose of a key in a table? Give an example of a key in a table. **2**

Ans) An attribute/group of attributes in a table that identifies each tuple uniquely is known as a Key.

OR

Any correct definition of Key / Primary Key / Candidate Key / Alternate Key

Table:Item

Ino	Item	Qty
I01	Pen	560
I02	Pencil	780
I04	CD	450
I09	Floppy	700
I05	Eraser	300
I03	Duster	200



Delhi 2008:

5.a) Differentiate between Candidate key and Primary key in context of RDBMS.

Ans:

Candidate Key: All attribute combinations inside a relation that can serve primary key are Candidate Keys as they are candidates for the primary key position.

Primary Key: A primary key is a set of one or more attributes that can uniquely identify tuples within the relations.

Outside Delhi 2008:

5.a) Differentiate between Candidate Key and alternate Key in context of RDBMS.

Ans:

Candidate Key: All attribute combinations inside a relation that can serve as primary key are Candidate Keys as they are candidates for the primary key position.

Alternate Key: A candidate key that is not the primary key is called an Alternate Key.

(Where Candidate Key: All attribute combinations inside a relation that can serve primary key (uniquely identifies a row in a relation) are Candidate Keys as they are candidates for the primary key position.)

Delhi 2007:

5.a) Differentiate between primary key and alternate key.

Ans:

Primary Key: A primary key is a set of one or more attributes that can uniquely identify tuples within the relations.

Alternate Key: A candidate key that is not the primary key is called an Alternate Key.

(Where Candidate Key: All attribute combinations inside a relation that can serve primary key (uniquely identifies a row in a relation) are Candidate Keys as they are candidates for the primary key position.)

Outside Delhi 2007:

5.a) What is the importance of a primary key in a table? Explain with suitable example.

Ans:

Primary Key: A primary key is a set of one or more attributes that can uniquely identify tuples within the relations. A primary key comprises a single column or set of columns. No two distinct rows in a table can have the same value (or combination of values) in those columns. Depending on its designing, a table may have arbitrarily many candidate keys but at most one primary key. The primary key is non redundant. It does not have duplicate values in the same relation.

Eg: Consider a table consists the following attributes:

AdmnNo, FirstName, LastName, SirName, M1, M2, M3, Total, Avg, FName

Here we can uniquely identify the rows in the relation with following key combinations:

a) AdmnNo

b) FirstName, LastName, SirName

c) FirstName, LastName, FName, etc.

We can set any one of the above candidate keys as primary key, others are called as alternate keys.

Delhi 2006:

5.a) What is an alternate key?

Ans:

Alternate Key: A candidate key that is not the primary key is called an Alternate Key.

(Where Candidate Key: All attribute combinations inside a relation that can serve primary key (uniquely identifies a row in a relation) are Candidate Keys as they are candidates for the primary key position.)

Outside Delhi 2006:

5.a) What are DDL and DML?

Ans: **DDL** means Data Definition Language. DDL provides statements for the creation and deletion of tables and indexes.

DML Means Data Manipulation Language. The DML provides statements to enter, update, delete data and perform complex queries on these tables. The SQL DDL (Data Definition Language) provides commands for defining relation schemas, deleting relations, creating indexes and modifying relation schemas.

The SQL DML (Data Manipulation Language) includes a query language to insert, delete and modify tuples in the database.

DML is used to put values and manipulate them in tables and other database objects and DDL is used to create tables and other database objects.

Delhi 2005:

5.a) What do you understand by the terms primary key and degree of a relation in relational data base?

Ans:

Primary Key: A primary key is a set of one or more attributes that can uniquely identify tuples within the relations. The number of attributes in a relation is called Degree of a relation in relational data base.

Outside Delhi 2005:

5.a) What do you understand by the candidate key and cardinality of a relation in relational data base?

Ans:

Candidate Key: All attribute combinations inside a relation that can serve as primary key (uniquely identifies a row in a relation) are Candidate Keys as they are candidates for the primary key position. The number of rows in a relation is known as **cardinality** of a relation.

2003:

5.a) What is primary key in a table? (Define first normal form.- This is out of syllabus)

Ans:

Primary Key: A primary key is a set of one or more attributes that can uniquely identify tuples within the relations.

2002:

5.a) Differentiate between data definition language and data manipulation language.

Ans: The SQL DDL (Data Definition Language) provides commands for defining relation schemas, deleting relations, creating indexes and modifying relation schemas.

The SQL DML (Data Manipulation Language) includes a query language to insert, delete and modify tuples in the database.

DML is used to put values and manipulate them in tables and other database objects and DDL is used to create tables and other database objects.

2001

5.c) Explain Cartesian product of two relations.

Ans: The Cartesian product is a binary operation and is denoted by a cross(x). The Cartesian product of two relations A and B is written as AXB. The Cartesian product yields a new relation which has a degree (number of attributes) equal to the sum of the degrees of the two relations operated upon. The number of types (cardinality) of the new relation is the product of the number of tuples of the two relations operated upon. The Cartesian product of two relations yields a relation with all possible combinations of the tuples of the two relations operated upon. All tuples of first relation are concatenated with all the tuples of second relation to form the tuples of the new relation.

Eg: There are two relations as follows:

Relation 1: Student

Student Number	StudentName	Hosteler
1	Ravi	Y
2	Robert	N
3	Raheem	Y

Relation 2: Instructor

InstructorName	Subject
K.Suman	Computer Science
P.Pavan	Electronics

The Cartesian product of these two relations, Student X Instructor, will yield a relation that have a degree of 5(3+2:sum of degrees of Student and Instructor) and a cardinality 6 (3 X 2: Product of cardinalities of two relations).

The resulting relation is as follows:

Student Number	Student Name	Hosteler	Instructor Name	Subject
1	Ravi	Y	K.Suman	Computer

				Science
1	Ravi	Y	P.Pavan	Electronics
2	Robert	N	K.Suman	Computer
				Science
2	Robert	N	P.Pavan	Electronics
3	Raheem	Y	K.Suman	Computer
				Science
3	Raheem	Y	P.Pavan	Electronics

The resulting relation contains all possible combinations of tuples of the two relations.

1998:

5.a) What is a relation? What is the difference between a tuple and an attribute?

Ans: In relational data model, the data is organized into table (rows and columns). These tables are called relations. A row in a table represents a relationship among a set of values.

Rows of the relations are called as tuples and columns of the relations are called as attributes.

MODEL PAPER 1 FOR 2009-10:

5.a) What do you understand by Degree and Cardinality of a table? 2

Ans)

Degree: Number of Columns in a table

Cardinality: Number of rows in a table

MODEL PAPER 2 FOR 2009-10:

5.a) What do you understand by Primary Key & Candidate Keys? 2

Ans)

An attribute or set attributes which are used to identify a tuple uniquely is known as Primary Key. If a table has more than one such attributes which identify a tuple uniquely than all such

attributes are known as Candidate Keys.

MODEL PAPER 1 FOR 2008-09:

Q5.(a) What do you understand by Degree and Cardinality of a table?2

Answer:

Degree of a table is total number of attributes.
Cardinality of a table is total number of rows.

MODEL PAPER 2 FOR 2008-09:

5.(a)What do you understand by Primary Key & Candidate Keys? 2

Answer:

An attribute or set attributes which are used to identify a tuple uniquely is known as Primary Key. If a table has more than one such attributes which identify a tuple uniquely than all such attributes are known as Candidate Keys.

12.STRUCTURED QUERY LANGUAGE

DELHI 2010:

5.b) Consider the following tables STORE and SUPPLIERS and answer (b1) and (b2) parts of this question:

Table: STORE

ItemNo	Item	Scode	Qty	Rate	LastBuy
2005	Sharpener Classic	23	60	8	31-Jun-09
2003	Ball Pen 0.25	22	50	25	01-Feb-10
2002	Gel Pen Premium	21	150	12	24-Feb-10
2006	Gel Pen Classic	21	250	20	11-Mar-09
2001	Eraser Small	22	220	6	19-Jan-09
2004	Eraser Big	22	110	8	02-Dec-09
2009	Ball Pen 0.5	21	180	18	03-Nov-09

Table: SUPPLIERS

Scode	Sname
21	Premium Stationers
23	Soft Plastics
22	Tetra Supply

b1)Write SQL commands for the following statements: 4

(i) To display details of all the items in the Store table in ascending order of LastBuy.

Ans. SELECT * FROM STORE ORDER BY LastBuy;

(ii) To display ItemNo and Item name of those items from Store table whose Rate is more than 15 Rupees.

Ans.
SELECT ItemNo, Item..In FROM STORE WHERE Rate >15;

(iii) To display the details of those items whose Supplier code (Scode) is 22 or Quantity in Store (Qty) is more than 110 from the table Store.

Ans.
SELECT * FROM STORE WHERE Scode = 22 OR Qty >110;

(iv) To display Minimum Rate of items for each Supplier individually as per Scode from the table Store.

Ans. SELECT Scode, MIN(Rate) FROM STORE GROUP BY Scode;

b2)Give the output of the following SQL queries: 2

Note: In all output Questions ignore Column Headings

(i) SELECT COUNT(DISTINCT Scode) FROM Store;

Ans. COUNT(DISTINCT Scode)

(ii) SELECT Rate*Qty FROM Store WHERE ItemNo=2004;

Ans.
RATE*QTY
880

(iii) SELECT Item,Sname FROM Store
S, Suppliers P WHERE
S.Scocode=P.Scocode AND ItemNo=2006;
Ans. ITEM SNAME Gel Pen Classic
Premium Stationers

(iv) SELECT MAX>LastBuy) FROM
Store;
Ans.
MAX (LASTBUY)
24-Feb-10

OUTSIDE DELHI 2010:

5.b) Consider the following tables
STORE and SUPPLIERS and answer
(b1) and (b2) parts of this question:
Table: STORE

ItemNo	Item	Scocode	Qty	Rate	LastBuy
2005	Sharpener Classic	23	60	8	31-Jun-09
2003	Ball Pen 0.25	22	50	25	01-Feb-10
2002	Gel Pen Premium	21	150	12	24-Feb-10
2006	Gel Pen Classic	21	250	20	11-Mar-09
2001	Eraser Small	22	220	6	19-Jan-09
2004	Eraser Big	22	110	8	02-Dec-09
2009	Ball Pen 0.5	21	180	18	03-Nov-09

Table: SUPPLIERS

Scocode	Sname
21	Premium Stationers
23	Soft Plastics
22	Tetra Supply

**(b1) Write SQL commands for the
following statements: 4**

(i) To display details of all the items in
the Store table in ascending order of
LastBuy.
Ans. SELECT * FROM STORE ORDER
BY LastBuy;

(ii) To display ItemNo and Item name of
those items from Store table whose
Rate is more than 15 Rupees.
Ans. SELECT ItemNo, Item..In FROM
STORE WHERE Rate >15;

(iii) To display the details of those
items whose Supplier code (Scocode) is
22 or Quantity in Store (Qty) is more
than 110 from the table Store.
Ans. SELECT * FROM STORE WHERE
Scocode = 22 OR Qty >110;

(iv) To display Minimum Rate of items
for each Supplier individually as per
Scocode from the table Store.
Ans. SELECT Scocode, MIN(Rate) FROM
STORE GROUP BY Scocode;

**(b2) Give the output of the following
SQL queries: 2**
Note: In all output Questions ignore
Column Headings

(i) SELECT COUNT(DISTINCT Scocode)
FROM Store;
Ans. COUNT (DISTINCT Scocode)

(ii) SELECT Rate*Qty FROM Store
WHERE ItemNo=2004;
Ans. RATE*QTY
880

(iii) SELECT Item,Sname FROM Store
S, Suppliers P WHERE
S.Scocode=P.Scocode AND ItemNo=2006;
Ans. ITEM SNAME Gel Pen Classic
Premium Stationers

(iv) SELECT MAX>LastBuy) FROM
Store;
Ans. MAX (LASTBUY)
24-Feb-10

DELHI 2009:

(b) Consider the following tables
GARMENT and FABRIC. Write SQL
commands for the statements (i) to (iv)
and give outputs for SQL queries (v) to
(viii) **6**

Table: GARMENT

GCODE	DESCRIPTION	PRICE	FCODE	READYDATE
10023	PENCIL SKIRT	1150	F03	19-DEC-08
10001	FORMAL SHIRT	1250	F01	12-JAN-08
10012	INFORMAL SHIRT	1550	F02	06-JUN-08
10024	BABY TOP	750	F03	07-APR-07
10090	TULIP SKIRT	850	F02	31-MAR-07
10019	EVENING GOWN	850	F03	06-JUN-08
10009	INFORMAL PANT	1500	F02	20-OCT-08
10007	FORMAL PANT	1350	F01	09-MAR-08
10020	FROCK	850	F04	09-SEP-07
10089	SLACKS	750	F03	20-OCT-08

Table: FABRIC

FCODE	TYPE
F04	POLYSTER
F02	COTTON
F03	SILK
F01	TERELENE

(i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE

Ans SELECT GCODE, DESCRIPTION FROM GARMENT ORDER BY GCODE DESC;

(ii) To display the details of all the GARMENTS, which have READYDATE in between 08-DEC-07 and 16-JUN-08(inclusive of both the dates).

Ans SELECT * FROM GARMENT WHERE READYDATE BETWEEN '08-DEC-07' AND '16-JUN-08';

OR

SELECT * FROM GARMENT WHERE LAUNCHDATE >= '08-DEC-07' AND LAUNCHDATE <= '16-JUN-08';

(iii) To display the average PRICE of all the GARMENTS, which are made up of FABRIC with FCODE as F03.

Ans SELECT AVG (PRICE) FROM GARMENT WHERE FCODE = 'F03';

(iv) To display FABRIC wise highest and lowest price of GARMENTS from

GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price)

Ans SELECT FCODE, MAX (PRICE), MIN(PRICE) FROM GARMENT GROUP BY FCODE;

(v) SELECT SUM (PRICE) FROM GARMENT WHERE FCODE = 'F01';

Ans SUM (PRICE)
26:10

(vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE GARMENT.FCODE = FABRIC.FCODE AND GARMENT. PRICE > = 1260 ;

Ans DESCRIPTION TYPE
INFORMAL SHIRT COTTON
INFORMAL PANT COTTON
FORMAL PANT TERELENE

(vii) SELECT MAX (FCODE) FROM FABRIC;

Ans MAX (FCODE)
F04

(viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT ;

Ans COUNT(DISTINCT PRICE)
7

OUTSIDE DELHI 2009:

(b) Consider the following tables DRESS and MATERIAL. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii). **6**

Table: DRESS

DCODE	DESCRIPTION	PRICE	MCODE	LAUNCHDATE
10001	FORMAL SHIRT	1250	M001	12-JAN-08
10020	FROCK	750	M004	09-SEP-07
10012	INFORMAL SHIRT	1450	M002	06-JUN-08
10019	EVENING GOWN	850	M003	06-JUN-08
10090	TULIP SKIRT	850	M002	31-MAR-07
10023	PENCIL SKIRT	1250	M003	19-DEC-08
10089	SLACKS	850	M003	20-OCT-08
10007	FORMAL PANT	1450	M001	09-MAR-08
10009	INFORMAL PANT	1400	M002	20-OCT-08
10024	BABY TOP	650	M003	07-APR-07

Table: MATERIAL

MCODE	TYPE
MOO1	TERELENE
MOO2	COTTON
MOO4	POLYESTER
MOO3	SILK

(i) To display DCODE and DESCRIPTION of each dress in ascending order of DCODE.

Ans SELECT DCODE, DESCRIPTION FROM DRESS ORDER BY DCODE ;

(ii) To display the details of all the dresses which have LAUNCHDATE in between 05-DEC-07 and 20-JUN-08 (inclusive of both the dates).

Ans SELECT * FROM DRESS WHERE LAUNCHDATE BETWEEN '05-DEC-07' AND '20-JUN-08'

OR

SELECT * FROM DRESS WHERE LAUNCHDATE >= '05-DEC-07' AND LAUNCHDATE <= '20-JUN-08'

(iii) To display the average PRICE of all the dresses which are made up of material with MCODE as M003.

Ans SELECT AVG(PRICE) FROM GARMENT WHERE MCODE = 'M003'

(iv) To display materialwise highest and lowest price of dresses from DRESS table. (Display MCODE of each dress along with highest and lowest price)

Ans SELECT MCODE, MAX(PRICE), MIN (PRICE) FROM DRESS GROUP BY MCODE

(v) SELECT SUM(PRICE) FROM DRESS WHERE MCODE='M001';

Ans SUM(PRICE)
2700

(vi) SELECT DESCRIPTION, TYPE FROM DRESS, MATERIAL WHERE DRESS.DCODE = MATERIAL.MCODE AND DRESS.PRICE >= 1250;

Ans DESCRIPTION TYPE
(NO OUTPUT)

(vii) SELECT MAX(MCODE) FROM MATERIAL;

Ans MAX (MCODE)
MOO4

(viii) SELECT COUNT(DISTINCT PRICE) FROM DRESS;

Ans COUNT(DISTINCT PRICE)
6

Delhi 2008:

5.b) Consider the following tables Product and Client. Write SQL commands for the statement (i) to (iv) and give outputs for SQL queries (v) to (viii)

Table: **PRODUCT**

P_ID	Product Name	Manufacturer	Price
TP01	Talcom Powder	LAK	40
FW05	Face Wash	ABC	45
BS01	Bath Soap	ABC	55
SH06	Shampoo	XYZ	120
FW12	Face Wash	XYZ	95

Table: **CLIENT**

C_ID	Client Name	City	P_ID
01	Cosmetic Shop	Delhi	FW05
06	Total Health	Mumbai	BS01
12	Live Life	Delhi	SH06
15	Pretty Woman	Delhi	FW12
16	Dreams	Banglore	TP01

(i) To display the details of those Clients whose city is Delhi.

Ans: Select all from Client where City="Delhi"

(ii) To display the details of Products whose Price is in the range of 50 to 100 (Both values included).

Ans: Select all from product where Price between 50 and 100

(iii) To display the ClientName, City from table Client, and ProductName and Price from table Product, with their corresponding matching P_ID.

Ans: Select ClientName, City, ProductName, Price from Product, Client where Product.P_ID=Client.P_ID.

(iv) To increase the Price of all Products by 10

Ans:
Update Product Set Price=Price +10

(v) SELECT DISTINCT Address FROM Client.

Ans: (The above question may consist DISTINCT City. If it is DISTINCT City, the following is the answer)

City

Delhi
Mumbai
Bangalore

(vi) SELECT Manufacturer, MAX(Price), Min(Price), Count(*) FROM Product GROUP BY Manufacturer;

Ans:

Manufacturer	Max(Price)	Min(Price)	Count(*)
LAK	40	40	1
ABC	55	45	2
XYZ	120	95	2

(vii) SELECT ClientName, ManufacturerName FROM Product, Client WHERE Client.Prod_Id=Product.P_Id;

Ans:

ClientName	ManufacturerName
Cosmetic Shop	ABC
Total Health	ABC
Live Life	XYZ
Pretty Woman	XYZ
Dreams	LAK

(viii) SELECT ProductName, Price * 4 FROM Product.

Ans:

ProductName	Price*4
Talcom Powder	160
Face Wash	180
Bath Soap	220
Shampoo	480
Face Wash	380

OUTSIDE DELHI 2008:

5.b) Consider the following tables Item and Customer. Write SQL commands for the statement (i) to (iv) and give outputs for SQL queries (v) to (viii)

Table: **ITEM**

I_ID	Item Name	Manufacturer	Price
PC01	Personal Computer	ABC	35000
LC05	Laptop	ABC	55000
PC03	Personal Computer	XYZ	32000
PC06	Personal Computer	COM P	37000
LC03	Laptop	PQR	57000

Table: **CUSTOMER**

C_ID	Customer Name	City	I_ID
01	N.Roy	Delhi	LC03
06	H.Singh	Mumbai	PC03
12	R.Pandey	Delhi	PC06
15	C.Sharma	Delhi	LC03
16	K.Agarwal	Banglore	PC01

(i) To display the details of those Customers whose city is Delhi.

Ans: Select all from Customer Where City="Delhi"

(ii) To display the details of Item whose Price is in the range of 35000 to 55000 (Both values included).

Ans: Select all from Item Where Price >= 35000 and Price <= 55000

(iii) To display the CustomerName, City from table Customer, and ItemName and Price from table Item, with their corresponding matching I_ID.

Ans: Select CustomerName, City, ItemName, Price from Item, Customer where Item.I_ID=Customer.I_ID.

(iv) To increase the Price of all Items by 1000 in the table Item.

Ans: Update Item set Price=Price+1000

(v) SELECT DISTINCT City FROM Customer.

Ans: City

Delhi

Mumbai

Bangalore

(vi) SELECT ItemName, MAX(Price), Count(*) FROM Item GROUP BY ItemName;

Ans:

ItemName	Max(Price)	Count(*)
Personal Computer	37000	3
Laptop	57000	2

(vii) SELECT CustomerName, Manufacturer FROM Item, Customer WHERE

Item.Item_Id=Customer.Item_Id;

Ans:

CustomerName	ManufacturerName
N.Roy	PQR
H.Singh	XYZ
R.Pandey	COMP
C.Sharma	PQR
K.Agarwal	ABC

(viii) SELECT ItemName, Price * 100 FROM Item WHERE Manufacturer = 'ABC';

Ans:

ItemName	Price*100
Personal Computer	3500000
Laptop	5500000

Outside Delhi 2007:

5.b) Consider the following tables Consignor and Consignee. Write SQL

Prepared By: Mr.M.Ravi Kiran.

command for the statements (i) to (iv) And give outputs for the SQL queries (v) to (viii). 6

TABLE : **CONSIGNOR**

CnorID	CnorName	CnorAddress	City
ND01	R singhal	24,ABC Enclave	New Delhi
ND02	Amit Kumar	123,Palm Avenue	New Delhi
MU15	R Kohil	5/A,South,Street	Mumbai
MU50	S Kaur	27-K,Westend	Mumbai

TABLE : **CONSIGNEE**

CneeID	CnorID	CneeName	CneeAddress	CneeCity
MU05	ND01	Rahul Kishore	5,Park Avenue	Mumbai
ND08	ND02	P Dhingra	16/j,Moore Enclave	New Delhi
KO19	MU15	A P Roy	2A,Central /avenue	Kolkata
MU32	ND02	S mittal	P 245, AB Colony	Mumbai
ND48	MU50	B P jain	13,Block d,a,viha	New Delhi

(i) To display the names of all consignors from Mumbai.

Ans: Select CnorName from Consignor where city="Mumbai";

(ii) To display the cneeID, cnorName, cnorAddress, CneeName, CneeAddress for every Consignee.

Ans: Select CneeId, CnorName, CnorAddress, CneeName, CneeAddress from Consignor, Consignee where Consignor.CnorId=Consignee.CnorId;

(iii) To display the consignee details in ascending order of CneeName.

Ans: Select * from Consignee Order by CneeName Asc;

(iv) To display number of consignors from each city.

Ans: Select city, count(*) from Consignors group by city;

(v) SELECT DISTINCT City FROM CONSIGNEE;

Ans: CneeCity
Mumbai

New Delhi
Kolkata

(vi) SELECT A.CnorName A, B.CneeName B FROM Consignor A, Consignee B WHERE A.CnorID=B.CnorID AND B.CneeCity='Mumbai';

Ans)

CnorName	CneeName
R singhal	Rahul Kishore
Amit Kumar	S mittal

(vii)SELECT CneeName,CneeAddress FROM Consignee WHERE CneeCity Not IN ('Mumbai', 'Kolkata');

Ans:

CneeName	CneeAddress
P Dhingra	16/J,Moore Enclave
B P Jain	13,Block D,A Vihar

(viii) SELECT CneeID, CneeName FROM Consignee WHERE CnorID = 'MU15' OR CnorID = 'ND01';

Ans: CneeID CneeName

MU05	Rahul Kishore
KO19	A P Roy

Delhi 2007:

5.b)Consider the following tables. Write SQL command for the statements (i)to(iv)and give outputs for the SQL queries (v) to (viii). 6

TABLE : **SENDER**

SenderID	SenderName	Sender Address	Sender City
ND01	R jain	2,ABC Appts	New Delhi
MU02	H sinha	12, Newton	Mumbai
MU15	S haj	27/ A,Park Street	New Delhi
ND50	T Prasad	122-K,SDA	Mumbai

TABLE :**RECIPIENT**

RecID	SenderID	RecName	RecAddress	Rec City
KO05	ND01	R Bajpayee	5,Central Avenue	Kolkata
ND08	MU02	S Mahajan	116, A Vihar	New Delhi

MU19	ND01	H sing	2A,Andheri East	Mumbai
MU32	MU15	P K swamy	B5, CS Terminus	Mumbai
ND48	ND50	S Tripathi	13, B1 D,Mayur Vihar	New Delhi

(i)To display the names of all senders from Mumbai.

Ans: Select * from Sender where SenderCity='Mumbai';

(ii)To display the recID, senderName, senderAddress, RecName, RecAddress for every receipt.

Ans: Select recID, SenderName, SenderAddress, RecName, RecAddress from Sender, Recipient where Sender.Senderid=Recipient.RenderId;

(iii)To display the sender details in ascending order of SenderName.

Ans: Select * from Sender order by SenderName;

(iv)To display number of Recipients from each city.

Ans: Select RecCity,Count(*) from Recipient group by RecCity;

(v) SELECT DISTINCT SenderCity FROM Sender;

Ans:

senderCity
New Delhi
Mumbai

(vi) SELECT A.SenderName A, B.RecName FROM Sender A, Recipient B WHERE A.SenderID=B.SenderID AND B.RecCity='Mumbai';

Ans: SenderName RecName

R.Jain	H.Singh
S.Jha	P.K.Swamy

(vii)SELECT RecName,RecAddress FROM Recipient WHERE RecCity Not IN ('Mumbai', 'Kolkata');

Ans: RecName RecAddress

S Mahajan	116, A Vihar
S Tripathi	13, B1 D, Mayur Vihar

(viii) SELECT RecID, RecName FROM Recipient WHERE SenderID = 'MU02' OR SenderID = 'ND50';

Ans:

RecID	RecName
ND08	S Mahajan
ND48	S Tripathi

OUTSIDE DELHI 2006:

5.b) Study the following tables FLIGHTS and FARES and write SQL commands for the questions (i) to (iv) and give outputs for SQL queries (v) to (vi).

TABLE: FLIGHTS

FL_NO	STARTING	ENDING	NO_FLIGHTS	NO_STOPS
IC301	MUMBAI	DELHI	8	0
IC799	BANGALORE	DELHI	2	1
MC101	INDORE	MUMBAI	3	0
IC302	DELHI	MUMBAI	8	0
AM812	KANPUR	BANGALORE	3	1
IC899	MUMBAI	KOCHI	1	4
AM501	DELHI	TRIVENDRUM	1	5
MU499	MUMBAI	MADRAS	3	3
IC701	DELHI	AHMEDABAD	4	0

TABLE:FARES

FL_NO	AIRLINES	FARE	TAX%
IC701	INDIAN AIRLINES	6500	10
MU499	SAHARA	9400	5
AM501	JET AIRWAYS	13450	8
IC899	INDIAN AIRLINES	8300	4
IC302	INDIAN AIRLINES	4300	10
IC799	INDIAN AIRLINES	1050	10
MC101	DECCAN AIRLINES	3500	4

(i) Display FL_NO and NO_FLIGHTS from "KANPUR" TO "BANGALORE" from the table FLIGHTS.

Ans: Select FL_NO, NO_FLIGHTS from FLIGHTS where Starting="KANPUR" AND ENDING="BANGALORE"

(ii) Arrange the contents of the table FLIGHTS in the ascending order of FL_NO.

Ans:
SELECT * FROM FLIGHTS ORDER BY FL_NO;

(iii) Display the FL_NO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid = FARE+FARE+TAX%/100.

Ans: Select FL_NO, FARE+FARE+(TAX%/100) from FLIGHTS, FARES where Starting="DELHI" AND Ending="MUMBAI"

(iv) Display the minimum fare "Indian Airlines" is offering from the tables FARES.

Ans: Select min(FARE) from FARES Where AIRLINES="Indian Airlines"

v) Select FL_NO, NO_FLIGHTS, AIRLINES from FLIGHTS, FARES Where STARTING = "DELHI" AND FLIGHTS.FL_NO = FARES.FL_NO

Ans:

FL_NO	NO_FLIGHTS	AIRLINES
IC302	8	Indian Airlines
AM501	1	Jet Airways
IC701	4	Indian Airlines

(vi) SELECT count (distinct ENDING) from FLIGHTS.

Ans: 7

DELHI 2006:

5.b) Study the following tables DOCTOR and SALARY and write SQL commands for the questions (i) to (iv) and give outputs for SQL queries (v) to (vi) :

TABLE: DOCTOR

ID	NAME	DEPT	SEX	EXPERIENCE
101	Johan	ENT	M	12
104	Smith	ORTHOPEDIC	M	5
107	George	CARDIOLOGY	M	10
114	Lara	SKIN	F	3
109	K George	MEDICINE	F	9
105	Johnson	ORTHOPEDIC	M	10
117	Lucy	ENT	F	3
111	Bill	MEDICINE	F	12
130	Murphy	ORTHOPEDIC	M	15

TABLE: SALARY

ID	BASIC	ALLOWANCE	CONSULTATION
101	12000	1000	300
104	23000	2300	500
107	32000	4000	500
114	12000	5200	100
109	42000	1700	200
105	18900	1690	300
130	21700	2600	300

(i) Display NAME of all doctors who are in "MEDICINE" having more than 10 years experience from the Table DOCTOR.

Ans: Select Name from Doctor where Dept="Medicine" and Experience>10

(ii) Display the average salary of all doctors working in "ENT" department using the tables DOCTORS and SALARY Salary =BASIC+ALLOWANCE.

Ans: Select avg(basic+allowance) from Doctor,Salary where Dept="Ent" and Doctor.Id=Salary.Id

(iii) Display the minimum ALLOWANCE of female doctors.

Ans: Select min(Allowance) from Doctor,Salary where Sex="F" and Doctor.Id=Salary.Id

(iv) Display the highest consultation fee among all male doctors.

Ans: Select max(Consulation) from Doctor,Salary where Sex="M" and Doctor.Id=Salary.Id

(v) SELECT count (*) from DOCTOR where SEX = "F"

Ans: 4

(vi) SELECT NAME, DEPT , BASIC from DOCTOR, SALRY Where DEPT = "ENT" AND DOCTOR.ID = SALARY.ID

Ans:

Name	Dept	Basic
Jonah	Ent	12000

DELHI 2005:

(5) Consider the following tables EMPLOYEES and EMPSalary. write SQL commands for the Statements (i) to (iv) and give outputs for SQL quires (v) to (viii).

EMPLOYEES

EMP ID	FIRSTNAME	LASTNAME	ADDRESS	CITY
010	GEORGE	Smith	83 First Street	Howard
105	MARY	Jones	842VineAve	Losantiville
152	SAM	Tones	33 Elm st	Paris
215	SARAH	Ackerman	440 U.S.110	Upton
244	MANILA	Sengupta	24 Friends Street	New Delhi
300	ROBERT	Samuel	9 Fifth Cross	Washington
335	HENRY	Williams	12 Moore Street	Boston
400	RACHEL	Lee	121 Harrison	New York
441	PETER	Thompson	11 Red road	Paris

EMPSALRAY

EMP ID	SALARY	BENEFITS	DESIGNATION
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	Salesman

(i) To display Firstname, Lastname, Address and City of all employees living in Paris from the table EMPLOYEES.

Ans: Select
Firstname,Lastname,Address,City
from Employees where City="Paris"

(ii) To display the content of EMPLOYEES table in descending order of FIRSTNAME.

Ans: Select * from Employees Order
By Firstname Desc

(iii) To display the Firstname, Lastname, and Total Salary of all managers from the tables, where Total Salary is calculated as Salary+Benefits.

Ans: Select
Firstname,Lastname,Salary+Benefits
from Employees, EmpSalary where
Designation="Manager" and
Employees.EmpId=EmpSalary.EmpId

(iv) To display the Maximum salary among Managers and Clerks from the table EMPLOYEES.

Ans: Select Designation,max(Salary)
from EmpSalary where
Designation="Manager" or
Designation="Clerk"

(v) SELECT FIRSTNAME,SALARY
FROM EMPLOYEES,EMPSALARY
WHERE DESTINATION

= 'Salesman' AND
EMPLOYEES.EMPID=EMPSALARY.EMPID;

Ans:

Firstname	Salary
Rachel	32000
Peter	28000

(vi) SELECT COUNT (DISTINCT
DESIGNATION) FROM EMPSALARY

Ans: 4

(vii) SELECT DESIGNATION ,
SUM(SALARY)
FROM EMPSALARY GROUP BY
DESIGNATION HAVING COUNT(*)>2;

Ans:

Designation	Sum(Salary)
Manager	215000
Clerk	135000

(viii)SELECT SUM (BENEFITS) FROM
EMPSALARY WHERE
DESIGNATION='Clerk';

Ans: 32000

OUTSIDE DELHI 2005:

5) Consider the following tables
WORKERS and DESIG. Write SQL
commands for the statements (i) to (iv)
and give outputs for SQL queries (v) to
(viii).

WORKERS

W_I D	FIRST NAME	LASTNAM E	ADDRESS	CITY
102	Sam	Tones	33 Elm St.	Paris
105	Sarah	Ackerman	44 U.S.110	NewYork
144	Manila	Sengupta	24 Friends Street	NewDelhi
210	George	Smith	83 First Street	Howard
255	Mary	Jones	842 Vine Ave.	Losantiville
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12 Moore Street	Boston
403	Ronny	Lee	121 Harrison St.	NewYork
451	Pat	Thompson	11 Red Road	Paris

DESIG

W_I D	SALAR Y	BENEFIT S	DESIGNATI ON
102	75000	15000	Manager
105	85000	25000	Director
144	70000	15000	Manager
210	75000	12500	Manager
255	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
451	28000	7500	Salesman

(i) To display W_ID Firstname, address and City of all employees living in New York from the Table WORKERS

Ans: select W_ID,firstname,address,city from workers where city="New York"

(ii) To display the content of workers table in ascending order of LASTNAME.

Ans:Select * from Worker Order By lastname Asc

(iii) To display the FIRSTNAME, LASTNAME and Total Salary of all Clerks from the tables WORKERS And DESIG, where Total salary is calculated as Salary + benefits.

Ans: Select firstname, lastname, salary+benefits where worker.w_id=desg.w_id and Designation="Clerk"

(iv) To display the minimum salary among managers and Clerks from the tables DESIG.

Ans:
SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION IN ('Manager','Clerk') GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION= 'Manager' OR DESIGNATION='Clerk' GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION= 'Manager' OR DESIGNATION='Clerk';

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION IN ('Manager','Clerk');

(v) SELECT FIRSTNAME, SALARY FROM WORKERS, DESIG WHERE DESIGNATION = "MANAGER" AND WORKERS.W_ID = DESIGN.W_ID

Ans: FIRSTNAME SALARY

Sam	75000
Manila	70000
George	75000

(vi)SELECT COUNT(DISTINCT DESIGNATION) FROM DESIGN ;

Ans: 4

(vii) SELECT DESIGNATION, SUM(SALARY) FROM DESIG GROUP BY DESIGNATION HAVING COUNT (*) < 3;

Ans: Designation	Sum(Salary)
Director	85000
Salesman	60000

(viii) SELECT SUM(BENIFTS) FROM DESIG WHERE DESIGNATION ="salesman";

Ans: 15000

2004:

5. Give the following table for database a LIBRARY.

TABLE : BOOKS

BOOK_ID	BOOK_NAME	AUTHORNAME	PUBLISHER	PRICE	TYPE	QUANTITY
F0001	The Tears	William Hopkins	First Publ.	750	Fiction	10
F0002	Thunder bolts	Anna Roberts	First Publ.	700	Fiction	5
T0001	My first C++	Brains & Brooke	EPB	250	Text	10
T0002	C++ Brain works	A.W.Rossaine	TDH	325	Text	5
C001	Fast Cook	Lata Kapoor	EPB	350	Cookery	8

TABLE:ISSUED

BOOK_ID	QUANTITY_ISSUED
F0001	3
T0001	1
C0001	5

Write SQL queries from b to g.

(b)To show Book name, Author name and Price of books of EPB publisher.

Ans: select Book_name,Author_name, price from books where Publisher =”EPB”

(c) To list the names of the books of FICTIONS type.

Ans: Select Book_name from books where type=”FICTION”

(d) To display the names and prices of the books in descending order of their price.

Ans: Select Book_name, price from books order by price desc;

(e) To increase the price of all books of First Pub.by 50.

Ans: update books set price= price+50 where publishers = “First Publ”

(f) To Display the Book_ID, Book_Name and Quantity Issued for all books Which have been issued.

Ans:Select Book_ID, Book_Name, Quantity_Issued from Books,Issued where Books.BookId=Issued.BookId;

(g) To insert a new row in the table Issued having the following data: “F0002”,4

Ans: insert into Issued values(“F0002”,4)

(h) Give the output of the following queries on the above tables:

(i) Select Count(Distinct Publishers) From Books

Ans: 3

(ii) Select Sum(Price) From Books Where Quantity>5

Ans: 1350

(iii) Select Book_Name,Author_Name From Books Where Price<500

Ans:

Book Name	Author Name
My First C++	Brian & Brooks
C++ Brainworks	A.W.Rossaine
Fast Cook	Lata Kapoor

(iv) Select Count(*) From Books

Ans: 5

2003:

5.b Write SQL commands for (b) to (g) and write the outputs for (h) on the basis of tables TNTERIORS and NEWONES.

TABLE: INTERIORS

NO	ITEMNAM	TYPE	DATEOF STOCK	PRICE	DISC OUNT
1	Red rose	Double Bed	23/02/02	32000	15
2	Soft touch	Baby cot	20/01/02	9000	10
3	Jerry’s home	Baby cot	19/02/02	8500	10
4	Rough wood	Office Table	01/01/02	20000	20
5	Comfort zone	Double Bed	12/01/02	15000	20
6	Jerry look	Baby cot	24/02/02	7000	19
7	Lion king	Office Table	20/02/02	16000	20
8	Royal tiger	Sofa	22/02/02	30000	25
9	Park sitting	Sofa	13/12/01	9000	15
10	Dine paradise	Dinning Table	19/02/02	11000	15

TABLE:NEWONES

NO	ITEM NAME	TYPE	DATEOFSTOCK	PRICE	DISCO UNT
11	White wood	Double bed	23/03/03	20000	20
12	James 007	Sofa	20/02/03	15000	15
13	Tom look	Baby cot	21/02/03	7000	10

(b) To show all information about the sofas from the INTERIORS table.

Ans: Select * from INTERIORS where type= “sofa”

(d) To list ITEMNAME and TYPE of those items, in which DATEOFSTOCK is before 22/01/02 from the INTERIORS table in descending order of ITEMNAME.

Ans: Select Itemname,Type From Interiors Where Dateofstock<{22/01/02} order by Itemname

(e) To display ITEMNAME and DATEOFSTOCK of those items in which the Discount percentage is more than 15 from INTERIORS.

Ans: Select Itemname,Dateofstock from Interiors Where Discount>15

(f) To count the number of items whose type is "Double bed";

Ans: Select Count(*) from Interiors Where Type="Double Bed"

(g) To insert new row in the NEWONES table with the following data:

14, "True Indian ", "Office Table ", {28/03/03},15000,20

Ans: Insert into Newones values(14,"True Indian","Office Table",{28/03/03},15000,20)

(h) Give the outputs for the following SQL statements.

(i) Select COUNT (distinct TYPE) from INTERIORS;

Ans: 5

(ii) Select AVG(DISCOUNT)from INTERIORS where TYPE ="Baby cot";

Ans: 13

(iii) Select SUM(price)from INTERIORS where

DATEOFSTOCK<{12/02/02};

Ans: 53000

2002:

5. Given the following Teacher Relation.

Write SQL Commands fro (b) to (g)

No	Name	Department	DateofJoining	Salary	Sex
1	Raja	Computer	21/5/98	8000	M
2	Sangita	History	21/5/97	9000	F
3	Ritu	Sociology	29/8/98	8000	F
4	Kumar	Linguistics	13/6/96	10000	M
5	Venkatraman	History	31/10/99	8000	M
6	Sindhu	Computer	21/5/86	14000	M
7	Aishwarya	Sociology	11/1/1998	12000	F

(b) To select all the information of teacher in computer department

Ans: Select * from Teacher where Department="Computer"

(c) To list the name of female teachers in History Department.

Ans: Select Name from Teacher Where Sex="F" And Department="History"

(d) To list all names of teachers with date of admission in ascending order.

Ans: Select Name from Teacher Order By Dateofjoining Asc

(e) To display Teacher's Name, Department, and Salary of female teachers

Ans: Select Name,Department,Salary from Teacher Where Sex="F"

(f)To count the number of items whose salary is less than 10000

Ans: Select Count(*) from Teacher Where Salary<10000

(g) To insert a new record in the Teacher table with the following data:

8,"Mersha","Computer", (1/1/2000),12000,"M".

Ans: Insert into Teacher values ,"Mersha", "Computer", {1/1/2000},12000,"M");

2001:

5.b) Write the SQL commands for (i) to (vii) on the basis of the table SPORTS

TABLE: SPORTS

Stud no	Class	Name	Game1	Grade1	Game2	Grade2
10	7	Smeer	Criquet	B	Swimming	A
11	8	Sujit	Tennis	A	Skating	C
12	7	Kamala	Swimming	B	Football	B
13	7	Veena	Tennis	C	Tennis	A
14	9	Archana	Basket ball	A	Criquet	A
15	10	Arpit	Criquet	A	Athletics	C

(i) Display the names of the students who have grade 'C' in either Game1 or Game2 or both.

Ans: Select Name From Sports Where Grade1="C" OR Grade2="C"

(ii) Display the number of students getting grade 'A' in Cricket.

Ans: Select Count(*) from Sports Where (Game1="Cricket" and Grade1="A") or (Game2="Cricket" and Grade2="A")

(iii) Display the names of the students who have same game for both game1 and game2

Ans: Select Name From Sports Where Game1=Game2

(iv) Display the games taken up by the students, whose name starts with 'A'.

Ans: Select Game1,Game2 From Sports Where Name Like "A%"

(v) Add a new column named 'marks'.

Ans: Alter Table Sports Add Marks Number(5);

(vi) Assign a value 200 for marks for all those who are getting grade 'B' or 'A' in both Game1 and Game2.

Ans: (Children, Try This Answer as an assignment)

(vii) Arrange the whole table in the alphabetical order of name.

Ans: Select * from Sports Order By Name

2000 :

5. Write SQL commands for the (b) to (e) and write the outputs for (g) on the basis of table CLUB.

TABLE: CLUB

COAC H-ID	COACH NAME	AG E	SPORTS	DATEOF APP	PAY	SEX
1	KUKREJA	35	KARATE	27/03/96	1000	M
2	RAVINA	34	KARATE	20/01/98	1200	F
3	KARAN	34	SQUASH	19/01/98	2000	M
4	TARUN	33	BASKET BAL	01/01/98	1500	M
5	ZUBIN	36	SWIMMING	12/01/98	750	M
6	KETAKI	36	SWIMMING	24/02/98	800	F
7	ANKITA	39	SQUASH	20/02/98	2200	F
8	ZAREEN	37	KARATE	22/02/98	1100	F
9	KUSH	41	SWIMMING	13/01/98	900	M
10	SHAILYA	37	BASKETBALL	19/02/98	1700	M

(b) To show all information about the swimming coaches in the club.

Ans: Select * from Club

(c) To list names of all coaches with their date of appointment (DATOFAPP) in descending order.

Ans: Select Coachname from Club order by Dataofapp desc

(d) To display a report, showing coachname, pay, age and bonus(15% of pay) for all coaches.

Ans:
Select Coachname,Pay,Age,Pay*0.15 from Club

(e) To insert a new row in the CLUB table with following data:

11,"PRAKASH",37,"SQUASH", {25/02/98},2500,"M"

Ans: Insert into Club Values (11,"PRAKASH",37,"SQUASH", {25/02/98}, 2500,"M")

(f) Give the output of the following SQL statements:

(i) select COUNT (distinct SPORTS)from CLUB;

Ans: 4

(ii) select MIN(AGE) from CLUB where SEX ="F";

Ans: 34

(iii) select AVG(PAY) from CLUB where SPORTS = "KARATE";

Ans: 1100

(iv) select SUM(PAY) from CLUB where DATAOFAPP>{31/01/98};

Ans: 7800

(G) Assuming that there is one more table COACHES in the database as shown below:

TABLE:COACHES

SPORTS PERSON	SEX	COACH_NO
AJAY	M	1
SEEMA	F	2
VINOD	M	1
TANEJA	F	3

What will be the output of the following query:

```
SELECT SPORTS PERSON,
COACHNAME
FROM CLUB,COACHES
WHERE COACH_ID=COACH_NO
```

Ans:

SPORTS PERSON	COACHNAME
AJAY	KUKREJA
SEEMA	RAVINA
VINOD	KUKREJA
TANEJA	KARAN

1999:

5.) Given the following Teacher relation: Write SQL commands for questions (b) to (g).

TEACHER

NO	NAME	Age	DEPARTMENT	DATEOF JOINING	SALARY	SEX
1	RAJA	45	COMPUTER	21/5/98	8000	M
2	SANGITA	32	History	21/5/97	9000	F
3	RITU	22	MATHS	29/8/98	8000	F
4	KUMAR	41	HISTORY	13/6/96	10000	M
5	VENKAT	44	MATHS	31/10/99	8000	M
6	SINDU	51	HISTORY	21/5/86	14000	F
7	ASHWARYA	37	MATHS	11/1/98	12000	F

(b) To show all information about the teachers of history department.

Ans: select * from teacher where department='history';

(c) To list names of female teacher who are in math department.

Ans: select name from teacher where sex='female' and department='maths';

(d) To list names of all teacher with their date of joining in ascending order.

Prepared By: Mr.M.Ravi Kiran.

Ans: Select Name From Teacher order by dateofjoing;

(f) To count the number of teachers with age >23.

Ans: Select count(name) from teacher where age>23;

(g) To insert a new row in the teacher table with the following data:

9, "raja", 26, "computer", {13/5/95}, 2300, "M".

Ans: Insert into Teacher values(9,"raja",26,"computer", {13/05/95},2300,"M");

1998:

5. Write SQL commands for (b) to (g) and write the outputs for (h) on the basis of table **HOSPITAL**.

NO	NAME	AGE	DEPARTMENT	DATEOF ADM	CHARGES	SEX
1	Arpit	62	Surgery	21/1/98	300	M
2	Zareena	22	Ent	12/12/97	250	F
3	Kareem	32	Arthopedic	19/2/98	200	M
4	Arun	12	Surgery	11/1/98	300	M
5	Zubin	30	Ent	12/1/98	250	M
6	Karin	16	Ent	24/2/98	250	F
7	Ankita	29	cardiology	22/2/98	800	F
8	Zareen	45	Gynecology	22/2/98	300	F
9	Kush	19	Cardiology	13/1/98	800	M
10	Shilpa	23	Nuclear medicine	21/2/98	400	F

(b) To select all the information of patients of all cardiology department.

Ans: Select all from Hospital where department="Cardiology"

(c) To list the names of female patients who are in ent department.

Ans: select name from Hospital where Department="Ent" and Sex="F"

(d) To list names of all patients with their date of admission in ascending order.

Ans: Select name,dateofadm from Hospital dateofadm.

(e) To display patients name, charges, age, for only female patients.

Ans: Select Name,Charges,age from Hospital where sex="F"

(f) To count the number of patients with age

<30.

Ans: Select count(*) from hospitals where age<30

(g) To insert the new row in the hospital table with the following data: 11, "aftab", 24, "surgery", {25/2/98}, 300, "M".

Ans: insert into Hospital values(11, "aftab", 24, "surgery", {25/02/98}, 300, "M")

(h) Give the output of the following SQL statements:

(i) Select count (distinct charges)from hospital;

Ans: 5

(ii) Select min(age) from hospital where sex = "F";

Ans: 16

(iii) Select sum(charges) from hospital where department = "ent";

Ans: 750

(iv) Select avg(charges) from hospital where date of admission is <{12/02/98};

Ans:380

MODEL PAPER 1 FOR 2009-10:

5.a)Consider the following tables ACTIVITY and COACH and answer (b) and (c) parts of this question:

Table: ACTIVITY

A Code	ActivityName	Stadium	Participants Num	Prize Money	Schedule Date
1001	Relay 100x4	StarAnnex	16	10000	23-Jan-2004
1002	High jump	StarAnnex	10	12000	12-Dec-2003
1003	Shot Put	Super Power	12	8000	14-Feb-2004
1005	Long Jump	StarAnnex	12	9000	01-Jan-2004
1008	Discuss Throw	Super Power	10	15000	19-Mar-2004

Table: COACH

PCode	Name	Acode	
1	Ahmad Hussain	1001	
2	Ravinder	1008	
3	Janila	1001	
4	Naaz	1003	

b) Write SQL commands for the flowing statements: 4

(i) To display the names of all activities with their Acodes in descending order.

Ans) SELECT Acodes, ActivityName FROM ACTIVITY ORDER BY Acode DESC;

(ii) To display sum of PrizeMoney for the Activities played in each of the Stadium separately.

Ans) SELECT SUM(PrizeMoney), Stadium FROM ACTIVITY GROUP BY Stadium;

(iii) To display the coach's name and ACodes in ascending order of ACode from the table COACH

Ans) SELECT Name, Acode FROM COACH ORDER BY Acode;

(iv) To display the content of the Activity table whose ScheduleDate earlier than 01/01/2004 in ascending order of ParticipantsNum.

Ans) SELECT * FROM ACTIVITY WHERE SchduleDate<'01-Jan-2004' ORDER BY ParticipantsNum;

c) Give the output of the following SQL queries: 2

(i) SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

Ans) 3

(ii) SELECT MAX(ScheduleDate), MIN(ScheduleDate) FROM ACTIVITY;

Ans) 19-Mar-2004 12-Dec-2003

(iii) SELECT Name,ActivityName FROM ACTIVITY A,COACH C WHERE A.Acode= C.Acode AND A.ParticipantsNum = 10;

Ans) Ravinder Discuss Throw

(iv) SELECT DISTINCT Acode FROM COACH;

Ans)

1001
1003
1008

MODEL PAPER 2 FOR 2009-10:

5.a) Consider the following tables GAMES and PLAYER and answer (b) and (c) parts of this question:

GCode	GameName	Type	Number	Prize Money	Schedule Date
101	Carom Board	Indoor	2	5000	23-Jan-2004
102	Badminton	Outdoor	2	12000	12-Dec-2003
103	Table Tennis	Indoor	4	8000	14-Feb-2004
105	Chess	Indoor	2	9000	01-Jan-2004
108	Lawn Tennis	Outdoor	4	25000	19-Mar-2004

PCode	Name	Gcode
1	Nabi Ahmad	101
2	Ravi Sahai	108
3	Jatin	101
4	Nazneen	103

b) Write SQL commands for the flowing statements: 4

(i) To display the name of all GAMES with their GCodes

Ans) SELECT GameName,Gcode FROM GAMES;

(ii) To display details of those GAMES which are having PrizeMoney more than 7000.

Ans) SELECT * FROM Games WHERE Prizemoney>7000;

(iii) To display the content of the GAMES table in ascending order of Schedule Date.

Ans) SELECT * FROM Games ORDER BY ScheduleDate;

(iv) To display sum of PrizeMoney for each Type of GAMES

Ans) SELECT SUM(Prizemoney),Type FROM Games GROUP BY Type;

c) Give the output of the following SQL queries: 2

(i) SELECT COUNT(DISTINCT Number) FROM GAMES;

Ans) 2

(ii) SELECT MAX(ScheduleDate),
MIN(ScheduleDate) FROM GAMES;

Ans) 19-Mar-2004 12-Dec-2003

(iii) SELECT Name, GameName FROM
GAMES G, PLAYER P

WHERE G.Gcode=P.Gcode AND
G.PrizeMoney>10000;

Ans) Ravi Sahai Lawn Tennis

(iv) SELECT DISTINCT Gcode FROM
PLAYER;

Ans) 3

MODEL PAPER 1 FOR 2008-09:

(b) Consider the following tables
ACTIVITY and COACH. Write SQL
commands for the statements (i) to (iv)
and give outputs for SQL queries (v) to
(viii) **6**

Table: ACTIVITY

ACode	ActivityName	ParticipantsNum	PrizeMoney	ScheduleDate
1001	Relay 100x4	16	10000	23-Jan-2004
1002	High jump	10	12000	12-Dec-2003
1003	Shot Put	12	8000	14-Feb-2004
1005	Long Jump	12	9000	01-Jan-2004
1008	Discuss Throw	10	15000	19-Mar-2004

Table: COACH

PCode	Name	ACode
1	Ahmad Hussain	1001
2	Ravinder	1008
3	Janila	1001
4	Naaz	1003

i) To display the name of all activities
with their ACodes in descending order.

Answer: SELECT ActivityName, ACode
FROM ACTIVITY ORDER BY Acode
DESC;

(ii) To display sum of PrizeMoney for
each of the Number of participants
groupings (as shown in column
ParticipantsNum 10,12,16)

Answer: SELECT SUM(PrizeMoney),
ParticipantsNum FROM ACTIVITY
GROUP BY ParticipantsNum;

(iii) To display the coach's name and
ACodes in ascending order of ACode
from the table COACH

Answer: SELECT Name, ACode FROM
COACH ORDER BY ACode;

(iv) To display the content of the
ACTIVITY table whose ScheduleDate
earlier than 01/01/2004 in ascending
order of ParticipantsNum.

Answer: SELECT * FROM ACTIVITY
WHERE ScheduleDate<'01-Jan-2004'
ORDER BY ParticipantsNum;

v) SELECT COUNT(DISTINCT
ParticipantsNum) FROM ACTIVITY;

Answer:

3

(vi) SELECT MAX(ScheduleDate),
MIN(ScheduleDate) FROM ACTIVITY;

Answer:

19-Mar-2004	12-Dec-2003
-------------	-------------

(vii) SELECT SUM(PrizeMoney)
FROM ACTIVITY;

Answer: 54000

(viii) SELECT DISTINCT
ParticipantsNum FROM ACTIVITY;

Answer: 16

10

12

MODEL PAPER 2 FOR 2008-09:

5.(b) Consider the following tables
GAMES and PLAYER. Write SQL
commands for the statements (i) to (iv)
and give outputs for SQL queries (v) to
(viii) **6**

Table: GAMES

GCode	GameName	Number	PrizeMoney	ScheduleDate
101	Carom Board	2	5000	23-Jan-2004
102	Badminton	2	12000	12-Dec-2003
103	Table Tennis	4	8000	14-Feb-2004
105	Chess	2	9000	01-Jan-2004
108	Lawn Tennis	4	25000	19-Mar-2004

(vii) SELECT SUM(PrizeMoney) FROM GAMES;

Answer: 59000

(viii) SELECT DISTINCT Gcode FROM PLAYER;

Answer: 101
103
108

Table: PLAYER

PCode	Name	Gcode
1	Nabi Ahmad	101
2	Ravi Sahai	108
3	Jatin	101
4	Nazneen	103

i) To display the name of all Games with their Gcodes

Answer:

```
SELECT GameName,Gcode FROM GAMES;
```

(ii) To display details of those games which are having PrizeMoney more than 7000.

Answer:

```
SELECT * FROM GAMES WHERE PrizeMoney>7000
```

(iii) To display the content of the GAMES table in ascending order of ScheduleDate.

Answer:

```
SELECT * FROM GAMES ORDER BY ScheduleDate;
```

iv) To display sum of PrizeMoney for each of the Number of participation groupings (as shown in column Number 2 or 4)

Answer: SELECT

```
SUM(PrizeMoney),Number FROM GAMES GROUP BY Number;
```

v) SELECT COUNT(DISTINCT Number) FROM GAMES;

Answer: 2

(vi) SELECT MAX(ScheduleDate), MIN(ScheduleDate) FROM GAMES;

Answer: 19-Mar-2004 12-Dec-2003