CBSE

COMPUTER SCIENCE

CLASS – XII

OLD QUESTIONS & ANSWERS

(Source of Grasping Subject & Gaining Marks)

By

Mr. M.Ravi Kiran 9490236965

mandaravikiran@yahoo.com mandaravikiran@rediffmail.com

PGT-ITof JNV West Godavari

JAWAHAR NAVODAYA VIDYALAYA PEDAVEGI, WEST GODAVARI DISTRICT, ANDHRA PRADESH.

Phone:08812-259461 Fax: 08812-259890

E-Mail: jnvwestgodavari@yahoo.co.in Website: : www.jnvwestgodavari.com

"The fear of the Lord is the beginning of wisdom"

PREFACE

Dear Faculty/Children,

I am Ravi Kiran, Working as a Post Graduate Teacher (Information Technology) in Jawahar Navodaya Vidyalaya and have been teaching Computer Science.

I am interested in teaching and I have passion to teach. So I planned to continue my career as a teacher (which is noblest profession in the world). I have great concern for my subject ie Computer Science.

I have planned to prepare a study material so as to help the students in preparing especially for exams. With that good interest, as my first attempt, I started preparing XII class Chapter Wise Old Questions (from 1998 to 2008). XII class Computer Science (Paper code: 083) Consists 14 Chapters. In this very material, I prepared Old Questions from 9 chapters. I am planning to complete the remaining 5 chapters too.

I have an interest to prepare Chapter Wise Material also. For that as an attempt, I prepared material for chapter 5 ie Constructors and Destructors. I have added that material too in this book. Please go through that and give me some feed back. I deserve for your feedback. Your feedback will becomes a catalyst for me in preparing material for the remaining chapters. If you too prepare any material or any soft copy is there with you related to computer science paper, please send me.

I feel that I gave answers accurately (to the best of my knowledge), but if you find any typing erros, or any better solugion, or any suggestions, Please send me. I feel very happy if you send some suggestions. If any of you have any doubt in subject, you can fell free to contact me at any time to

Phone: **9490236965**
9949001361

Yours ....
Ever....Dear....
Faculty & Friend
M.Ravi Kiran

Email: mandaravikiran@yahoo.com mandaravikiran@rediffmail.com

Thank you Lord, for everything. I never have words to say to you what I want to say.
But Thank you very much.

CONTENTS

The Remaining Chapters (Which are not included in this material):

Chap 7: Data File Handling

Chap 9: Arrays

Chap 10: Linked Lists, Stacks and Queues

Chap 13: Boolean Algebra

Chap 14: Communication and Network Concepts

1. C++ REVISION TOUR

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
}
```

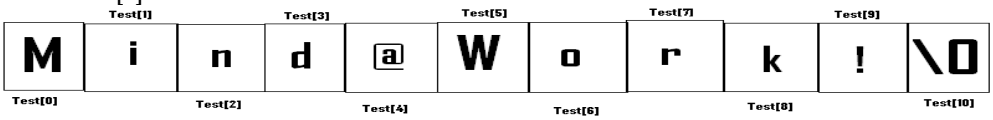
d) Find the output of the following program; 3

```
#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;
    }
```

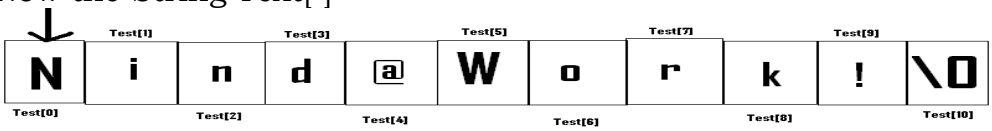
Ans: Solution:

Text[ ] =



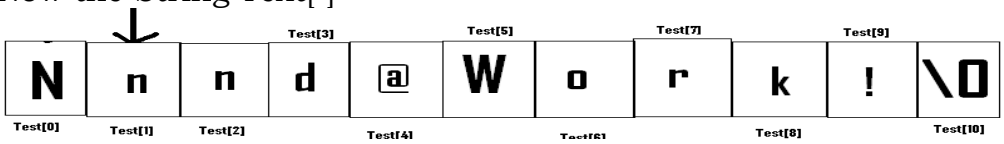
When I=0

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[ ] =



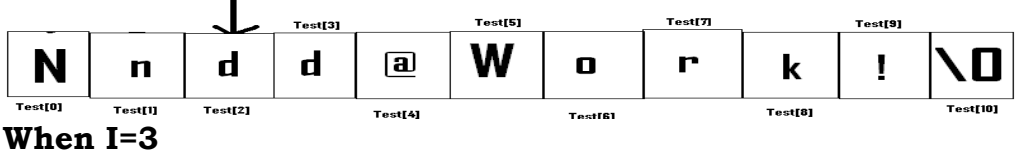
When I=1

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[ ] =



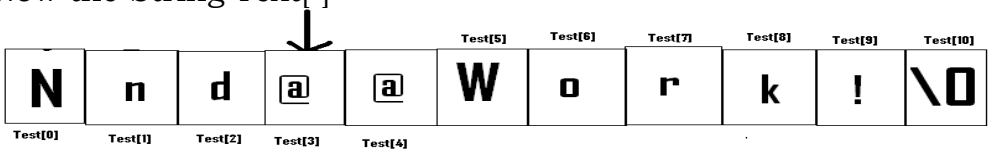
When I=2

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[ ] =

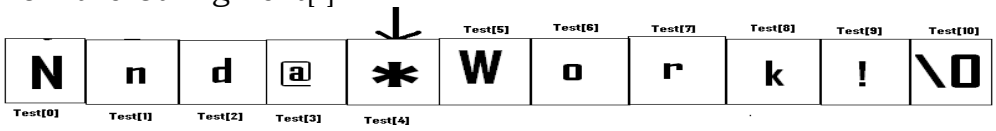


When I=3

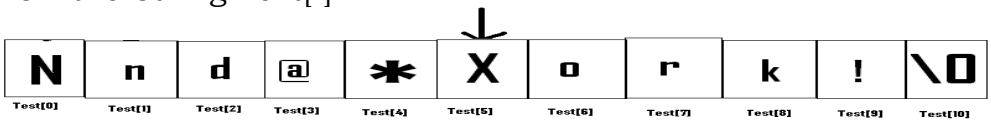
Since Text[3] is 'd', Which is a character, but which is not Upper case, else part will be executed.
Ie Text[I]=Text[I+1]
Here Text[3]=Text[3+1]
=Text[4]
Ie '@' will be stored in place of 'd'
Now the String Text[ ] =



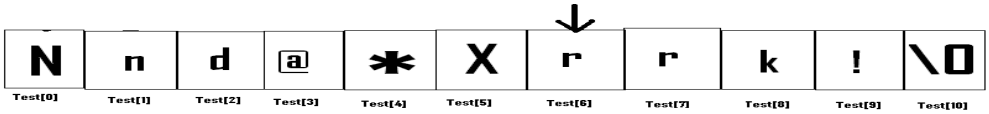
When I=4
Since Text[4] is '@', Since which is not an alphabet, (!isalpha(Text[I])) will becomes true.
Ie **if(!isalpha(Text[I]))**
Text[I]='*';
Ie Text[4]='*'
Ie '*' will be stored in place of '@'
Now the String Text[ ] =



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[ ] =

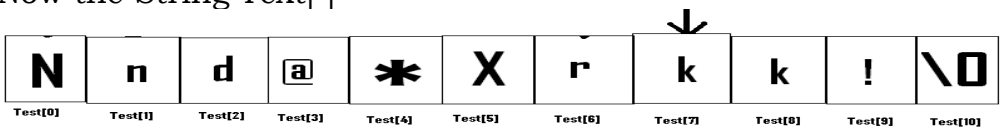


When I=6
Since Text[6] is 'o', Which is a character, but which is not Upper case, else part will be executed.
Ie Text[I]=Text[I+1]
Here Text[6]=Text[6+1]
=Text[7]
Ie 'r' will be stored in place of 'o'
Now the String Text[ ] =



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.

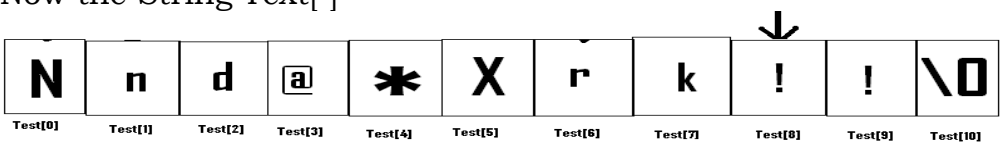
Ie Text[I]=Text[I+1]

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.

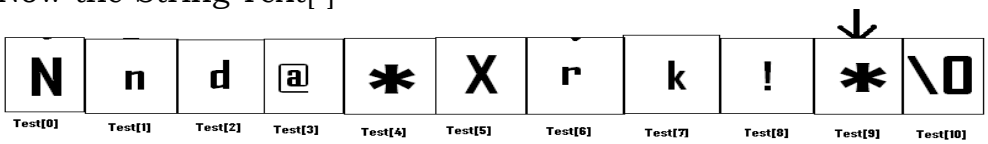
Ie **if(!isalpha(Text[I]))**

Text[I]='*';

Ie Text[9]='*'

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

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;
    }
}
```

Ans:

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:
(ii) CHN: KOL : CHN:
(iii) KOL : BOM : BNG:
(iv) 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:

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"<<++B<<"&"<<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]<<":";
    }
}
```

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 takes 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 :

2007 Delhi :

1.a) Differenctiate 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 occurs a syntax error.

(ii)cin<<a;

In this statement, since stream insertion operator (<<) has given instead of stream extraction operation(>>), there will occurs 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>=10;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 occurs a syntax error.
(ii)cin<<a; In this statement, since stream insertion operator (<<) has given instead of stream extraction operation(>>), there will occurs 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 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. 2

```
#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: 3

```
#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. 2

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

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

Ans: Expected Output:

(ii) None of the above.

2006 Delhi:

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

(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: 2

```
#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

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**

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<<end1;
    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

2005 Outside Delhi :

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

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

Ans)(i) puts( ) - stdio.h

(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 dividor 5;
void main( )
{    Number = 15;
     for(int Count=1;Count=<5;Count++,Number -= 3)
          if(Number % dividor = = 0)
               cout<<Number / Dividor;
               cout<<endl;
          else
               cout<<Number + Dividor <<endl;
```

Ans:

```
#include<iostream.h>
const int dividor= 5;
void main( )
{
     int Number = 15;
     for(int Count=1;Count<=5;Count++,Number -= 3)
          if(Number % dividor = = 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

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.

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

Note: The symbol ! represents Factorial of a number
ie 5!= 1 X 2 X 3 X 4 X 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;
}
```

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. 2

```
#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;
}
```

Output:

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

```
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:

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

```
#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<<"\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;
}
```

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. 2

```
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. 3

```
#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;      }
```

2000:

1.b) Name the header file, to which following built in function belong: (i) isupper( ) (ii)setw() (iii)exp( ) (iv)strcmp( ) 2

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 eason(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

(i) 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: **AOROoIiE**

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

$1+ x/2! + x^2/4! + x^3/6! + x^4/8! + x^5/10! + ----------+ x^n/(2n)!$

```
#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="IntRAneT";
 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:

$1 + x^1/2! + x^2/3! + x^3/4! + x^4/5! + \text{- - - - - - } x^n/(n+1)!$

```
#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();
}
```

2. STRUCTURES

2008 Delhi:

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 u s 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.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.

2006 Delhi:

1.b) Illustrate the use of #define in C++ to define a macro. 2

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

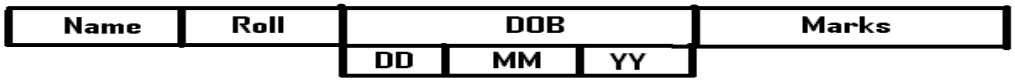
```
#include<iostream.h>
void main( )
{
    struct STUDENT
    {
        char stu_name[20];
        char stu_sex;
        int stu_age=17;
    }student;
    gets(stu_name);
    gets(stu_sex);
}
```

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 astructure within the structure of a student as shown below. These types of structures are known as nested structures.



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;
};
emp worker;
```

2006 Outside Delhi:

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.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.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 :

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.membhernumber;
     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 :

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
```

2001 :

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
```

3.OBJECT ORIENTED PROGRAMMING

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:

(i) Anything that an object does not know or cannot do is excluded from the objects.

(ii) Encapsulation is used to hide unimportant implementation details from other objects.

(iii) 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<<"\nThe area of the circle = "<<3.1415*r*r;    }
void area(float l,float b)
{  cout<<"\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<<"\nEnter the radius: ";
                      cin>>rad;
                      area(rad);
                      break;
            case 2:   cout<<"\nEnter the length and breadth: ";
                      cin>>len>>bre;
                      area(len,bre);
                      break;
            default:  cout<<"\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:

1) Capability to express the inheritance relationship which ensures the closeness with the real world models.
2) Reusability.
3) Transitive nature of inheritance.

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

4.CLASSES AND OBJECTS

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 calss 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:

a. For functions that return values and are having a loop or a switch or a goto.
b. For functions not returning values, if a return statement exists.
c. If functions contain static variables.
d. 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 linline 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)
cakcwg()	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 calcwg( ) 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 cakcwg( )
    {
            return hrwrk*wgrate;
    }
public:
   void In_data( )
    {
 cout<<"\nEnter Worker number,name,hours worked and wage rate";
       cin>>wno;
       gets(wname);
       cin>>hrwrk>>wgrate;
       calcwg( );
    }
```

```
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 Annual:

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;
};
```

5.CONSTRUCTORS & DESTRUCTORS

DELHI 2008

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 intiger
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 ALLOTED"and Gsize and Gprice with 0.

A function Input ()to the values of the data membersGCode, 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 ALLOTED");
        strcpy(GType,"NOT ALLOTED");
        Gsize=0;
        strcpy(Gfabric,"NOT ALLOTED");
        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( );
}
```

OUTSIDE DELHI 2008

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 GPprice 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( );
}
```

DELHI: 2007

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

Ans:

Constructor	Destructor
Purpose: Is used to intitialize 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

Constructor: A constructor is used to intitialize 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 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 below4

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();
}
```

OUTSIDE DELHI: 2007

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

Fare (Rs)	***For Kilometers***
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();
}
```

DELHI 2006

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 Constructer 2.
Ans:
```
Interview(Interview &t)  //This is a copy constructor.
 {
      Month=t.Month;
}
```

OUTSIDE DELHI 2006

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;
 }
```

DELHI 2005

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 Funciton 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 constructer 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 the3 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();
}
```

OUTSIDE DELHI 2005

1.a) Differentiate between a default constructer and copy constructer, 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)    //Function 4
       {      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 Funciton 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 constructer 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**
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();
}
```

DELHI 2004

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.

DELHI 2003

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 bPlay

- A constructer 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 corresponding values passed as parameters to this function.
- Shoplay() 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( );
}
```

DELHI 2002

2.c) Write the oputput 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
```

DELHI 2000

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.

Ie in the above example whenever an object of the class is being destroyed, "Destructor at work" will be displayed.

DELHI 1998

2.a) What is a copy constructor? What do you understand by constructer 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 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<<"\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<<"\nThe Radius of the Circle = "<<r;
      cout<<"\nThe Area of the Circle = "<<a;
    }
};
void main()
{   clrscr();
   Circle c1; /*Default Constructor will be called implicitely.
              ie c1.r = 0.0 and c1.a = 0.0  */
   Circle c2(10.3);  //Parameterized Constructor will be called
                     //implicitely
   Circle c3(c2);    //Copy Constructor will be called implicitely
   c1.take();
   c1.calculate();
   c1.display();
   c2.display();
   c3.display();
   getch();}
```

8. INHERITANCE

DELHI 2008

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

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

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

Ans: Hierarchical Inheritance.

Since the sub classes are derived from a single base class(Dolls).

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

Ans: 41 Bytes

(Explonation: The memory will be reserved as follows:

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

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

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

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

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

OUTSIDE DELHI 2008

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

```
class Toys
{    char Tcode[5];
     protected:
       float Price;
       void Assign(float);
    public:
       Toys();
       void Tentry();
       void Tdisplay();
};
class SoftToys:public Toys
{      char STName[20];
       float Weight;
   public:
       SoftToys();
       void  STentry();
       void STDisplay();
};
class ElectronicToys:public Toys
{      char ETName[20];
       int No_of_Batteries;
  public:
     ElecronicToys();
     void ETEntry();
     void ETDisplay();
};
```

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

Ans: Hierarchical Inheritance.

Since the sub classes are derived from a single base class(Dolls).

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

Ans: 33 Bytes

(Explonation: The memory will be reserved as follows:

```
char Tcode[5];              //5 Bytes
float Price;                //4 Bytes
 char STName[20];           //20 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( )

DELHI 2007

2.d) Answer the questions (i) to(iv) based on the following code:4

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

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

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

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

TEntry()
LDisplay()
IEntry()

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

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

Ans: Data Members – Trainer::Remuneration,
Learner::Attendance, Learner::Grade,
Institute::ICode, Institute::IName
Member functions – Trianer::AssignRem( ),
Trainer::TEntry( ),
Trainer::TDisplay( ),
Learner:: LEntry( ),
Learner::LDisplay( ),
Institute::IEntry ( ) (LDisplay can call IEntry( ))
Institute::LDisplay( )(IEntry can call LDisplay( ))

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

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

OUT SIDE DELHI 2007

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

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

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

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

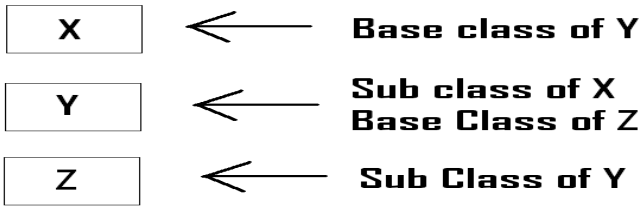
```
class Teacher
{       char TNo[5],Tname[20],Dept[10];
        int Workload;
 protected :
        float Salary;
        void AssignSal(float);
 public:
        Teacher();
        void TEntry();
        void TDisplay();
};
class Student
{       char Admno[10],SName[20],Stream[10];
protected:
     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

(i) Which type of inheritance is depicted by above example?
Ans: Multiplel Inheritance.
(ii) Identify the member function(s) that cannot be called directly from the objects of class School from the following

TEntry()
SDisplay()
SchEntry()

Ans: All the above three member function(s) can be called from the objects of class School.
(iii) Write name of all member(s) accessible from member functions of class School.
Ans: Data Members : Teacher::Salary
Student::Attendance
Student::Totmarks
School::SCode
School::SName
Member Funcions:Teacher::AssignSal( )
Teacher::TEntry( )
Teacher::TDisplay( )
Student::Sentry( )
Student::SDisplay( )
School::SChEntry( )
School::SChDisplay( )
(iv) If class School was derived privately from class Learner and privately from class Trainer, then name the member function(s)that could be accessed through Objects of class School.
Ans: School::SChEntry( )
School::SChDisplay( )

DELHI 2006
2.a) Define Multilevel and Multiple inheritance in context of Object Oriented Programming. Give suitable example to illustrate the same. 2
Ans:
Multilevel Inheritance: When a subclass inherits from a class that itself inherits from another class, it is known as multilevel inheritance.



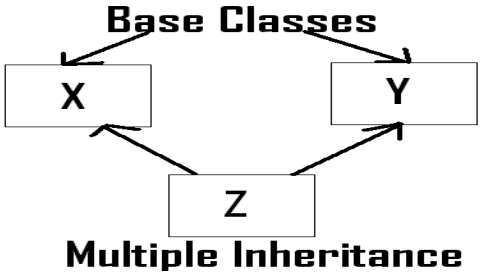
Multi level Inheritance

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.



Multiple Inheritance

Eg: (for Multiple Inheritance)

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

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

```
class stationary
{     char Type;
      char Manufacture[10];
public:
      stationary( );
      void Read_sta_details( );
      void Disp_sta_details( );
};
class office:public stationary
{
      int no_of_types;
      float cost_of_sta;
```

```
public:
      void Read_off_details( );
      void Disp_off_details( );
};
class printer:private office
{
      int no_of_users;
      char delivery_date[10];
public:
     void Read_pri_details( );
     void Disp_pri_details( );
};
void main( )
{
   printer MyPrinter;
}
```

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

Ans:

```
printer::Read_pri_details( );
printer::Disp_pri_details( );
```

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

Ans: 29 Bytes

(iii) Mention the names of functions accessible from the member function Read_pri_details() of class printer.

Ans:

```
stationary::Read_sta_details( )
stationary::Disp_sta_details( )
office::Read_off_details( )
office::Disp_off_details( )
printer::Disp_pri_details( )
```

OUT SIDE DELHI 2006

2.d) Answer the questions (i) to(iv) based on the following code:4

```
class furniture
{
      char Type;
      char Mode[10];
public:
      furniture( );
      void Read_fur_details();
      void Disp_fur_details();
};
class sofa:public furniture
{
      int no_of_seats;
      float cost_sofa;
public:
      void Read_sofa_details();
      void Disp_sofa_details();
};
```

```
class office:public sofa
{
      int no_of_pieces;
      char delivery_date[10];
public:
     void Read_office_details();
      void Didp_office_details();
};
void main()
{
   office MyFurniture;
}
```

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

Ans:

Data Members: No data member can be called from Myfurniture object.

Member Functions:

Furniture::Read_fur_details()
Furniture::Disp_fur_details()
Sofa::Read_sofa_details()
Sofa::Disp_sofa_details()
Office::Read_office_details()
Office::Didp_office_details()

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

Ans: 29 Bytes

(iii) Mention the names of functions accessible from the member function Read_office_details() of class office.

Ans:

Furniture::Read_fur_details( )
Furniture::Disp_fur_details( )
Sofa::Read_sofa_details( )
Sofa::Disp_sofa_details( )
Office::Disp_office_details( )

DELHI 2005

2.d) Answer the questions (i) to(iv) based on the following code:4

```
class Medicine
{
      char Category[10];
      char Date_of_manufacture[10];
      char Company[20];
public:
      Medicine();
      void entermedicinedetails();
      void showmedicinedetails();
};
class capsule:public Medicine
{
protected:
      char capsule_name[30];
      char volume_lable[20];
```

```
public:
    float Price;
    capsules();
    void entercapsuledetails();
    void showcapsuledetails();
};
class Antibiotics:public Capsule
{
    int Dosage_units;
    char side_effects[20];
    int Use_within_days;
public:
    Antibiotics();
    void enterdetails();
    void showdetails();
};
```

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

Ans: Medicine – 40 Bytes
Antibiotics Object – 118 Bytes

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

Ans:

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

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

Ans: Data Members:

Capsule::capsule_name[30]
Capsule::volume_lable[20]
Capsule::Price

Member Funcitons:

Medicine::entermedicinedetails()
Medicine::showmedicinedetails()
Capsule::entercapsuledetails()
Capsule::showcapsuledetails()

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

Data members:

Capsule::Price

OUTSIDE DELHI 2005

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

```
class Drug
{   char Category[10];
    char Date_of_manufacture[10];
    char Company[20];
```

```
public:
    Medicines();
    void enterdrugdetails();
    void showdrugdetails();
};
class tablet:public Drug
{
protected:
    char tablet_name[30];
    char volume_lable[20];
public:
    float Price;
    Tablet();
    void entertabletdetails();
    void showtabletdetails();
};
class PainReliever:public Tablet
{
    int Dosage_units;
    char side_effects[20];
    int Use_within_days;
public:
    PainReliever();
    void enterdetails();
    void showdetails();
};
```

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

Ans: Drug Object - 40 Bytes
Pain Reliever – 118 Bytes

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

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

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

Ans: Data Members:
Tablet::tablet_name[30];
Tablet::volume_lable[20];
Tablet::Price;

Member Functions:
Drug::enterdrugdetails()
Drug::showdrugdetails()
Tablet::entertabletdetails()
Tablet::showtabletdetails()

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

Ans: Data Members: Tablet::Price

DELHI 2004

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

```
class livingbeing
{
      char specification[20];
      int average;
public:
      void read();
      void show();
};
class ape: private livingbeing
{
      int no_of_organs,no_of_bones;
protected:
      int iq_level;
public:
      void readape();
      void showape();
};
class human:public ape
{
      char race[20];
      char habitation[30];
public:
      void readhuman();
};
```

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

Ans: Data Members - ape::iq_level
human::race
human::habitation

Member Function – ape::readape( )
ape::showape( )

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

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

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

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

Ans: 78 Bytes.

DELHI 2003

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

```
class MNC
{  char Cname[25];          //Company name
  protected:
```

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

Ans:

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

Ans: MNC class constructor can be called first at the time of declaration of an object of class Outlet.

(When an object of the derived class is declared, in order to create it, firstly the constructor of the base class is invoked an then, the constructor of the derived class is invoked. On the other hand, when an object of the derived class is destroyed, first the destructor of the derived class is invoked followed by the destructor of the base class).

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

Ans: 133 Bytes

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

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

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

Ans: MNC::Country

DELHI 2002

1.a) Illustrate the concept of Inheritance with the help of an example. 2

Ans: The capability of one class to inherit propertied from another class, is called as inheritance.

The most important advantage of inheritance is code reusability.

There are 5 types of inheritance:

(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 inherited the existing features (members) and you can develop new class consists the remaining features using **inheritance (in Object Oriented Programming ie in C++.)**

DELHI 2000

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

```
class School
{
      int A;
protected:
      int B,C;
public:
      void INPUT(int);
      void OUTPUT();
};
class Dept:protected School
{
      int X,Y;
protected:
      void IN(int,int)
public:
      void OUT();
};
```

```
class Teacher:public Dept
{
      int P;

      void DISPLAY(void);
public:
      void ENTER();
};
```

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

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

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

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

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

Ans: Teacher::Display( )

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

Ans: Yes. Since it is public member function.

DELHI 1999

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

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

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

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

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

Ans: Base class of heavy_vehicle – vehicle
Derived class of heavy_vehincle – bus

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

Ans: bus::make
heavy_vehicle::load
vehicle::passenger

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

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

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

Ans: No.

DELHI 1998

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

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

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

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

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

Ans: QQQ::U , RRR::M

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

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

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

Ans: No.

8.POINTERS

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));
    }
}
void main( )
{   clrscr( );
    int Position=0;
    char Message[]="Pointers Fun";
    ChangeString(Message,Position);
    cout<<Message<<"@"<<Position;
}
```

Output:

PoiNteRs Fun@10

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.

Explonation:

(1) Error 1 is in Line no.5 ie (*ptr)++
Here ptr is a constant pointer ie the contents cann'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)
                  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( );   }
```

Output:

Name:REEMA
Salary:10000
Name:KRISHNAN
Salary:20000

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

11.DATA BASE CONCEPTS

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. Ie 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:

(i) AdmnNo
(ii) FirstName,LastName,SirName
(iii) 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?

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 typles (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 realtion to form the tuples of the new relation.

Eg: There are two relations as follows:

Relation 1: Student

StudentNumber	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.

12.STRUCTURED QUERY LANGUAGE

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.

ProductName	Price*4
Talcom Poweder	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	COMP	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 command for the statements(i)to(iv) And give outputs for the SQL quries (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 Orderby 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,viha

(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 quries (v) to (viii). 6

TABLE : **SENDER**

SenderID	SenderName	SenderAddress	senderCity
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	ReCCity
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 recipt.
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 Tripati	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 quires (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	BANGLORE	3	1
IC899	MUMBAI	KOCHI	1	4
AM501	DELHI	TRIVENDRUM	1	5
MU499	MUMBAI	MADRAS	3	3
IC701	DELHI	AHMEDABAD	4	0

TABLE:**FLIGHTS**

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: (Children, Try this as an assignment)

(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
IC799	2	Indian Airlines

(vi) SELECT count (distinct ENDING) from FLIGHTS.

Ans: (Children, Try this answer as an assignment)

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	CONSULTAION
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 Doctro,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

EMPID	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

EMPID	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+Benifts.

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 EMPSALARY.

Ans: Select Designation,max(Salary) from EmpSalary where Designation=”Manager” or Designation=”Clerk”

(v)
```
SELECT FIRSTNAME,SALARY
FROM EMPLOYEES,EMPSALARY
WHERE DESTINATION =’Salesman’AND
EMPOLYEES.EMPID=EMPSALARY.EMPID;
```

Ans:

Firstname	**Salary**
Rachel	32000
Peter	28000

(vi) SELECT COUNT (DISTINT 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_ID	FIRSTNAME	LASTNAME	ADDRESS	CITY
102	Sam	Tones	33 Elm St.	Paris
105	Sarah	Ackerman	44 U.S.110	New York
144	Manila	Sengupta	24 Friends Street	New Delhi
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.	New York
451	Pat	Thompson	11 Red Road	Paris

DESIG

W_ID	SALARY	BENEFITS	DESIGINATION
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 + benifts.

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: **(Try This Answer)**

(v) SELECT FIRSTNAME, SALARY
FROM WORKERS, DESIG
WHERE DESIGINATION = "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 DESIGINATION ="salesman";

Ans: 15000

2004 Question Paper

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	Thunderbolts	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 Kapoore	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	ITEMNAME	TYPE	DATEOF STOCK	PRICE	DISCOUNT
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	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
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 (8,"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

Studno	**Class**	**Name**	**Game1**	**Grade1**	**Game2**	**Grade2**
10	7	Smeer	Criket	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	Cricket	A
15	10	Arpit	Cricket	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 thse basis of table CLUB.

TABLE: CLUB

COACH -ID	COACH NAME	AGE	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	BASKETBAL L	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) fromCLUB 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	DEPARTMENT	DATEOF JOING	SALARY	SEX
1	RAJA	COMPUTER	21/5/98	8000	M
2	SANGITA	History	21/5/97	9000	F
3	RITU	MATHS	29/8/98	8000	F
4	KUMAR	HISTORY	13/6/96	10000	M
5	VENKAT	MATHS	31/10/99	8000	M
6	SINDU	HISTORY	21/5/86	14000	F
7	ASHWARYA	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='male' and department='maths';

d) To list names of all teacher with their date of joining in ascending order.

Ans: Select Name From Teacher order by dateofjoing;

(f) To count the number of teachers with age >23.

Ans: Select count(number of teachers) 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

5.CONSTRUCTORS AND DESTRUCTORS

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 Valid Identifier
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 declaration.
        ------                           //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 construct or 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 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 coped 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 complaints 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 Chracteristics 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. Ie 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 may7 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<<"\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<<"\nThe Radius of the Circle = "<<r;
      cout<<"\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;
      m2=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<<"\nEnter the 3 Subject marks of a student: ";
      cin>>m1>>m2>>m3;
      total=m1+m2+m3;
      avg=total/3;
    }
    void display()
    {
      cout<<"\nTotal Marks = "<<total;
      cout<<"\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();                }
```

Computer Science (Code 083)
Sample Paper Set - 1

Max. Marks: 70 Duration: 3 Hours

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

(b) Write the names of the header files to which the following belong:
(i) strcmp() (ii) fabs() 1

(c) 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();
}
```

(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;
}
```

(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;
}
```

(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;
}
```

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

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.

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

Private Members

a. TestCode of type integer
b. Description of type string
c. NoCandidate of type integer
d. CenterReqd (number of centers required) of type integer
e. 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 DISPTEST() to allow user to view the content of all the data members

(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:
     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?

3.

(a) 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

(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 an element S[15][5] is stored at the memory location 5500. 4

(c) Write a function in C++ to perform Insert operation in a dynamically allocated Queue containing names of students. 4

(d) Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (matrix). 2

(e) Evaluate the following postfix notation of expression: 2
20,30,+,50,40,-,*

4.

(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:
   //Function to search and display the content
   from a particular //record number
   void Search(int );
   //Function to modify the content of a
   particular record number
   void Modify(int);
};
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();
```

```
}
```

(b) Write a function in C++ to count the number of lines present in a text file "STORY.TXT". 2

(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;}
};
```

5.(a) What do you understand by Degree and Cardinality of a table? 2

(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	Participants Num	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.

(ii) To display sum of PrizeMoney for each of the Number of participants groupings (as shown in column ParticipantsNum 10,12,16)

(iii) To display the coach's name and ACodes in ascending order of ACode from the table COACH

(iv) To display the content of the GAMES table whose ScheduleDate earliar than 01/01/2004 in ascending order of ParticipantNum

(v) SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

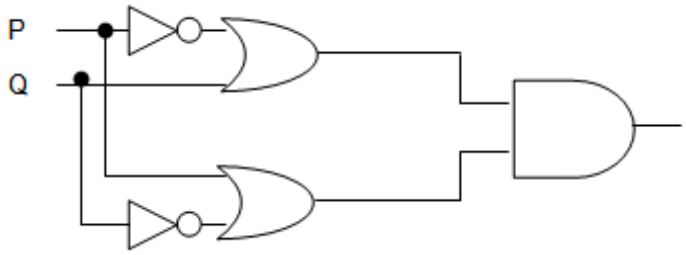
(vi)SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM ACTIVITY;

(vii) SELECT SUM(PrizeMoney) FROM ACTIVITY;

(viii) SELECT DISTINCT ParticipantNum FROM COACH;

6. (a) State and verify Demorgan's Laws. 2

(b) Write the equivalent Boolean Expression for the following Logic Circuit 2



(c) Write the POS form of a Boolean function F, which is represented in a truth table as follows: 1

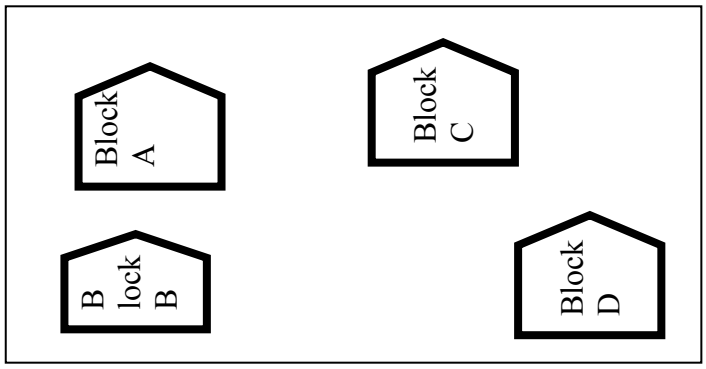
U	V	W	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(d) Reduce the following Boolean Expression using K-Map: 3
F(A,B,C,D)=Σ(0,1,2,4,5,6,8,10)

7.

a) What is the significance of ARPANET in the network? 1
b) Expand the following terminologies: 1
(i) CDMA (ii) GSM
c) Give two major reasons to have network security. 1
d) What is the purpose of using a Web Browser? Name any one commonly used Web Browser. 1

e) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below:



Center to center distances between various blocks

Black A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

Number of Computers

Black A	25
Block B	50
Block C	125
Block D	10

e1) Suggest a cable layout of connections between the blocks. 1

e2) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason. 1

e3) Suggest the placement of the following devices with justification 1
(i) Repeater (ii) Hub/Switch

e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed? 1

Computer Science (Code 083)

Sample Paper with Solution Set - 1

Max. Marks: 70 **Duration: 3 Hours**

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 functions • It is accessible throughout the program	• 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);
}
```

(1/2 Mark for each point of difference)
(1/2 Mark for example of Global Variable)
(1/2 Mark for example of Local Variable) OR

(Full 2Marks to be awarded if the difference is explained with the help of suitable example)

(d) Write the names of the header files to which the following belong: 1
(i) strcmp() (ii) fabs()

Answer:

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

(1/2 Mark for mentioning name of each header file)

(e) 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 <iostream.h>
class PAYITNOW
{
   int Charge;
public:
   void Raise(){cin>>Charge;}
   void Show(){cout<<Charge;}
};
void main()
{
   PAYITNOW P;
   P.Raise();
   P.Show();
}
```

(1/2 Mark for correcting each error) OR
(1 Mark for identifying all the 4 errors with no correction)

(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 Mark for each correct line of output)

Note:

Deduct ½ Mark for not showing : in the output

Deduct ½ Mark for not considering endl

(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 Textare separated by single space
      Encrypt(Text);
      cout<<Text<<endl;
}
```

Answer:

```
@a@E@E#rTH
```

(1 Mark for writing all alphabets at correct positions)

(1/2 Mark for writing @ at correct positions)

(1/2 Mark for writing # at correct position)

(g) 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? #include <iostream.h> 2

```
#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
```

(1 Mark for writing correct minimum value)

(1 Mark for writing correct maximum value)

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();
};
```

Data Hiding

Data Encapsulation

(1 Mark for each definition and explanation) OR

(Full 2 marks for explaining both with the help of an example)

(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<<"Seminarstarts 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;
   }
};
```

iii) 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.

(½ Mark for mentioning "Destructor")

(½ Mark for correctly answering to remaining part of the question)

iv) 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);
```

(½ Mark for mentioning "Constructor Oveloading" OR "Polymorphism") (½ Mark for example)

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

Private Members

a. TestCode of type integer
b. Description of type string
c. NoCandidate of type integer
d. CenterReqd (number of centers required) of type integer
e. 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 DISPTEST() 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;;
}
```

(1 Mark for correctly declaring Data Members)
(1 Mark for correctly defining CALCNTR())
(½ Mark for correctly defining SCHEDULE())
(½ Mark for calling CALCNTR() from SCHEDULE())
(½ Mark for correctly defining DISPTEST())

(½ Mark for correct syntax of class)

(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();
};
```

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

(vii) Write the names of all the member functions, which are accessible from objects belonging to class BRANCH.

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

(ix) 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

(1 Mark for each correct answer)

Note: No marks to be given for partial answers

Q3.(a) 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];
}
```

(½ Mark for function header with desired parameters)
(½ Mark initialising counters)
(1 Mark for correct formation of loop)
(1 Mark for correct comparison of elements)
(1 Mark for transferring remaining elements in resultant array)

(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

Answer:

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

(1/2 Mark for correct formula/substitution of values in formula)
(1 ½ Mark for correctly calculating Base Address)
(2 Mark for correctly calculating address of desired location)

(g) Write a function in C++ to perform Insert operation in a dynamically allocated Queue containing names of students. 4

Answer:

```
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;
    }
}
```

(½ Mark for appropriate function header)

(½ Mark for declaring a Temporary pointer - TEMP)

(1 Mark for correct use of input/assignment of Temporary pointer- TEMP)

(1 Mark for checking FRONT as NULL and assigning REAR and FRONT as – TEMP) (1 Mark for connecting TEMP to link part of REAR and assigning REAR as TEMP)

(h) Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (matrix). 2

Answer:

```
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;
}
```

(½ Mark for initialization of desired variables)

(½ Mark for correct formation of loop)

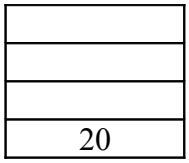
(½ Mark for statement to add left diagonal elements)

(½ Mark for statement to add right diagonal elements)

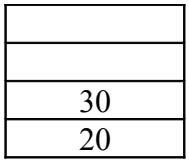
(i) Evaluate the following postfix notation of expression: 2
20,30,+,50,40,-,*

Answer:

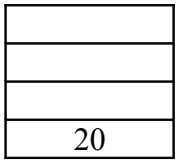
Step 1: Push

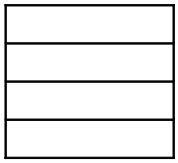


Step 2: Push

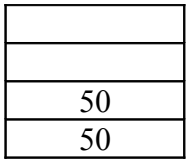


Step 3: +

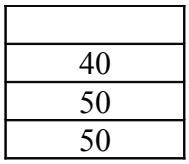




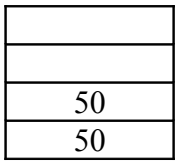
Step 4: Push

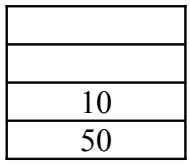


Step 5: Push

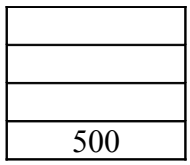


Step 6: -

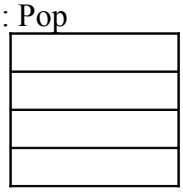




Step 7: *



Step 8: Pop



Result
500

*(½ Mark for showing stack position for each operation +,- and *)*
(½ Mark for correctly evaluating the final result)

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:
   //Function to search and display the content
   from a particular //record number
   void Search(int );
   //Function to modify the content of a
   particular record number
   void Modify(int);
};
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:

```
File.seekg(RecNo*sizeof(Item));    //Statement
1
File.seekp(RecNo*sizeof(Item));    //Statement
2
```

(½ Mark for each correct statement)

(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();   }
```

(½ mark for opening the file in 'in' mode)

(½ mark for initializing the variable for counting lines to 0)

(½ mark for reading each line)

(½ mark for incrementing and displaying/returning value of variable)

(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()
{
  fstream 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();
}
```

(½ mark for correct syntax of function header and body)

(½ mark for opening the file in 'in' mode)

(½ mark for reading content from file into the object of B)

(½ mark for appropriate loop)

(½ mark for correct condition for searching)

(½ mark for displaying the content of the object)

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.

(1 mark for definition of Degree)

(1 mark for definition of Cardinality)

(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;
```

(½ mark for correct SELECTion of columns)
(½ mark for correct use of ORDER BY)

(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;
```

(½ mark for correct SELECTion of columns)
(½ mark for correct use of GROUP BY)

(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;
```

(½ mark for correct SELECTion of columns)
(½ mark for correct use of ORDER BY)

(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;
```

(½ mark for correct SELECTion of columns)
(½ mark for correct use of ORDER BY)

(x) SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

Answer:

(½ mark for correct output)

(vi)SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM ACTIVITY;

Answer:

```
19-Mar-2004 12-Dec-2003
```

(½ mark for correct output)

(vii) SELECT SUM(PrizeMoney) FROM ACTIVITY;

Answer:54000 *(½ mark for correct output)*

(viii) SELECT DISTINCT ParticipantsNum FROM ACTIVITY;

Answer:

16 10 12

(½ mark for correct output)

Q6. (a) State and verify Demorgan's Laws. 2

Answer:

(X+Y)' =X'.Y' (X.Y)' =X'+Y'

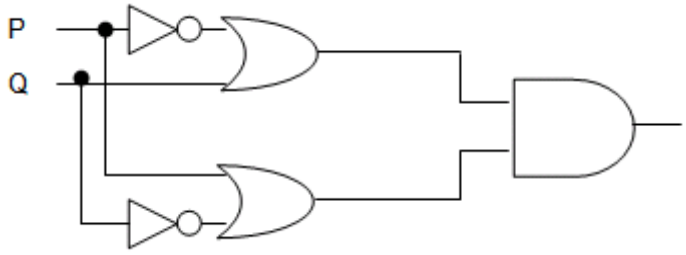
X	Y	X+Y	(X+Y)'	X'	Y'	X'.Y'	X.Y	(X.Y)'	X'+Y'
0	0	0	1	1	1	1	0	1	0
0	1	1	0	1	0	0	0	1	0
1	0	1	0	0	1	0	0	1	0
1	1	1	0	0	0	0	1	0	1

Verified

(1 mark for stating the correct law)

(1 mark for the appropriate verification using truth table OR algebraic method)

(b) Write the equivalent Boolean Expression for the following Logic Circuit 2



Answer:

F(P,Q)=(P'+Q).(P+Q')

(Full 2 marks for obtaining the correct Boolean Expression for the Logic Circuit) OR (1 mark correctly interpreting SUM terms)

(d) Write the POS form of a Boolean function F, which is represented in a truth table as follows: 1

U	V	W	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	**1**	1

Answer:

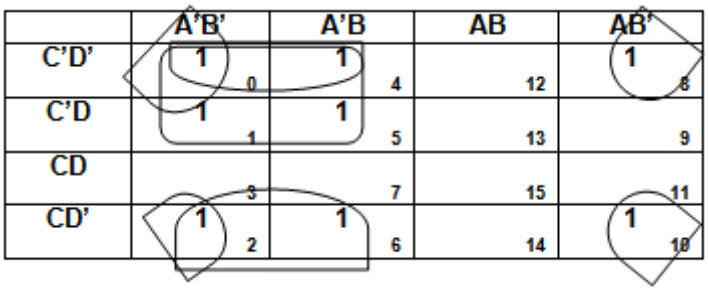
F(U,V,W) = (U+V+W').(U+V'+W').(U'+V+W')

(1 mark for correct POS representation)

(e) Reduce the following Boolean Expression using K-Map: 3

F(A,B,C,D)=Σ(0,1,2,4,5,6,8,10)

Answer:



F(A,B,C,D)=A'C'+A'D'+B'D'

(1 mark for correctly drawing K-Map with 1s represented on right places)

(1 mark for minimizing each Quad)

(1 mark for writing the complete Boolean Expression)

Q7.

e) What is the significance of ARPANET in the network? 1

Answer:

The first evolution of network was jointly designed by The Advanced Research Projects Agency (ARPA) and Department of Defence (DoD) in 1969 and was called ARPANET. It was an experimental project, which connected a few computers of some of the reputed universities of USA and DoD. ARPANET allowed access and use of computer resource sharing projects. Later Defence Data Network (DDN) was born in 1983.

(1 marks for mentioning the significance correctly)

f) Expand the following terminologies: 1

(i) CDMA (ii) GSM

Answer:

(i) Code Division Multiple Access (ii) Global System for Mobile Communication

(½ mark each expansion)

g) Give two major reasons to have network security. 1

Answer:

Two major reasons to have Network Security are
(i) Secrecy: Keeping information out of the reach of unauthorized users. (ii) Authentication: Determining the authorized user before sharing sensitive information with or entering into a business deal.

(½ mark for each appropriate reasons)

h) What is the purpose of using a Web Browser? Name any one commonly used Web Browser. 1

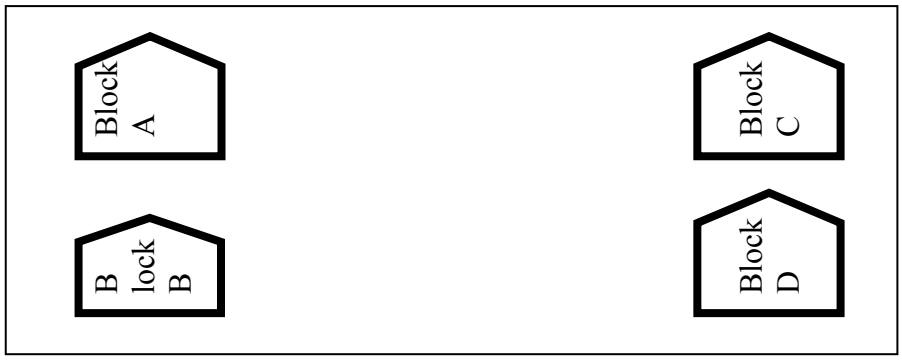
Answer:

The Web Browser fetches the page requested, interprets the text and formatting commands that it contains, and displays the page properly formatted on the screen. Example of a Web Browser: Mozilla Firefox OR Internet Explorer OR Netscape Navigator OR Safari OR OPERA

(½ mark for mentioning purpose of using a Web Browser)

(½ mark for Example of a Web Browser)

e) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below:



Center to center distances between various blocks

Black A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

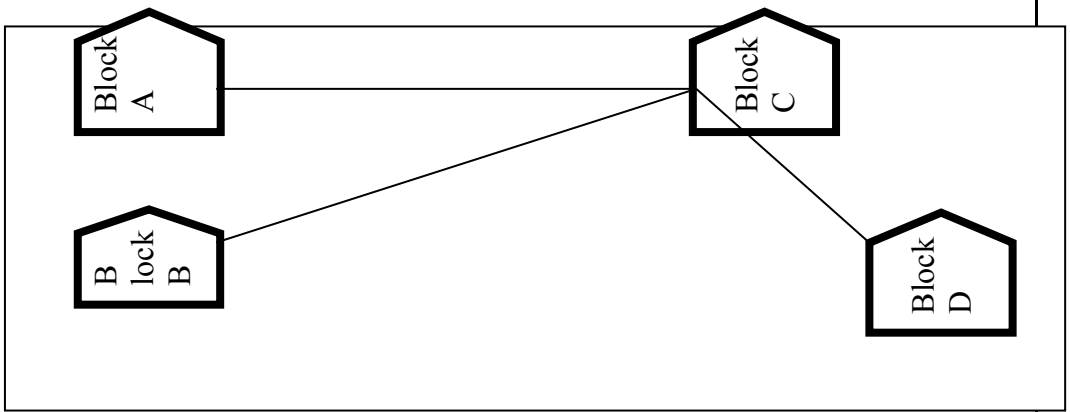
Number of Computers

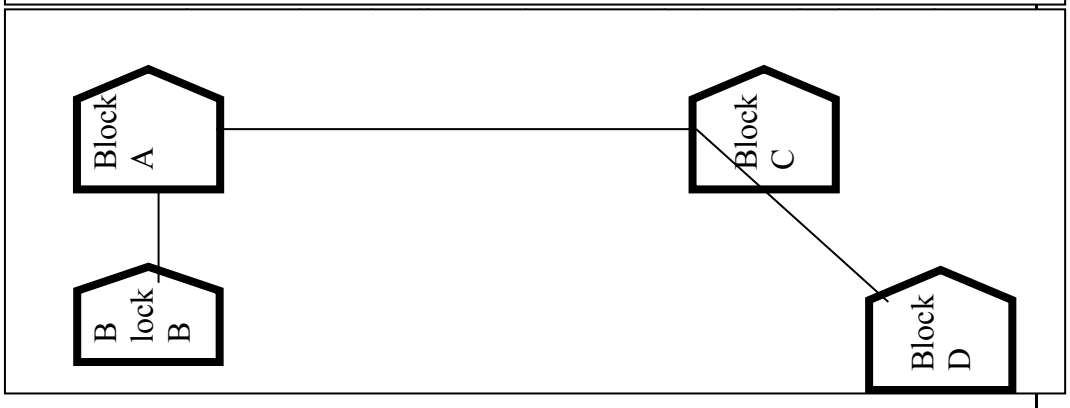
Black A	25
Block B	50
Block C	125
Block D	10

e1) Suggest a cable layout of connections between the blocks. 1

Answer:(Any of the following option)

Layout Option 1:





(1 mark for any of the above shown Layout)

e2) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason. 1

Answer:

The most suitable place / block to house the server of this organisation would be Block C, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

(½ mark for mentioning the correct block)

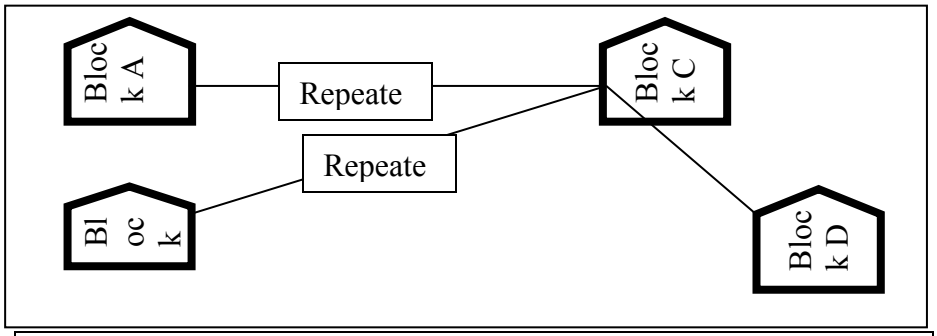
(½ mark for reason)

e3) Suggest the placement of the following devices with justification 1

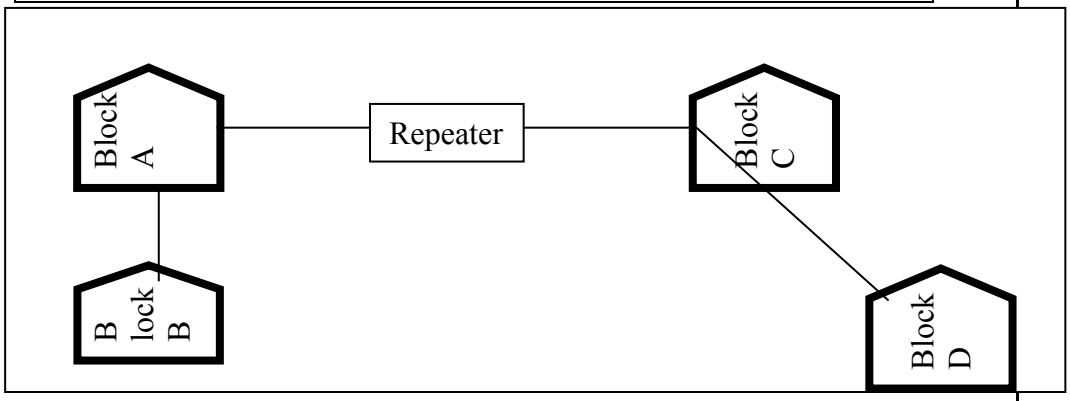
(i) Repeater (ii)Hub/Switch

Answer:

(i) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes.



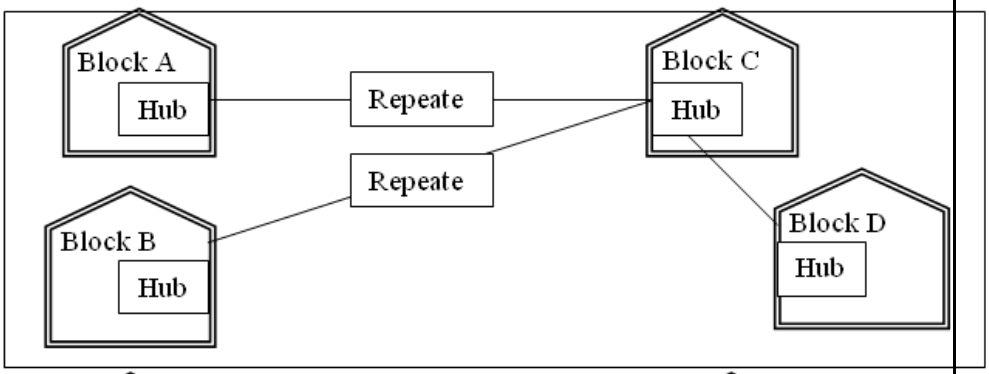
For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path

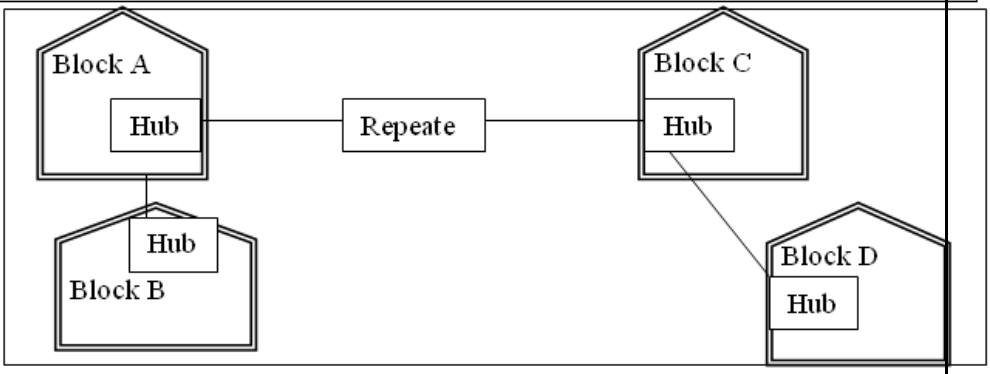


(1 mark for showing correct placement of repeater)

(ii) In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block

Layout 1





Layout 2

(1 mark for showing correct placement of hub)

e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed? 1

Answer:

The most economic way to connect it with a reasonable high speed would be to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

(1 mark for suggesting the appropriate economic way)

Computer Science (Code 083)
Sample Paper Set –II

Max. Marks: 70 Duration: 3 Hours

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

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

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

(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);
}
```

(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] <<'#';
}
```

(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;
    }
```

(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;
}
```

2.

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

v) Which category of constructor - Function 4 belongs to and what is the purpose of using it?

vi) Write statements that would call the member Functions 1 and 3

(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

(c) 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();
};
```

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

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

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

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

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

(j) 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

(k) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. 4

(l) Write a function in C++ to find sum of rows from a two dimensional array. 2

(m) Evaluate the following postfix notation of expression: 2
True, False, AND, True, True, NOT, OR, AND

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;
}
```

(b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT". 2

(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;}
};
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();
}
```

5.

(a) What do you understand by Primary Key & Candidate Keys? 2

(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

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

(ii) To display details of those games which are having PrizeMoney more than 7000.

(iii) To display the content of the GAMES table in ascending order of ScheduleDate.

(iv) To display sum of PrizeMoney for each of the Number of participation groupings (as shown in column Number 2 or 4)

(xv)SELECT COUNT(DISTINCT Number) FROM GAMES;

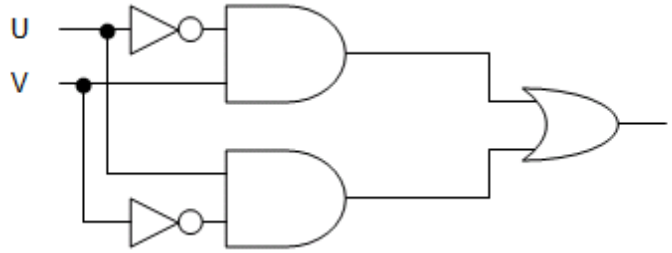
(vi)SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM GAMES;

(vii) SELECT SUM(PrizeMoney) FROM GAMES;

(viii) SELECT DISTINCT Gcode FROM PLAYER;

6. (a) State and algebraically verify Absorbtion Laws. 2

(b) Write the equivalent Boolean Expression for the following Logic Circuit 2



(c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: 1

P	Q	R	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(d) Reduce the following Boolean Expression using K-Map: 3

F(U,V,W,Z)=Π(0,1,2,4,5,6,8,10)

7.a) Define the term Bandwidth. Give unit of Bandwidth. 1

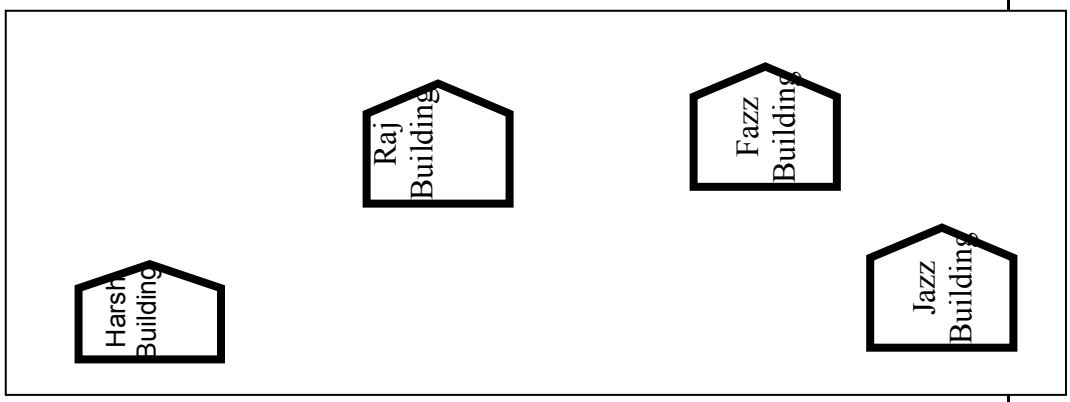
b) Expand the following terminologies: 1

(i) HTML (ii) XML

c) Define the term firewall. 1

d) What is the importance of URL in networking? 1

e)Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:



Center to center distances between various buildings is as follows:

Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m

Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m

Number of Computers in each of the buildings is follows:

Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Bulding	25

e1) Suggest a cable layout of connections between the buildings. 1

e2) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason. 1

e3) Suggest the placement of the following devices with justification: 1
(i) Internet Connecting Device/Modem (ii)Switch

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer. 1

Computer Science (Code 083)
Sample Paper with Solution Set –II

Max. Marks: 70 **Duration: 3 Hours**

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

Answer:

Object Oriented Programming	Procedural Programming
• 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	• 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

(1/2 Mark for each point of difference – to maximum of 2 marks)

(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

(1/2 Mark for mentioning name of each header file)

(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);        }
```

Answer:

```
#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;
     Point1.Color+=2;
   ShowPoint(Point2);
}
```

(1/2 Mark for correcting each error) OR

(1 Mark for identifying all the 4 errors with no correction)

(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 Mark for each correct line of output)

Note:

Deduct ½ Mark for not showing : in the output

Deduct ½ Mark for not considering endl

(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 Mark for each line of output)

(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

(1 Mark for writing correct minimum value)

(1 Mark for writing correct maximum value)

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;
}
```

(1 Mark for definition)(1 Mark for example) OR
(Full 2 marks for explaining both with the help of an example)

(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;
   }
};
```

vii) 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.

(½ Mark for mentioning "Constructor")
(½ Mark for correctly answering to remaining part of the question)

viii) Write statements that would call the member Functions 1 and 3

Answer:

```
Match M1;                    //for Function 1
Match M2(90);                //for Function 3
```

(½ Mark for each example)

(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;;
}
```

(1 Mark for correctly declaring Data Members)
(1 Mark for correctly defining CALFUEL())
(½ Mark for correctly defining FEEDINFO())
(½ Mark for calling CALFUEL() from FEEDINFO())
(½ Mark for correctly defining SHOWINFO())
(½ Mark for correct syntax of class)

(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();
};
```

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

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

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

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

Answer:

(iv) None of data members are accessible from objects belonging to class CUSTOMER.
(v) Enter(), Show()
(vi) Data members: Voucher_No, Sales_Date, Salary
Member function: Sales_Entry(), Sales_Details(), Enter(), Show(), Register(), Status()
(iv) 66

(1 Mark for each correct answer)

Note:

No marks to be given for partial answers

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

Answer:

```
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];
}
```

(1 Mark for function header with desired parameters)

(1 Mark for correct formation of loop)

(1 Mark for the formula)

(1 Mark for transferring elements in the resultant array)

(n) 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

Answer:

```
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
```

(1/2 Mark for correct formula/substitution of values in formula)

(1 ½ Mark for correctly calculating Base Address)

(2 Mark for correctly calculating address of desired location)

(o) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. 4

Answer:

```
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;
}
```

(½ Mark for appropriate function header)
(½ Mark for declaring a Temporary pointer - TEMP)
(1 Mark for new operation) (1 Mark for Temp->Link to Top)
(1 Mark for assigning Top as Temp)

(p) Write a function in C++ to find sum of rows from a two dimensional array. 2

Answer:

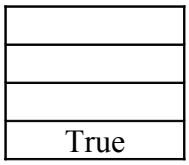
```
void MatAdd(int A[100][100],int N,int M)
{
     for (int R=0;R<N;R++)
     {
      int SumR=0;
       for (int C=0;C<M;C++)
            SumR+=A[C][R];
      cout<<SumR<<endl;
     }
}
```

(½ Mark for initialization of desired variables)
(1 Mark for loops)
(½ Mark for statement to add rows elements)

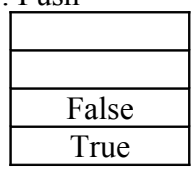
(q) Evaluate the following postfix notation of expression: 2
True, False, AND, True, True, NOT, OR, AND

Answer:

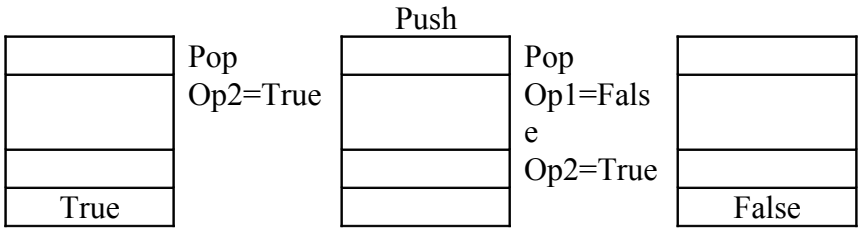
Step 1: Push



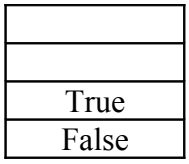
Step 2: Push



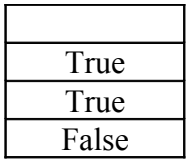
Step 3: AND



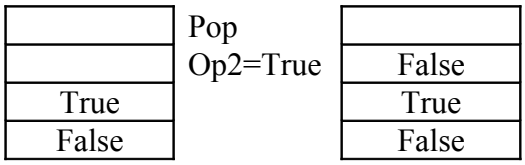
Step 4: Push



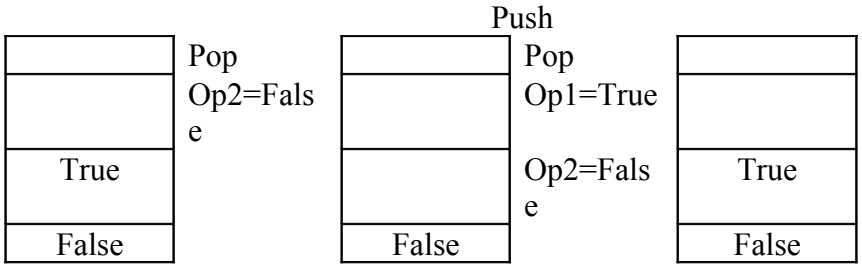
Step 5: Push



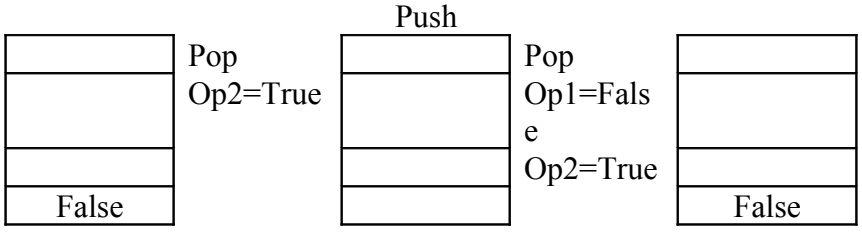
Step 6: NOT



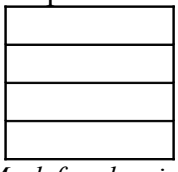
Step 7: OR



Step 8: AND



Step 9: Pop



Result
False

(1½ Mark for showing stack position for operations NOT,OR and AND)
(½ Mark for correctly evaluating the final result)

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;
}
```

Answer:

```
File.seekg(0,ios::end); //Statement 1
File.tellg();                  //Statement 2
```

(½ Mark for each correct statement)

(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();
}
```

(½ mark for opening the file in 'in' mode)
(½ mark for correct use of eof)(½ mark for reading each character)
(½ mark for correct increment)

(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();
}
```

(½ mark for opening the file in 'app' mode)
(½ mark for declaration of desired variables)
(½ mark for calling the member function Enter correctly)
(1 mark for writing the content of object to the binary file)
(½ mark for forming the appropriate loop)

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.

(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

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;

(1 mark for correct SELECTion of columns)

(ii) To display details of those games which are having PrizeMoney more than 7000.

Answer: SELECT * FROM GAMES WHERE PrizeMoney>7000

(½ mark for correct SELECTion of columns)

(½ mark for correct use of WHERE)

(iii) To display the content of the GAMES table in ascending order of ScheduleDate.

Answer:

```
SELECT * FROM GAMES ORDER BY ScheduleDate;
```

(½ mark for correct SELECTion of columns)

(½ mark for correct use of ORDER BY)

(vii)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;
```

(½ mark for correct SELECTion of columns)

(½ mark for correct use of GROUP BY)

(viii)SELECT COUNT(DISTINCT Number) FROM GAMES;

Answer:2 *(½ mark for correct output)*

(vi)SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM GAMES;

Answer:

```
19-Mar-2004   12-Dec-2003
```

(½ mark for correct output)

(vii) SELECT SUM(PrizeMoney) FROM GAMES;

Answer:

```
59000
```

(½ mark for correct output)

(viii) SELECT DISTINCT Gcode FROM PLAYER;

Answer:

```
101
103
108
```

(½ mark for correct output)

6. (a) State and algebraically verify Absorbtion Laws. 2

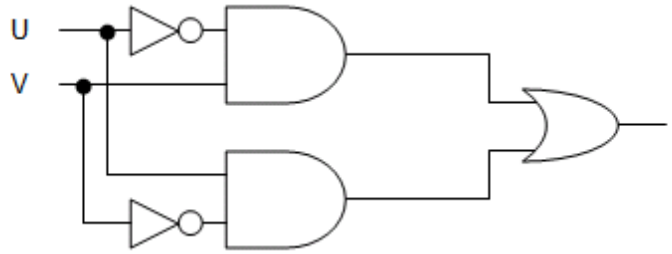
Answer:

```
X+X.Y=      X
L.H.S  =    X+X.Y
            =     X.1+X.Y
            =     X.(1+Y)
            =     X.1
            =     X
            =     R.H.S
X+X'.Y      =     X+Y
L.H.S. =    X+X'.Y
            =     (X+X').(X+Y)
            =     1.(X+Y)
            =     X+Y=R.H.S
```

(1 mark for stating the correct law)

(1 mark for the appropriate verification using algebraic method)

(b) Write the equivalent Boolean Expression for the following Logic Circuit 2



Answer:

F(U,V)=U'.V+U.V'

(Full 2 marks for obtaining the correct Boolean Expression for the Logic Circuit) OR (1 mark correctly interpreting Product terms)

(d) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: 1

Answer:

P	Q	R	G	
0	0	0	0	
0	0	1	0	
0	1	0	1	
0	1	1	0	
1	0	0	1	
1	0	1	0	
1	1	0	1	
1	1	1	1	

G(P,Q,R) = P'.Q.R'+P.Q'.R'+P.Q.R'+P.Q.R

(1 mark for correct SOP representation)

(e) Reduce the following Boolean Expression using K-Map: 3

F(U,V,W,Z)=Π(0,1,2,4,5,6,8,10)

Answer:

	U'V'	U'V	UV	UV'
W'Z'	0	4	1 (12)	(8)
W'Z	1	5	1 (13)	1 (9)
WZ	1 (3)	1 (7)	1 (15)	1 (11)
WZ'	2	6	1 (14)	10

F(U,V,W,Z)=UV+WZ+UZ

(1 mark for correctly drawing K-Map with 1s represented on right places)

(1 mark for minimizing each Quad)

(1 mark for writing the complete Boolean Expression)

7.a)Define the term Bandwidth. Give unit of Bandwidth. 1

Answer:

Bandwidth is the capability of a medium to transmit an amount of information over a distance. Bandwidth of a medium is generally measured in bits per second (bps) or more commonly in kilobits per second (kbps)

(½ Mark for correct definition and ½ Mark for correct unit)

b) Expand the following terminologies: 1

(i) HTML (ii) XML

Answer:

(i)	Hypertext Markup Language
(ii)	Extended Markup Language

(½ Mark for each correct expansion)

e) Define the term firewall. 1

Answer:

Firewall is a feature used for Network Security. In a Network there is always danger of information leaking out or leaking in. Firewall is a feature which forces all information entering or leaving the network to pass through a check to make sure that there is no unauthorized usage of the network.

(1 Mark for correct definition)

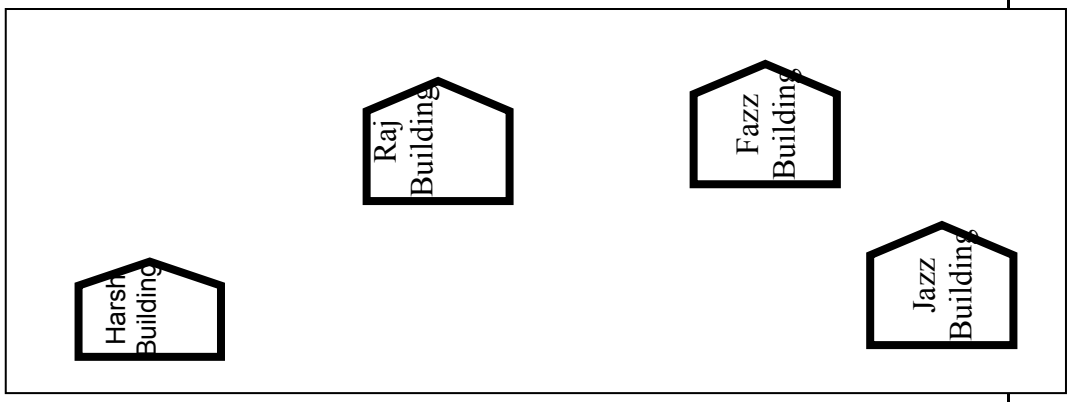
f) What is the importance of URL in networking? 1

Answer:

URL stands for Uniform Resource Locator. Each page that is created for Web browsing is assigned a URL that effectively serves as the page's worldwide name or address. URL's have three parts: the protocol , the DNS name of the machine on which the page is located and a local name uniquely indicating the specific page(generally the filename).

(1 Mark for correct significance)

e) Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:



Center to center distances between various buildings is as follows:

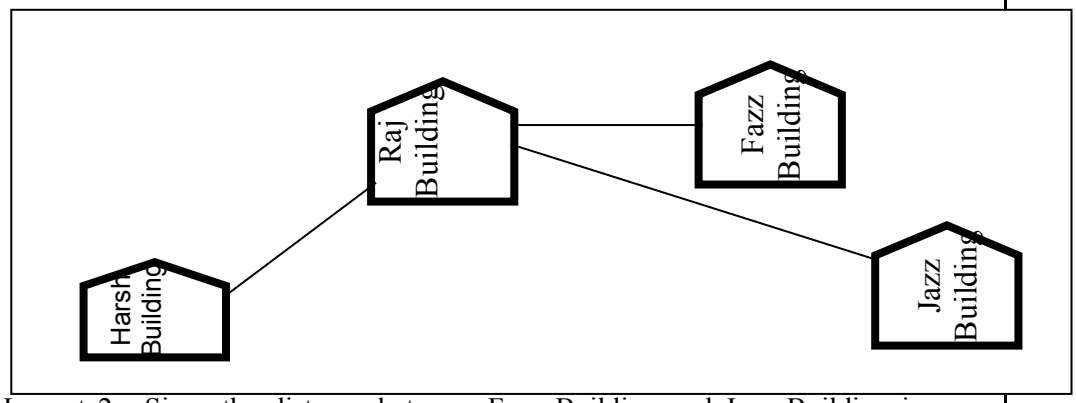
Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m

Number of Computers in each of the buildings is follows:

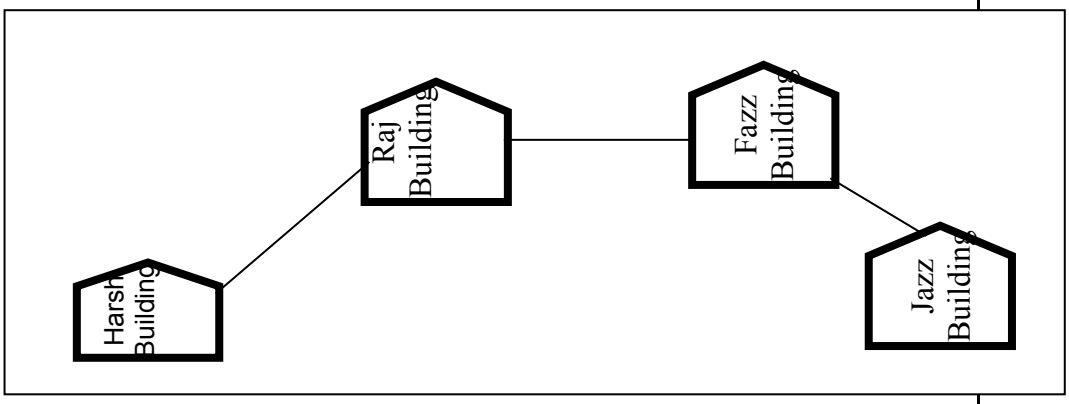
Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Bulding	25

e1) Suggest a cable layout of connections between the buildings. 1

Answer:Layout 1:



Layout 2: Since the distance between Fazz Building and Jazz Building is quite short



(1 Mark for appropriate layout)

e2) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason. 1

Answer:

The most suitable place / block to house the server of this organisation would be Raj Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

(1 mark for correct placement)

e3) Suggest the placement of the following devices with justification: 1

(ii) Internet Connecting Device/Modem (ii)Switch

Answer:

(i)	Raj Building
(ii)	In both the layouts, a hub/switch each would be needed in all the buildings, to interconnect the group of cables from the different computers in each block

(½ Mark for placement of each device correctly)

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer. 1

Answer:

The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan Area Networks) are the networks that link computer facilities within a city.

(½ mark for correct type and ½ mark for correct justification)