CBSE

CLASS – XII

COMPUTER SCIENCE

OLD

Name of the Student

_____

CHAPTERWISE MODELWISE

OLD QUESTIONS

&

ANSWERS

(Source of Grasping Subject & Gaining Marks)

(Maximum Questions covered from 1998 to 2019 CBSE Papers)

(Material for the last batch : 2019-20)

C++

Data Structures
Structured Query Language
Boolean Algebra
Networking & Open Source Concepts

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"THE FEAR OF THE LORD IS THE BEGINNING OF WISDOM"

CONTENTS

Dear Student/Reader, I have prepared this material with the good intention to make the XIIth class computer students to understand all the important models and to score good marks. By practicing this material students will get good marks. But to score full marks, one must prepare all the syllabus prescribed by CBSE.

As I have prepared the above material through my own answers, marking schemes from CBSE, copied material from various other sources, etc, there are some spelling mistakes, or any other errors. So reader should read carefully. I am not responsible for any errors that creep in this material.

****ALL THE BEST****

Your 's Ever…. Dear….

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XII COMPUTER

1. C++ REVISION TOUR

MODEL WISE QUESTION & ANSWERS

Note:This material is prepared for thorough practice of important models from old questions and thereby getting good marks and student is advised to prepared all the syllabus prescribed by CBSE.

MODEL 1A: Name the types of tokens. 2 Marks

1. Write the type of C++ Operators (Arithmetic, Logical , Operators) from the following. 2019SP
(i)! (ii)!= (iii)&& (iv) %
A)(i)Logical (ii)Relational (iii)Logical (iv)Arithmetic

2. Write the type of C++ tokesn (keywords and user defined identifiers) from the following: (2018)
(i) else (ii) Long (iii) Queue (iv) _Count
(**Note :** Actually (iii) option is given wrong as 4Queue.For 4Queue – Answer will be "None")
Ans) (i) else – Keyword
(ii) Long – User defined Identifier
(iii) Queue – User defined Identifier
(iv) _Count – User defined Identifier

3.Write the type of C++ tokens (keywords and user defined identifiers) from thefollowing: (2017)
(i) new (ii) While (iii) case (iv) Num_2
Ans) (i) new - Keyword
(ii) While - User defined Identifier
(iii) case - Keyword
(iv) Num_2 - User defined Identifier

MODEL 1B: Valid/Invalid Identifiers. 2 Marks

1. Out of the following, find those identifiers, which can not be used for namingVariable, Constants or Functions in a C++ program: 2016
Total*Tax, double, Case, My Name,
NeW, switch, Column31, _Amount
A) Total*Tax, double, My Name, switch

2. Find the correct identifiers out of the following, which can be used for naming Variable, Constants or Functions in a C++program: 2015
For, while, INT, NeW, delete,
1stName, Add+Subtract, name1
A) For, INT, NeW, name1

MODEL 2A)Which C++ header file(s) are essentially required to be included to run/execute the following C++ code: 1 Mark

1) Write the names of the correct header files, which must be included in the following C++ code to compile the code successfully: (2019)

```
void main( )
{ char L[ ]="CS 2018";
  int N=strlen(L);
  cout<<L[N-1];
}
```

Ans: iostream.h, string.h

2. Observe the following program very carefully and write the name of those header file(s), which are essentially needed and execute the following program successfully: 2019SP

```
void main()
{char text[20], newText[20];
  gets(text);
  strcpy(newText,text);
  for(int i=0;i<strlen(text);i++)
    if(text[i]=='A')
        text[i]=text[i]+2;
  puts(text);
}
```

Ans: stdio.h, string.h

3. The following C++ code during compilation reports errors as follows: 2018
Error: 'ofstream' not declared
Error: 'strupr' not declared
Error: 'strcat' not declared
Error: 'FIN' not declared
Write the names of the correct header files, which must be included to compile the code successfully:

```
void main( )
{       ofstream  FIN("WISH.TXT");
        char TEXT2[ ]="good day";
        char TEXT1[ ]="John!";
        strupr(TEXT2);
        strcat(TEXT1, TEXT2);
        FIN<<TEXT1<<endl;
}
```

Ans:(i) fstream.h (ii) string.h

4) Raman suggests Kishan the following header files which are required to be included in the given C++ program. Identify the header files which are **wrongly** suggested by Raman. **2018MP**

```
void main( )
{  char Grade;
   cin.get(Grade);
    if(isalpha (Grade))
          cout.put(Grade);
}
```

Suggested header files:-
1. iostream.h 2. stdio.h
3. conio.h 4. ctype.h
Ans) stdio.h, conio.h

5. Anil typed the following C++ code and during compilation he found three errorsas follows:
(i) Function strlen should have prototype
(ii) Undefined symbol cout
(iii) Undefined symbol endl
On asking, his teacher told him to include necessary header files in the code.Write the names of the header files, which Anil needs to include, for successfulcompilation and execution of the following code **2017**

```
void main( )
{ char Txt[] = "Welcome";
  for(int C= 0; C<strlen(Txt); C++)
      Txt[C] = Txt[C]+1;
  cout<<Txt<<endl;
}
```

Ans) string.h, iostream.h OR fstream.h (iomanip.h also)

6) Which C++ header file(s) are essentially required to be included torun/execute the following C++ code : 2017MP

```
void main()
{ char *word1="Hello",*word2="Friends";
  strcat(word1,word2);
  cout<<word1;
}
```

A)iostream.hstring.h

7)Ronica Jose has started learning C++ and has typed the following program. Whenshe compiled the following code written by her, she discovered that she needs toinclude some header files to successfully compile and execute it. Write the namesof those header files, which are required to be included in the code. **2016**

```
void main()
{  double X,Times,Result;
   cin>>X>>Times;
   Result=pow(X,Times);
   cout<<Result<<endl;
}
```

A) ● iostream.h (also iomanip.h) ● math.h

8) Observe the following program very carefully and write the nameof those header file (s), which are essentially needed to compileand execute the following program successfully: **2015**

```
typedef char STRING[80];
void main( )
{       STRING Txt[] = "We love Peace";
        int Count=0;
        while (Txt[Count]!='\0')
        if (isalpha(Txt[Count]))
                Txt[Count++]='@' ;
        else
                Txt[Count++]='#' ;
        puts (Txt) ;
}
```

A)ctype.h, stdio.h

9) Observe the following C++ code and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler: **2014**

```
void main( )
{   char CH,STR[20];
    cin>>STR;
   CH=toupper(STR[0]);
 cout<<STR<<"start with"<<CH<<endl;
}
```

A)iostream.h and ctype.h

10) Observe the following C++ code and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler: **(2013 D)**

```
void main( )
{  int Number;
   cin>>Number;
   if (abs(Number)= = Number);
        cout<<"Positive"<<endl;
}
```

A)iostream.h, math.h

11) Which C++ header file(s) are essentially required to be included to run/execute the following C++ source code (Note: Do not include any header file, which is/are not required): **2012**

```
void main( )
{  char TEXT[ ]="SomeThing";
cout<<"Remaining SMS Chars:"<<
        160-strlen(TEXT)<<endl;
}
```

Ans: iostream.h (for cout)
string.h (for strlen( ));

12) Write the names of the header files, which is/are essentially required to run/execute the following c++ code: **2011**

```
void main ( )
{  char CH,Text[ ] ="+ve Attitude";
  for (int I=0 ; Text[I] ! ='\0' ;I++)
      if (Text[I]== '')
          cout<<end1;
      else
      {     CH=toupper (Text [I]) ;
            cout<<CH;
      }
}
```

Ans: iostream.h, ctype.h

13) Which C++ header file(s) will be essentially required to be included to run/execute the following C++ code: **2010**

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

Ans.iostream.h, iomanip.h

14) Name the header files that shall be needed for the following code: **2008**

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

Ans: iostream.h, iomanip.h

15) Name the header file(s) that shall be needed for successful compilation of the following C++ code. **2007**

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

Ans: string.h, stdio.h

MODEL 2b): Write the names of the header files to which the following belongs to : 1 Mark

1) Write the names of the header files to which the following belong: (i)puts ( ) (ii) sin ( ) **(2009 D)**
Ans (i) stdio.h (ii) math.h

2) Write the names of the header files to which the following belong: **(2009 OD)**
(i) **setw( )** (ii) **sqrt( )**
Ans (i) iomanip.h (ii) math.h

3 Name the header file to which the following below:
(i) abs( ) (ii) isupper( ) **(2006 D)**
Ans) (i) abs( ) - math.h, stdlib.h, complex.h
(ii)isupper( ) - ctype.h

4) Name the header file to which the following belong:
i) pow ( ) (ii)random( ) **(2006 OD)**
Ans:(i) abs( ) - math.h, stdlib.h, complex.h
(ii)random( ) - stdlib.h

5) Name the header files to which the following belong:
(i) abs( ) (ii) strcmp( ) **(2005 D)**
Ans) (i) abs( ) - stdlib.h, math.h, complex.h
(ii) strcmp( ) - string.h

6) Name the header files to which the following belong:
(i) puts( ) (ii)isalnum( ) **(2005 OD)**
Ans)(i) puts( ) - stdio.h
(ii)isalnum( ) - ctype.h

7) Write the names of the header files to which the following belong: **(2004)**
(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

8) Name the header file, to which the following built-in function belongs:i) strcmp( ) (ii)getc( ) **(2003)**
Ans: (i) strcmp( ) - string.h
(ii) getc( ) - stdio.h

9)Name the header files of C++ to which the following functions belong: 2 **(2002)**
(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

10) Name the header file to be included for the use of the following built in functions: **(2001)**
(i)getc( ) (ii)strcat()
Ans: (i)getc( ) - stdio.h
(ii)strcat( ) - string.h

11) Name the header file, to which following built in function belong: 2 **(2000)**
(i) isupper( ) (ii)setw()
(iii)exp( ) (iv)strcmp( )
Ans) (i) isupper( ) - ctype.h
(ii)setw( )- iomanip.h (iii)exp( ) - math.h
(iv)strcmp( ) - string.h

12) Name the header file of C++ to which following functions belong. (i)strcat( ) **(1999)**
(ii) scanf( ) (iii) getchar( ) (iv)clrscr( )
Ans: (i)strcat( ) - string.h
(ii)scanf( ) - stdio.h
(iii)getchar( ) - stdio.h
(iv)clrscr( ) - conio.h

13) Name the header files, to which the following built in functions belongs to: **(1998)**
(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

14) Write the names of the header files to which the following belong: **(2008-09 MP1)**
(i) strcmp() (ii) fabs()
Answer: (i)string.h (ii) math.h

15) Write the names of the header files to which the following belong: **(2008-09 MP2)**
(i) frexp() (ii) isalnum()
Answer:(i) math.h (ii) ctype.h

IMPORTANT HEADER FILES & ITS FUNCTIONS

Header File	Functions
ctype.h	isalnum( ), isalpha( ), isdigit( ), islower( ), isupper( ), tolower( ), toupper( )
string.h	strcat( ), strcmp( ), strcpy( ), strlent( ), strchr( ), stricmp( ), strlwr( ), strew( ), strupr( )
iomanip.h	setw( ), setprecision( ), endl, flush( ).
Stdlib.h	abs( ), labs( ), free( ), random( ), atof( ), atoi( ), atol( ),strtol( ), strtod( ), calloc( ), malloc(),realloc( )
iostream.h	(cout,cin – these are streams available in iostream.h) get( ) getline( ) read( ) write( ) put( ) open( ) close( ) flush( ) seekg( ) seekp( ) tellg( ) tellp( ) bad( ) eof( ) fail( ) good( ) clear( )
stdio.h	printf( ) scanf( ) fflush( ) fgetc( ) fgetchar( ) fgets( ) fopen( ) fprintf( ) fputc( ) fputchar( ) fputs( ) fread( ) freopen( ) fscanf( ) fseek( ) fsetpos( ) fwrite( ) ftell( ) fwrite( ) getc( ) getchar( ) gets( ) getw( ) putc( ) putchar( ) puts( ) putw( ) remove( ) rename( )
conio.h	clrscr( ) getch( ) gotoxy( ) cprintf( )
dos.h	sound( ) nosound( ) delay( )
process.h	exit(0)
math.h	acos( ) acosl( ) div( ) exp( ) ceil( ) ceill( ) fabs( ) floor( ) fmod( ) log( ) pow( ) modf( ) poly( ) sqrt( )

MODEL 3a): Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined. Note: Assume all required header files are already being included in the program. 2 Marks

1) Rewrite the following C++ program after removing any/all syntactical error(s). Underline each correction done in the code:
Note: Assume all required header files are already included in the program.
#define Area(L, B) = L*B **(2019)**
structure Recta
{ int Length, Breadth;
};

```
void main( )
{ Recta R=[10,15];
  cout<<Area(Length.R, Breadth.R);
}
```

Ans)

```
#define Area(L, B)  L*B       //Error 1
struct Recta                  //Error 2
{      int Length, Breadth;
};
void main( )
{
  Recta R={10,15};            // Error 3
  cout<<Area(R.Length, R.Breadth);//Error 4
}
```

2.Rewrite the following C++ code after removing any/all Syntactical Error(s) with each correction underlined. 2019SP

Note: Assume all required header files are already being included in the program.

```
#define float PI 3.14
void main( )
{  float R=4.5,H=1.5;
    A=2*PI*R*H + 2*PIpow(R,2);
    cout<<'Area='<<A<<endl;
}
```

Ans:

```
#define PI 3.14                          //Error 1
void main( )
{ float R=4.5,H=1.5;
  floatA=2*PI*R*H + 2*PI*pow(R,2);    //Error 2, 3
  cout<<"Area="<<A<<endl;             //Error 4
}
```

3. Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined. (2018)

Note: Assume all required header files already included in the program.

```
Typedef Count int;
void main( )
{ Count C;
  Cout<<"Enter the count: ";
  cin>>C;
  for (K=1;K<=C;K++)
     cout<<C "*" K<<endl;
}
```

Ans:

```
typedef  int Count ;                 //Error 1, Error 2
void main()
{
Count C;
int K;              //OR Count K;      //Error 3
cout<<"Enter the count:";
cin>>C;
for (K = 1; K<=C; K++)
// OR for ( int K = 1; K<=C; K++)          //Error 3
// OR for ( Count K = 1; K<=C; K++)        //Error 3
cout<< C << "*" << K <<endl;       //Error 4
// OR cout<< C * K <<endl;                 //Error 4
}
```

4) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. **(2018 MP)**

```
#include<iostream.h>
#include<conio.h>
Typedef int Num;
Num full=100;
Num Calc(int X)
{  full = (X>2)?1:2;
   Return (full%2)
}
void main
{  int full = 1000;
   full = Calc (::full);
   cout<<::full<<"::">>full>>endl;
}
```

A)

```
#include<iostream.h>
#include<conio.h>
typdef int Num;
//Typedef should be written as typedef
Num full=100;
Num Calc(int X)
{  full=(X>2)?1:2;
    return (full%2);          //; is missing
}
void main( )
{  int full=1000;
   full=Calc(::full);
   cout<<::full<<"::"<<full<<endl;
}
```

5) Rewrite the following C++ code after removing any/all syntactical errorswith each correction underlined.**Note:** Assume all required header files are already being included in theprogram **(2017)**

```
void main()
{   cout<<"Enter an Alphabet:";
    cin>>CH;
    switch(CH)
    case 'A' cout<<"Ant"; Break;
    case 'B' cout<<"Bear" ; Break;
}
```

Ans)

```
{cout<<"Enter an Alphabet:";
  char CH;                          // Error 1
  cin>>CH;
  switch(CH)
  {                                 // Error 2(i)
    case 'A':                       // Error 3(i)
    cout<<"Ant"; break;             // Error 4(i)
    case 'B' :                      // Error 3(ii)
    cout<<"Bear"; break;            // Error 4(ii)
   }                                // Error 2(ii)
}
```

6) Rewrite the following C++ code after removing any/all syntactical errors with eachcorrection underlined. Note: Assume all required header files are already being included in the program. (2016)

```
#define Formula(a,b) = 2*a+b
void main()
{ float X=3.2;Y=4.1;
  Z=Formula(X,Y);
  cout<<'Result='<<Z<<endl;
}
```

A)
```
#define Formula(a,b) 2*a+b
 void main()
{      float X=3.2 , Y=4.1;
       float Z=Formula(X,Y);
       cout<<"Result="<<Z<<endl;
 }
```

7) Observe the following C++ code very carefully and rewrite itafter removing any/all syntactical errors with each correctionunderlined.
Note: Assume all required header files are already being includedin the program. **(2015)2**

```
#Define float MaxSpeed=60.5;
void main()
{ int MySpeed
  char Alert='N' ;
  cin»MySpeed;
  if MySpeed>MaxSpeed
  Alert='Y' ;
  cout<<Alert<<endline;
}
```

A)
```
#define float MaxSpeed 60.5 ; //Error 1,2,3
void main()
{   int MySpeed ;                          //Error 4
    char Alert='N';
    cin>>MySpeed;
    if (MySpeed>MaxSpeed)                  //Error 5
    Alert='Y';
    cout<<Alert<< endl;                    //Error 6
}
```

8) Rewrite the following C++ code after removing all the syntax error(s), if present in the code. Make sure that you underline each correction done by you in the code. **(2014)**

Important Note:
-Assume that all the required header files are already included, which are essential to run this code.
-The correctons made by you do not change the logic of the program.

```
Typedef char[80] STR;
void main( )
{Txt STR;
 gets(Txt);
 cout<<Txt[0]<<'\t'<<Txt[2];
 cout<<Txt<<endline;
}
```

A)
```
typedef char STR[80];
void main( )
{       STR Txt;
        gets(Txt);
        cout<<Txt[0]<<"\t"<<Txt[2];
        cout<<Txt<<endl;
}
```

9) Observe the following C++ code carefully and rewrite the same after removing all the syntax error(s) present in the code. Ensure that you underline each correction in the code. (2013)

Important Note:
-All the desired header files are already included, which are required to run the code.
-Correction should not change the logic of the program

```
#define Convert  (P,Q)  P+2*Q;
void main( )
{Float A,B, Result;
 cin>>A>>B;
 Result=Convert [A,B];
 cout<<"Output:"<<Result<<endline;
}
```

A)
```
#define Convert(P,Q)  P+2*Q
//No semicolon, and space between Covert and (P,Q)
void main( )
{
float A, B, Result;   //keywords should be in small case
cin>>A>>B;
Result=Convert(A,B);     //(A,B) instead of [A,B]
cout<<"Output:"<<Result<<endl;
                          //endl instead of endline;
}
```

10) Rewrite the following program after removing the syntactical errors (if any).Underline each correction. (2011)

```
include<iostream.h>
typedef char [80] String;
void main ( )
{  String S= "Peace";
    int L=strlen(S) ;
    cout<<S<<'has'<<L<<'characters'<<end1;
}
```

Ans:
```
#include<string.h>
#include<iostream.h>
typedef char String [80];
void main ( )
{  String S = "Peace";
   int L= strlen(S) ;
   cout<<S<<"has"<< L <<"characters"<<end1;
}
```

11) Rewrite the following program after removing the syntax error(s) if any.Underline eachcorrection.2

```
#include<iostream.h>                    (2008)
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;
 }
```

12) Rewrite the following program after removing the syntactical error(s), if any.Underline each correction.2 **(2007)**

```
#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];
}
```

13) Rewrite the following program after removing the syntactical error(s), if any.Underline each correction **(2006)**

```
#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
}
```

14) Rewrite the following program after removing the syntactical error(s), if any.Underline each correction. **(2005)**

```
#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;
}
```

15) Rewrite the corrected code for the following program. Underline each correction if any. **(2004)**

```
 #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;
 }
```

16) Rewrite the following program after removing all the syntax error(s) if any. **(2003)**

```
#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;
     }
}
```

17)Find the syntax error(s), if any, in the following program. (2002)

```
#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;
}
```

18) Will the following program execute successfully? If not, state the reason(s) **(2000)**

```
#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;
}
```

19) Find the syntax error(s), if any, in the following program: **(1999)**

```
#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.

20) Find the syntax error(s), if any, in the following program: **(1998)**

```
include<iostream.h>
void main( )
{    int R; W=90;
     while W>60
     {    R=W-50;
          switch(W)
          {   20:cout<<"LowerRange"<<endl;
              30:cout<<"MiddleRange "<<endl;
              40:cout<<"HigherRange"<<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<<"LowerRange"<<endl;
       case 30:cout<<"MiddleRange "<<endl;
       case 40:cout<<"HigherRange"<<endl;
    }
   }
}
```

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

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

Ans: (**MP2 2009-10)**

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

MODEL 3b): Rewrite the following program after removing the syntactical errors (if any). Underline each correction (Using Class) -2 Marks

REFER CLASSES CHAPTER

MODEL 4a): Write the **output** of the following C++ program code (2 Marks).
Note: Assume all required header files are already being included in the program (**using pointers)**

REFER IN POINTERS CHAPTER

MODEL 4b): Output**(Using Class Concept)–3M**

REFER IN CLASSES CHAPTER

MODEL 4c): Output **(Converting a string)–2 or 3M**

1.Find and write the output of the following C++ program code: 2019SP

```
typedef char STRING[80];
void MIXNOW(STRING S)
{ int Size=strlen(S);
  for(int I=0;I<Size;I+=2)
  {char WS=S[I];
   S[I]=S[I+1];
   S[I+1]=WS;
}
for (I=1;I<Size;I+=2)
if (S[I]>='M' && S[I]<='U')
S[I]='@';
}
void main()
{   STRING Word="CBSEEXAM2019";
    MIXNOW(Word);
   cout<<Word<<endl;
}
```

Ans: BCE@XEMA0291

Word	Output
JNVWGAP&2019	NJWVAG&@0291
2015 elr#NAVODAYA$	0251e rlN#VAD@YA$A

2)Find and write the output of the following C++ program code: (2016)
Note: Assume all required header files are already included in the program.

```
typedef char TEXT[80];
void JumbleUp(TEXT T)
{int L=strlen(T);
for (int C=0;C<L;C+=2)
{    char CT=T[C];
     T[C]=T[C+1];
     T[C+1]=CT;
}
for (C=1;C<L;C+=2)
   if (T[C]>='M' && T[C]<='U')
        T[C]='@';
}
void main()
{   TEXT Str="HARMONIOUS";
    JumbleUp(Str);
    cout<<Str<<endl;
}
```

A) AHM@N@OIS@

Str	Output
RAVI KIRAN	A@IVK RINA
2019 BEGINNING	0291B GENII@G@
welcome to C++	ewclmo eotC ++
OUTPUT#testing*	U@P@T@t#seitgn

3) Find. The output of the following program:

```
#include <iostream.h>                    (2010)
#include <ctype.h>
```

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

Ans. NEW TEXT :@@e@ccddIIe

MyText	Output
WelcoMe&2019	WWLLOOEE2211
137Asdf!Qwer$	117@SSFFQQEE$

4) Find the output of the following program:

```
#include <iostream.h>                                    (2009)
#include <ctype.h>
void Secret (char Mig[ ], int N);
void main ( )
{   char SMS[ ] = "rEPorTmE" ;
   Secret(SMS,2);
   cout<<SMS<<endl;
}
void Secret(char Msg[ ], int N)
{  for (int C=0; Msg[C] !=' \0' ;C++)
   if (C%2==0)
        Msg[C] = Msg[C]+N;
   else if (isupper(Msg[C]))
            Msg[C] = tolower(Msg[C]);
    else
            Msg[C] = Msg[C]-N;
}
```

Ans: teRmttoe

SMS	Output
WelcoMeToAP	YcnaqmgtqaR
SecretOpeRation	UcepgrQngrcrkmp
KVSchool	MvUajmqj

5)Find the output of the following program:

```
#include<iostream.h>                                    (2008)
#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: hat@*PVUQVU*

MyString	Output
Beautiful@2019	Cautiful@*****
313$uGLY#212	****GHMZ****
TSModelSch	UTNdelSTh
TSModelSch!	UTNdelSTh!*

6) Find the output of the following program

```
#include<iostream.h>                                    (2005)
#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: 3116*tESTS*AHEAD
DAEHA*SSTEt*6113

Message	Output
WelcoMe to 2378 Exams	wELCOmE*TO*3489*eXAMS SMAXe*9843*OT*EmOCLEw
WelcoMe to 2378 Exam	wELCOmE*TO*3489*eXAM MAXe*9843O*T*EmOCLEw
1245RAJU@Temp%	2356raju*tEMP* *PMEt*juar6532

7)Give the output of the following program segment(Assuming all required header files are included in the program): (2000)

```
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: A OROoIiE

NAME	Output
2019 Jnv Selection	2019 NV ELECTION
Hamu%Nava%Yug$2019	GAMU%%AVA%XUG$2019

8) Give the **output** of the following program segment:

```
char *NAME="IntRAneT";        (1998)
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: iNTTaNEE

NAME	Output
APWestBhi	aawESTbHI
UniEarAsiaIndia	uNIIARaSIAiNDIA

9)Find the output of the following program:

```
#include <iostream.h>                    (MP1 2008-09)
#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@EArTH

Text	Output
Human Being%2019	@uMaN @eInG%@0@9
2019#JNVHyd	@0@9@J@V@yD

10) Find the output of the following program:

```
#include <iostream.h>          (MP1 2009-10)
void Secret(char Str[ ])
{  for (int L=0;Str[L]!='\0';L++);
   for (int C=0;C<L/2;C++)
   if (Str[C]=='A' || Str[C]=='E')
         Str[C]='#';
   else
   { char Temp=Str[C];
         Str[C]=Str[L-C-1];
         Str[L-C-1]=Temp;
    }
}
void main()
{    char Message[ ]="ArabSagar";
     Secret(Message);
     cout<<Message<<endl;
}
```

A) #agaSbarr

Message	Output
JaWaHar NavoDAYA	AYADovaN raHaWaJ
2019&JNV*AP	PA*VNJ&9102

MODEL 4d): Output (Using functions) – 2 or 3 Marks

1) Find and write the output of the following C++ program code: (2019)

Note : Assume all required header files are already included in the program.

```
void Convert(float &X, int Y=2)
{ X=X/Y;
  Y=X+Y;
cout<<X<<"*"<<Y<<endl;
}
void main( )
{ float M=15, N =5;
  Convert(M,N);
  Convert(N);
  Convert(M);
}
```

Ans: 3*8
2.5*4
1.5*3

2) Find and write the output of the following C++ programs code: (2018)

Note: Assume all required header files are already included in the program.

```
void Revert(int &Num, int Last=2)
{  Last = (Last%2= =0) ? Last +1 : Last – 1;
   for(int C=1; C<=Last; C++)
        Num + = C;
}
void main( )
{   int A=20,B=4;
    Revert (A,B);
    cout<<A<<"&"<<B<<endl;
    B- -;
    Revert(A,B);
    cout<<A<<"#"<<B<<endl;
    Revert(B);
    cout<<A<<"#"<<B<<endl;
}
```

Ans) 35&4
38#3
38#9

3)Write the output of the following C++ program code:Note: Assume all required header files are already beingincluded in the program. **(2015)**

```
void Location(int &X,int Y=4)
{   Y+=2;
    X+=Y;
}
void main()
{         int PX=l0,PY=2;
          Location(PY) ;
          cout<<PX<<" , "<<PY<<endl ;
          Location(PX,PY);
          cout<<PX<<" , "<<PY<<endl ;
}
```

A) 10, 8
20, 8

(4) Find the output of the following program:3
#include<iostream.h> **(2011)**
```
void SwitchOver(int A [ ], int N, int Split)
{  for (int K=0 ; K<N; K++)
   if (K<Split)
        A(K]+ =K;
   else
     A [K]*=K;
}
void Display (int A [ ], int N)
{
for (int K=0 ; K<N ; K++)
  (K%2==0)? Cout<<A[K]<<"%":cout<<A(K]<<endl;
}
void main ( )
{  int H[ ]= {30,40,50,20,10,5};
   SwitchOver (H, 6, 3);
   Display (H, 6);
}
```
Ans: **30%41**
52%60
40%25

5)Find the output of the following program3
#include<iostream.h> **(2007)**
```
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: **10,15,20,25,30,**
10,15,20,
Number =30

6) Write the output of the following program: **(2003)**
```
#include<iostream.h>
int Execute(int M)
{  if(M%3==0)
      return M*3;
  else
     return M+10;
 }
 void Output(int B=2)
 {  for(int T=0;T<B;T++)
           cout<<Execute(T)<<"*";
           cout<<endl;
 }
 void main( )
 {    Output(4);
      Output( );
      Output(3);
 }
```
Output:
0*11*12*9*
0*11*
0*11*12*

7)Write the output of the following program 3
#include<iostream.h> **(2002)**
```
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: **18,4**

8) Give the output of the following program: **(2001)**
```
#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: **-13,-130**
-13,20
33,330
-13,33

9)Write the output of the following program
#include<iostream.h> **(2000)**
```
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: **2023**
1023
1111

10) Write the output of the following program.
#include<iostream.h> **(1999)**
```
static int i=100;
void abc( )
{  static int i=8;
  cout<<"first  ="<<I;
 }
 main( )
 {  static int i=2;
    abc( );
    cout<<"second ="<<i<<endl;  }
```
Ans: **First =8second =2**

11) Write the output of the following program:
#include<iostream.h> **(1998)**
```
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
```

12) Find the output of the following program3
#include <iostream.h> **(MP2 2008-09)**
```
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#

MODEL 4e): Output (Using functions & Structures) – 3M

(1) Write the output of the following C++ program code(assume all necessary header files are included in program): **(2018 MP)**
```
struct Ticket
{   char Level;
   int Price;
}
void Compute(Ticket &T)
{  if (T.Level = ='A')
     T.Price += 50;
   else if (T.Level = = 'B')
     T.Price += 30;
   else if(T.Level = ='C')
     T.Price +=25;
   cout<<T.Level<<"::"<<T.Price<<endl;
}
void main( )
{  Ticket Mon_Show[ ]={{'C',250},{'A',300},{'B',350}};
  for(int count=2;count>=0; )
   {   compute(Mon_Show[count- -]);
   }
}
```
Ans) B:380
A:350
C:275

2) Find the output of the following program: 3
#include <iostream.h> **(2010)**
```
struct THREE_D
{   int X,Y,Z;};
void MoveIn(THREE_D &T, int Step=l)
{          T.X+=Step;
           T.Y-=Step;
           T.Z+=Step;
}
void MoveOut(THREE_D &T, int Step=l)
{          T.X-=Step;
           T.Y+=Step;
           T.Z-=Step;
}
void main ()
{  THREE_D Tl={lO,20,5},T2={30,lO,40};
   MoveIn(T1);
   MoveOut(T2,5) ;
   cout<<Tl.X<<","<<Tl.Y<<","<<T1.Z<<endl;
   cout<<T2.X<<","<<T2.Y<<","<<T2.Z<<endl;
   MoveIn(T2,l0);
   cout<<T2.X<<","<<T2.y<<","<<T2.Z<<endl;
}
```
Ans. **11, 19, 6**
25, 15, 35
35, 5, 45

3) Find the output of the following program:
#include<iostream.h> **(2005)**
```
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
```

4) Give the output of the following program:
#include<iostream.h> **(2003)**

```
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
```

5)Find the output of the following program:
#include <iostream.h>**(MP1 2008-09)** (**MP1 2009-10)**

```
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

MODEL 4f): Output **(Mislleneous) – 2M**

1. Find and write the output of the following C++ program code:Note: Assume all required header files are already included in theprogram. **(2017)**

```
#define Diff(N1,N2) ((N1>N2)?N1-N2:N2-N1)
void main()
{    int A,B,NUM[] = {10,23,14,54,32};
    for(int CNT =4; CNT>0; CNT--)
    {        A=NUM[CNT];
             B=NUM[CNT-1];
             cout<<Diff(A,B)<<'#';
     }
}
```

Ans) **22#40#9#13#**

2.Find the output of the following program:2
#include <iostream.h> **(2012)**

```
#include <ctype.h>
typedef char str80[80] ;
void main ( )
{ char *Notes ;
  str80 str="vR2GooD";
  int L=6;
  Notes=Str;
  while (L>=3)
  {Str[L]=(isupper(Str[L])?tolower(Str[L]):
   toupper(Str[L]));
   cout<<Notes<<endl;
   L--;
   Notes++;
  }
}
```

Ans) **vR2Good**
R2GoOd
2GOOd
gOOd

3) Find the output of the following program: 2
#include<iostream.h> **(2008)**

```
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: **Line15&8**
Line211&9
Line16&9
Line212&10

4. Find the output of the following program.
#include<iostream.h> **(2006 D)**

```
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: **2**

5)Find the output of the following program
#include<iostream.h **(2006)**

```
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: **-2**

6) What will be the output of the following program **(2004)**

```
#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: **5 9**
9 7
7 7
7 9

7)Write the output of the following program **(2002)**

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

Ans: 5,3,4,4

MODEL 5): Possible Output (Random)– 2 or 3 Marks

(1)Observe the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the minimum and maximum values that can possibly be assigned to the variable End. (2019)

Note: Assume all the required header files are already being included in the code.
The function random (N) generates any possible integer between 0 and N-1(both values included).

```
void main()
{ randomize( );
  int A[ ]= {10,20,30,40,50,60,70,80};
  int Start = random(2)+1;
  int End = Start + random(4);
  for(int I=Start; I<=End, I++)
          cout<<A[I]<<"$";
}
```

(i) 10$20$30$ (ii) 20$30$40$50$60$
(iii)30$40$50$60$ (iv) 40$50$60$70$

Ans)

Minimum value of End :
Maximum value of End :

2.Observe the following program and find out, which output(s) out of (i) to (iv) willbe expected from the program? What will be the minimum and the maximum value assigned to the variable Alter?
Note: Assume all required header files are already being included in the program. **2019SP**

```
void main( )
{ randomize();
  int Ar[]={10,7}, N;
  int Alter=random(2) + 10 ;
  for (int C=0;C<2;C++)
  {       N=random(2) ;
          cout<<Ar[N] +Alter<<"#";
  }
}
```

(i) 21#20# (ii) 20#18#
(iii) 20#17# (iv) 21#17#

Ans: The output expected from the program is
(iii) 20#17#
Minimum Value of Alter = 10
Maximum Value of Alter = 11
(**Note:** The above answer is given in the marking Scheme. But I feel personally that the answer is incorrect. Minimum value and maximum value of Alter is correct)

3) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the highest and lowest values that can be assigned in the array A.
Note: 2018

Assume all the required header files are already being included in the code. The function random(n) generates an integer between o and n-1.

```
void main( )
{   randomize( );
    int A[4], C;
    for (C=0;C<4;C++)
         A[C]=random(C+1) + 10;
   for(C=3;C>=0;C- - )
        cout<<A[C]<<"@";
}
```

(i) 13@10@11@10@
(ii)15$14$12$10$
(iii)12@11@13@10@
(iv) 12@11@10@10@

Ans) (i) 13@10@11@10@
(iv) 12@11@10@10@
Highest value that can be assigned in the array A = 13
Lowest value that can be assigned in the array A = 10

4) Consider the following C++ program code and choose the option(s) which are **not** possible as output. Also, print the **minimum** & **maximum** value of variable **Pick** during complete execution of the program.(assume all necessary header files are included in program): **(2018 MP)**

```
const int NUM = 5;
void main( )
{   randomize( );
    int V1=1,V2=5,Pick;
    while (V1<V2)
   {   Pick = random(NUM)+(V2-V1);
       cout<<Pick<<":";
       V1++;
   }
}
```

(a) 5:6:6:6: **(b) 4:7:5:3:**
(c) 8:6:1:2: **(d) 7:5:3:1**

Ans: **Output:** Option (a) & (c)
Maximum value of Pick will be 8
Minimum value of Pick will be 1

5. Look at the following C++ code and find the possible output(s) from theoptions (i) to (iv) following it. Also, write the maximum values that canbe assigned to each of the variables N and M.

Note:● Assume all the required header files are already being included inthe code. **(2017)**

● The function random(n) generates an integer between 0 and n-1

```
void main()
{  randomize();
   int N=random(3),M=random(4);
   int DOCK[3][3] = {{1,2,3},{2,3,4},{3,4,5}};
   for(int R=0; R<N; R++)
   {  for(int C=0; C<M; C++)
         cout<<DOCK[R][C]<<" ";
      cout<<endl;
    }
}
```

Ans:

(i)	(ii)
1 2 3 2 3 4 3 4 5	1 2 3 2 3 4
(iii)	**(iv)**
1 2 2 3	1 2 2 3 3 4

Correct Options : (ii) and (iii)
Maximum value of N = 2
Maximum value M = 3

6)Observe the following program carefully and attempt the given questions:

```
#include<iostream.h>                    (2017 MP)
#include<conio.h>
#include<stdlib.h>
void main()
{clrscr();
 randomize();
char courses[][10]={"M.Tech","MCA","MBA","B.Tech"};
 int ch;
 for(int i=1;i<=3;i++)
 {       ch=random(i)+1;
        cout<<courses[ch]<<"\t";
  }
  getch();
}
```

I. Out of all the four courses stored in the variable courses, which course will never be displayed in the output and which course will always be displayed at first in the output?

Ans: M.Tech will never be displayed in the output.
MCA will always be displayed at first in the output.

II. Mention the minimum and the maximum value assigned to thevariable ch?

Ans: Minimum value of ch=1
Maximum value of ch=3

7)Look at the following C++ code and find the possible output(s) from the options (i)to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable PICKER. **2**

Note:- Assume all the required header files are already being included in the code.
- The function random(n) generates an integer between 0 and n-1 **(2016)**

```
void main()
{ randomize();
  int PICKER;
  PICKER=1+random(3);
 char COLOR[][5]=
          {"BLUE","PINK","GREEN","RED"};
  for(int I=0;I<=PICKER; I++)
 { for(int J=0; J<=I;J++)
       cout<<COLOR[J];
   cout<<endl;
 }
}
```

(i)	(ii)	(iii)	(iv)
PINK PINKGREEN PINKGREENRED	BLUE BLUEPINK BLUEPINKGREEN BLUEPINKGREENRED	GREEN GREENRED	BLUE BLUEPINK BLUEPINKGREEN

A)

(ii)	(iv)
BLUE BLUEPINK BLUEPINKGREEN BLUEPINKGREENRED	BLUE BLUEPINK BLUEPINKGREEN

Minimum Value of PICKER = 1
Maximum Value of PICKER = 3

8) Study the following program and select the possible output(s)from the option (i) to (iv) following it. Also, write the maximumand the minimum values that can be assigned to the variableVAL.

Note:-Assume all required header files are already being included inthe program. **(2015)**
-random(n) function generates an integer between 0 and n-1.

```
void main()
{   randomize();
    int VAL;
    VAL=random(3)+2;
    char GUESS[]="ABCDEFGHIJK";
    for (int I=l;I<=VAL;I++)
    {    for(int J=VAL;J<=7;J++)
            cout«GUESS[J];
        cout«endl;
     }
}
```

(i)	(ii)	(iii)	(iv)
BCDEFGH	CDEFGH	EFGH	FGHI
BCDEFGH	CDEFGH	EFGH	FGHI
		EFGH	FGHI
		EFGH	FGHI

A) (ii) and (iii)
Min Value of VAL = 2
Max Value of VAL = 4

9)Read the following C++ code carefully and find out, which out of the given option (i) to (iv) are expected correct output(s) of it. Also, write the maximum and minimum value that can be assigned to the variable Taker used in the code: (**2014)**

```
void main( )
{ int GuessMe[4]={100,50,200,20};
  Int Taker=random(2)+2;
  For(int Change=0;Change<Taker;Change++)
   Cout<<GuessMe[Change]<<"#";
}
```

(i) 100# (ii) 50#200#
(iii)100#50#200# (iv)100#50#
Answer:(iii) and (iv)
Maximum Value = 3
Minimum Value = 2

10) Based on the following C++ code, find out the expected correct output(s) from the options (i) to (iv). Also, find out the minimum and the maximum value that can be assigned to the variable Trick used in the code at the time when value of Count is 3:

```
void main( )                                    (2013)
{  char Status[ ][10]={"EXCEL","GOOD","OK"};
 int Turn=10, Trick;
 for(int Count=1;Count<4;Count++)
  { Trick=random(Count);
    cout<<Turn-Trick<<Status[Trick]<<"#";
  }
}
```

(i) 10EXCEL#10EXCEL#80K#
(ii) 10EXCEL#80K#9GOOD#
(iii) 10EXCEL#9GOOD#10EXCEL#
(iv) 10EXCEL#10GOOD#80K#
A) Minimum Value for Trick: 0
Maximum Value for Trick: 2
(i) & (iii)

11) Observe the following program and find out, which output(s) out of (i) to (iv) **will not** be expected from the program? What will be the minimum and the maximum value assigned to the variable Chance?

```
#include<iostream.h>                          (2012 D)
#include<stdlib.h>
void main( )
{  randomize( );
   int Arr[ ] ={9,6},N;
   int Chance=random(2)+10;
   for(int C=0;C<2;C++)
   {     N=random(2);
         cout<<Arr[N]+Chance<<"#";
   }
}
```

(i) 9#6# (ii)19#17#
(iii)19#16# (iv) 20#16#
Ans: (i) 9#6#
Minimum Value: 10 Maximum Value: 11

12) Go through the C++ code shown below, and find out the possible output or outputs from the suggested Output Options (i) to (iv). Also, write the minimum and maximum values, which can be assigned to the variable MyNum.

```
#include<iostream.h>                          (2011)
#include <stdlib.h>
void main ( )
{randomize ( ) ;
int MyNum, Max=5;
MyNum = 20 + random (Max) ;
for (int N=MyNum; N<=25;N++)
cout<N<"*";
}
```

(i)20*21*22*23*24*25
(ii) 22*23*24*25*
(iii) 23*24*
(iv)21*22*23*24*25
Ans (ii) 22*23*24*25*
Minimum value 20
Maximum value 24

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

```
#include<iostream.h>                          (2010)
#include <stdlib.h>
const int LOW=25;
void main ()
{    randomize() ;
     int P01NT=5,Number;
    for (int I=1;I<=4;I++)
   {   Number=LOW+random(POINT);
       cout<<Number<<":";
       P0INT--;
    }
}
```

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

Ans. (iv) 29:26:25:26:

Justification is as follows:

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

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

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

```
#include<iostream.h>                          (2009)
#include <stdlib.h>
const int MAX=3 ;
```

```
void main ( )
{          randomize( ) ;
          int Number ;
          Number = 50 + random{MAX) ;
          for (int P=Number; P>=50; P– –)
                    cout<<p<< " # " ;
          cout<<endl;
}
```

(i)53#52#51#50#(ii) 50#51#52#
(iii) 50#51#(iv)51#50#

Ans(iv) 51#50#

(**Solution:** MAX value is 3. That's why random(MAX)can produce 0 or 1 or 2. (random(N)will produce no.between 1 to n-1). The Number value may be 50 or 51 or 52. The P value starts from Number, upto50,each time decreases by 1. So Possible outputs are as follows:
52#51#50#
51#50#
50#.
As the output 51#50# is available in given answers, so 51#50# is the answer.)

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

```
#include<stdlib.h>                                    (2008)
#include<iostream.h>
void main( )
{  randomize( );
char Area[
][10]={"NORTH","SOUTH","EAST","WEST"};
   int ToGo;
   for(int I=0; I<3;I++)
   {   ToGo=random(2) + 1;
      cout<<Area[ToGo]<<":";
    }
}
```

Ans: **Outputs:**

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

Ans) Since random(2) gives either 0 or 1, ToGo value will be either 1 or 2. (random(n) gives you any number between 0 to n-1)Area[1] is "SOUTH".Area[2] is "EAST". Since I value from 0 to 2 (ie<3), 3 iterations will 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 :

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

```
#include<stdlib.h>                                    (2007 D)
#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: (ii) 94

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

```
#include<stdlib.h>                                    (2007)
#include<iostream.h>
void main( )
{ randomize( );
  int Score[ ] = {25,20,34,56,72,63},Myscore;
  cout<<Myscore<<endl;
}
```

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

Ans: Expected Output:

(i) None of the above.

18) 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.

```
//Program:GAME.CPP
#include<stdlib.h>                                    (2005)
#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

19) 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>
#include<stdlib.h>                                    (2008-09 MP1)
void main()
{   int N,Guessme;
    randomize();
    cin>>N;
    Guessme=random(N)+10;
    cout<<Guessme<<endl;
}
```

Ans: **`Maximum Value:24 Minimum Value:10`**

20) 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?

```
#include<iostream.h>                    (2008-09 MP2) (2009-10 MP2)
```

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

Ans: `Maximum Value:19 Minimum Value:10`

21) In the following program, if the value of Guess entered by the user is 65, what will be the expected output(s) from the following options (i), (ii), (iii) and (iv)? **(2009-10 MP1)**

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

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

A) (i) ABBC

MODEL 6): Theory Question – **2M**

1) Write the names of any four fundamental data types of C++. (2019)

A) int, float, double, char, void

2)What is the role of a parameter/argument passed in a function? Can a default value be assigned to a parameter (Yes/No)? If yes, justify your answer with the help of a suitable example otherwise give reason. **(2018MP)**

A) Parameters/arguments are values passed in the function for the attributes which are required by the function to work and provide desired output.

Yes, an argument may be assigned a default value.

E.g.

```
int Sum(int a, int b=10)//Here b is given a default value of 10
{ return (a+b);
}
void main()
{ int x=5;
- cout<<Sum(x);
}
```

Output: 15

3) Explain conditional operator with suitable example? (2017 MP)

A) Conditional operator is also known as ternary operator because itrequires three operands and can be used to replace simple if-elsecode. It is used to check the condition and execute first expression ifcondition is true else execute other.

Syntax:

Conditional expression? Expression 1 : Expression 2;

Explanation:

If the conditional expression is true then expression 1 executesotherwise expression 2 executes.

Example:

```
int y=10,x;
x=y>10?1:0;
cout<<x;
```

Output: 0

4) What is the difference between call by reference and call by value with respect to memory allocation? Give a suitableexample to illustrate using aC++ code. **(2014 OD) (2010 OD)(2009) (2005D)** 2

Call by value	Call by reference
The actual arguments will be copied into formal perameters.	The formal perameters are the reference to the actual arguments
If we done any modifications to the formal perameters, actual arguments will not be modified.	If we done any modifications to the formal perameters, actual arguments will be modified.
We should use call by value when we do not want to change the original values.	We should use call by reference when we want to change the original values.
Formal perameters declaration will not be preceded by & in the function definition.	Formal perameters declaration will be preceded by & in the function definition.

Ex:

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

Here in the above example, A is called by value and B is called byreference.

OUTPUT

Before function call
I=50&J=25
In the function
A=51&B=26
After function call
I=50&J=26

5) What is the benefit of using function prototype for a function? Give a suitable example to illustrate it using a C++ code. **(2013D)**

A) The benefit of using function prototype for a function is that, it tells the compilr that there is a some function defined somewhere in the program and we can access it.

Example:

```
void Add(int,int)              //function prototype
void main( )
{  Add(4,6);
}
void Add(int a, int b)
{
 cout<<a+b;
}
```

6) Give the difference between the type casting and automatic type conversion. Also, give a suitable C++ code toillustrate both **(2012D) (2011 OD) (2010 D)**

Ans.Automatic Type Conversion: It is an implicit process of conversion of a data from one data type to another. It is performed by the compiler.Compiler converts entire expression to biggest datatype so it is also called as type promotion.

Example:

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

Output:A

Type Casting: It is an explicit process of conversion of a data from one type to another.
(It is performed by the programmer.)

Example:

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

Output: 0.5

7) What is the difference between Local Variable and Global Variable?Also, give a suitable C++ code to illustrate both. **(2011D)(2003)**

Ans:Local Variables: Local variables are those variables which are declared within a function or a compound statement(block) and these variables can only be used within that function/scope.

Global Variables: 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. They are also known as External Variables.

Example Code:

```
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.

8) What is the difference between Global Variable and Local Variable?**(2008-09 MP1) (2009-10 MP1)** 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);
}
```

9) What is the difference between Actual Parameter and Formal Parameter?Give an example in C++ to illustrate both types of parameters.**(2009 OD) (2009-10 MP2)**

Ans A parameter used in the function call is known as Actual Parameter. It is used to send the data to function.

A parameter used in the function definition is known as Formal Parameter, Itis used to accept the data from actual parameter.

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

/* Other answer for the same question:

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

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

Eg:

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

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

***/**

10) What is the difference between #define and const? Explain with suitable example. **(2008 D)**

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.

11) Illustrate the use of #define in C++ to define a macro. **(2006 D)**

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.

12) What is the purpose of using a typedef command in C++?Explain with suitable example **(2008 OD)**

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.

13) Differenctiate between a Run Time Error and Syntax Error. Also give suitable examples of each in c++. **(2007 D)**

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+bIn 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.

14) 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 **(2007 OD)**

```
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.

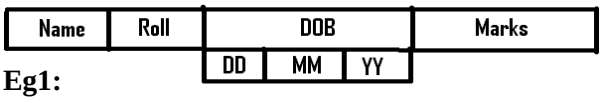
Eg (i) c=a+b

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.

15) What are Nested Structures? Give an example.

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. **(2006 D)**



Eg1:

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

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

Student stud;

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

Eg2:

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

16) Why main( )function is so special. Give two reasons? **(1999)**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.

14)Differentiate between the post increment and pre increment operators. Also, give a suitable C++ code to illustrate both. **(2011-12 MP1)**2

Post Increment: ++ is an increment operator to increment the value of a variable by one. When used after the operand it is known as post increment operator.

Pre Increment: When ++ is used before an operand to increment its value by one, it is called a pre-increment operator.

Example:

```
#include<iostream.h>
void main( )
{ int NUM=9;
  cout<<++NUM; //10 will be displayed
  cout<<NUM++;//10 will be displayed
  cout<<NUM;//11 will  be displayed
}
```

MODEL 7): Write a function definition for the following sequence

1)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. **(2004)**

$1/x - 3!/x^2 + 5!/x^3 - 7!/x^4 + 9!/x^5$ - ------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;
}
```

2) 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: **(2003)**

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

```
#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;
}
```

3) Write a function named SUMFIN( ), with arguments x, N, which returns the sum of N terms of the following series.: **(2001)**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;
}
```

4) 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. **(2000)**

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

```
#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;
}
```

5) Write a C++ function having two value parameters X and N with result type float to find the sum of series given below: **(1998)**

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

```
#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( )
{ 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);
}
```

MODEL 8): Mislleneous

1)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. **(2002)**

```
#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();
}
```

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

```
#include<iostream.h>                    (1999)
#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;
  cout<<"Enter a two digit octal number: ";
  cin>>n;
  x=n/10;
  y=n%10;
  binary(x);
  binary(y);
}
```

2.OBJECT ORIENTED PROGRAMMING
&
3. FUNCTION OVERLOADING

MODEL 1 : PROBLEM

1. Write the output of the following C++ code. Also, write the name of feature of Object Oriented Programming used in the following program jointly illustrated by the Function 1 to Function 4.
(2019SP)(2011)2

```
void My_fun ( )                    // Function 1
{ for (int I=1 ; I<=50 ; I++)
        cout<< "-" ;
  cout<<end1 ;
}
void My_fun (int N)                // Function 2
{ for (int I=1 ; I<=N ; I++)
        cout<<"*" ;
  cout<<end1 ;
}
void My_fun (int A, int B)         // Function 3
{ for (int I=1. ;I<=B ;I++)
        cout <<A*I ;
   cout<<end1 ;
}
void My_fun (char T, int N)        // Function 4
{ for (int I=1 ; I<=N ; I++)
        cout<<T ;
  cout<<end1;
}
void main ( )
{   int X=7, Y=4, Z=3;
    char C='#' ;
    My_fun (C,Y) ;
    My_fun (X,Z) ;
}
```

Ans: ####
71421

Polymorphism OR Function Overloading

2. Which function(s) out of the following can be considered as overloaded function(s) in the same program? Also, write the reason for not considering the other(s) as overloaded function(s).

```
void Execute(char A,int B);        //Function 1
void Execute(int A,char B);        //Function 2
void Execute(int P=10);            //Function 3
void Execute();                    //Function 4
int Execute(int A);                //Function 5
void Execute(int &K);              //Function 6
```

2018

Ans: Option [i]: Functions 1,2,3 are overloaded
Reason: Function 4,5,6 would give ambiguity for Function 3

OR

Option [ii]: Functions 1,2,4,5 are overloaded
Reason: Function 3 and 6 not considered in this case because it would give redeclaration error for Function 5

OR

Option [iii]: Functions 1,2,4,6 are overloaded
Reason: Function 3 and 5 not considered in this case because it would give redeclaration error for Function 6

MODEL 2 : THEORY QUESTION

1. What do you mean by Data Abstraction in OOPs? Explain its significance with a suitable example. (2018 MP)2

A) Data abstraction in OOPs is the process of showing only the essential details of a class without going into background details.

E.g.

```
#include<iostream.h>
class PRODUCT
{  int a,b;
 public:
   void Mult( )
   {   int c;
       cout<<"Enter 2 nos";
       cin>>a>>b;
       c = a*b;
       cout<<"Product is : "<<c;
    }
};
void main( )
{  PRODUCT p;
   p.Mult( );
}
```

In the above example, public member Mult() is invoked using the object p of class PRODUCT.
Thus, demonstrating Data abstraction.

2) Define the term Data Encapsulation in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same.(2005OD)(2009-10MP1)(2008-09MP1)(1998)2

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

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

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

Eg: Here in the above class the data members ie CPU, RAM, STOCK( ) and SHOW( ) are bind together in a class named as Computer. Ie The member functions can access any data member in the class.

Benefits with encapsulation:

(i) Modularity (ii) Information hiding

3) What do you understand by Data Encapsulation and Data Hiding? Also, give a suitable C++ code to illustrate both.**(2010 OD)** (**2009-10 MP1)** (**2008-09 MP1)** 2

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

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

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

4) Define the following terms: (1998)
(i) Inheritance (ii)Encapsulation.

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

Uses of Inheritance:

i)Capability to express the inheritance relationship which ensures the closeness with the real world models.
ii) Reusability.
iii)Transitive nature of inheritance.

Types of Inheritance:

(i) Single Inheritance
(ii) Multiple Inheritance
(iii) Hierarchical Inheritance
(iv) Multi Level Inheritance
(v) Hybrid Inheritance

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

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 **(2015 D)2**

```
{       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.

6. Explain Polymorphism in context of Object Oriented Programming. Also give a supporting example in C++.
(2019) (2009-10 MP1)(2008-09 MP2) (2010 D)2

Ans. The process of using an - operator or a function in different ways for different set of inputs given is known- as polymorphism.

C++ implements polymorphism through virtual functions, through overloaded functions and overloaded operators.

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

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

Example:

```
void Disp()                  //Function 1
{       cout<<"Hello"<<endl;
}
void Disp(int N)             // Function 2
{       for (int I=1;I<=N;I++)
        cout<<I<<end1;
}
void main ()
{ int x=5;
  Disp(x);//call for Function 2 - Prints numbers from 1 to 5
  Disp();   //call for Function 1 - Prints Hello
}
```

7) What is function overloading? Give an example in C++ to illustrate functionoverloading.
(2014 OD)(2009OD) (2003)(2000)

What do you understand by Function overloading or Functional polymorphism? Explain with suitable example. (**2017MP)**

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

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

Example:

```
void Disp()                    //Function 1
{       cout<<"Hello"<<endl;
}
void Disp(int N)               // Function 2
{       for (int I=1;I<=N;I++)
        cout<<I<<end1;
}
void main ()
{ int x=5;
  Disp(x);//call for Function 2 - Prints numbers from 1 to 5
  Disp();   //call for Function 1 - Prints Hello
}
```

8) Write any four important characteristics of Object Oriented Programming? Give example of any one of the characteristics using C++. (2016)2

A) Encapsulation,Data Hiding, Polymorphism, Inheritance, Modularity.

Example of Encapsulation:

```
class student
{  int rno;
   char name[20];
public:
   void input()
   { cin>>rno;
      gets(name);
    }
   void output()
   { cout<<rno<<" "<<name<<endl;
    }
};
```

The data members and member functions are wrapped up together(encapsulated) into a single unit called class.

9) What is the difference between Object Oriented Programming and Procedural Programming? 2

Object Oriented Programming	**Procedural Programming**
• Emphasis on Data	• Emphasis on doing things (functions)
• Follows Bottom-Up approach in program design	• Follows Top-down approach in program design
• Data hiding feature prevents accidental change in data	• Presence of Global variables increase chances of accidental change in data
• Features like data encapsulation, polymorphism, inheritance are present	• Such features are not available

4. CLASSES, 5.CONSTRUCTORS & MODEL WISE QUESTION & ANSWERS

MODEL 1A: Define a class (without strings) (4M)

1. Define a class Ele_Bill in C++ with the following descriptions: 2019SP4

Private members:

Cname of type character array
Pnumber of type long
No_of_units of type integer
Amount of type float.
Calc_Amount( ) This member function should . calculate the amount asNo_of_units*Cost .

Amount can be calculated accordingto the following conditions:

No_of_units	Cost
First 50 units	Free
Next 100 units	0.80 @ unit
Next 200 units	1.00 @ unit
Remaining units	1.20 @ unit

Public members:

* A function Accept( ) which allows user to enter Cname, Pnumber, No_of_units and invoke function Calc_Amount().
* A function Display( ) to display the values of all the data members on the screen.

Answer:

```
class Ele_Bill
{  char Cname[20];
   long Pnumber;
   int No_of_units;
   float Amount;
   void Calc_Amount( );
public:
   void Accept();
   void Display();
};
void Ele_Bill : : Calc_Amount( )
{ if(No_of_units<=50)
  {  Amount=0;
   }
 else if(No_of_units<=150)
 { Amount=(No_of_units-50)*0.80;
 }
 else if(No_of_units<=350)
 {Amount=80+(No_of_units-150)*1.00;
 }
 else
 {Amount=80+200+(No_of_units-350)*1.20;
  }
}
void Ele_Bill :: Accept( )
{ gets(Cname);
  cin>Pnumber>>No_of_units;
  Calc_Amount( );
}
void Ele_Bill :: Display( )
{cout<<Cname<<Pnumber<<No_of_units<<Amount;
}
```

2. Write the definition of a class CONTAINER in C++ with the following description: (2018)

Private Members:

-Radius, Height //float
- Type // int (1 for cone, 2 for cylinder)
- Volume // float
- CalVolume ( ) //Member function to calculate volume as // per the type

Type	Formula to calculate volume
1	3.14 * Radius * Height
2	3.14 * Radius * Height/3

Public Members:

-GetValues( ) /*A function to allow user to enter value of Radius, Height and Type. Also, call function CalVolume( ) from it */

-ShowAll( ) /*A function to display Radius, Height, Type and volume of Container */

Ans)

```
class  CONTAINER
{ float Radius, Height, Volume;
  int Type;
  void CalVolume( );
public:
  void GetValues();
  void ShowAll( );
};
void CONTAINER ::CalVolume( )
{  if (type= =1)
      Volume=3.14*Radius*Height;
  else if (type= =2)
      Volume=3.14*Radius*Height/3;
  }
/*        OR
void CONTAINER::CalVolume()
{  switch (Type)
  { case 1: Volume =3.14*Radius*Height;
              break;
    case 2: Volume=3.14*Radius*Height/3;
}
*/
 void CONTAINER ::GetValues( )
 {   cout<<"Enter value of Radius, Height and Type";
     cin>>Radius>>Height>>Type;
     CalVolume( );
 }
void CONTAINER ::ShowAll( )
{  cout<<"\nRadius  = "<<Radius;
   cout<<"\nHeight  ="<<Height;
   cout<<"\nType = "<<Type;
   cout<<"\nVolume = "<<Volume;
}
```

3) Define a class Bill in OOP with the following specifications:- (2018 MP)

Private members:

1. Bill_no - type long(bill number)
2. Bill_period - type integer(number of months)

3. No_of_calls - type integer(number of mobile calls)
4. Payment_mode - type string("**online**" or "**offline**")
5. Amount - type float(amount of bill)
6. Calculate_Bill() function to calculate the amount of bill given as per the following conditions:

No_of_calls	Calculation Rate/call (in rupees)
<=500	1.0
501 - 1200	2.0
>1200	4.0

Also, the value of Amount should be reduced by 5% if Payment_mode is "online".

Public members:

1. A member function New_Bill() that will accept the values for Bill_no, Bill_period, No_of_calls, Payment_mode from the user and invoke Caluclate_Bill() to assign the value of Amount.
2. A member function Print_Bill() that will display all details of a Bill.

Solution:

```
class Bill
{    long Bill_no;
     int Bill_period;
    int No_of_calls;
    char Payment_mode[8];
    float Amount;
    void Calculate_Bill( )
    {  if(No_of_calls <=500)
            Amount=(No_of_calls)*1.0;
       else if(No_of_calls<=1200)
            Amount =(No_of_calls)*2.0;
       Else
            Amount = (No_of_calls)*4.0;
      if (strcmpi(Payment_mode,"online")==0)
            Amount=Amount- 0.05*Amount;
   }
public:
   void New_Bill( )
  {  cout<<"Enter values for Bill No, Bill Period, No. of
calls & Payment mode (online or offline)";
    cin>>Bill_no>>Bill_period>>No_of_calls;
  gets(Payment_mode);
 Calculate_Bill( );
 }
 void Print_Bill( )
 {   cout<<"Bill No: "<<Bill_no<<endl;
     cout<<"Bill period (in months): "<<Bill_period <<endl;
   cout<<"No. of Calls : "<<No_of_calls<<endl;
 cout<<"Payment mode: "<<Payment_mode<<endl;
 cout<<"Amount of Bill: "<<Amount<<endl;
}
};
```

4.Write the definition of a class BOX in C++ with following description: (2017)

Private Members

- BoxNumber // data member of integer type
- Side // data member of float type
- Area // data member of float type
- ExecArea() // Member function to calculate and assign
// Area as Side * Side

Public Members

- GetBox() // A function to allow user to enter values of
// BoxNumber and Side. Also, this
// function should call ExecArea() to calculate Area
- ShowBox()// A function to display BoxNumber,
//Side and Area

Ans)

```
class BOX
{ int BoxNumber ;
  float Side ;
  float Area ;
   void ExecArea(){ Area=Side*Side;}
public:
   void GetBox();
   void ShowBox();
};
void BOX::GetBox()
{  cin>>BoxNumber>>Side;
   ExecArea();
}
void BOX::ShowBox()
{cout<<BoxNumber<<" "<<Side<<" "<<Area<<endl;
}
```

5) Write the definition of a class CITY in C++ with following description: (2016)

Private Members

Ccode //Data member for City Code (an integer)
CName //Data member for City Name (a string)
Pop //Data member for Population (a long int)
KM //Data member for Area Coverage (a float)
Density //Data member for Population Density (a float)
DenCal() //A member function to calculate Density as PopKM

Public Members

Record() /*A function to allow user to enter values of Acode,Name,Pop,KM and call DenCal() function */
View() /*A function to display all the data members also display a
message "Highly Populated City" if the Density is more than 10000*/

Ans)

```
class CITY
{   int Ccode;
    char CName[20];
    long int Pop;
    float KM;
    float Density;
   void DenCal();
public:
   void Record();
   void View();
};
void CITY::Record()
{   cin>>Ccode;
   gets(CName); // OR cin>>CName;
   cin>>Pop;
   cin>>KM;
   DenCal( );
}
void CITY::View()
{cout<<Ccode<<CName<<Pop<<KM<<Density;
                                    //Ignore endl
 if(Density>10000)
   cout<<"Highly Populated City";  //Ignore endl
}
void CITY::DenCal()
{    Density= Pop/KM;
}
```

6) Define a class Applicant in C++ with following description: (2011)

Private Members

_ A data member ANo (Admission Number) of type long
_ A data member Name of type string
_ A data member Agg (Aggregate Marks) of type float
_ A data member Grade of type char

_ A member function GradeMe() to find the Grade as per the AggregateMarks obtained by a student. Equivalent Aggregate Marks range andthe respective Grades are shown as follows:

Aggregate Marks	Grade
>=80	A
less than 80 and >=65	B
less than 65 and >=50	C
less than 50	D

Public Members

_ A function ENTER() to allow user to enter values for ANo, Name, Agg& call function GradeMe() to find the Grade._ A function_RESULT( ) to allow user to view the content of all the dataMembers

A)

```
class Applicant
{  long ANo;
   char Name [20] ;
   float Agg;
   char Grade;
   void Grademe ( ) ;
public:
  void Enter ( ) ;
  void Result ( ) ;
} ;
void Applicant: :GradeMe( )
{if (Agg>=80)
            Grade=' A' ;
 else if(Agg>=65)
           Grade=' B' ;
 else if(Agg>=50)
           Grade=' C' ;
  else
          Grade=' D' ;
}
void Applicant: :Enter ( )
{cin>>ANo;
 gets (Name) ;
 cin>>Agg;
 GradeMe() ;
}
void Applicant: :Result ( )
{
cout<<ANo<<Name<<Agg<<Grade<<end1;
}
```

7) Define a class STOCK in C++ with following description: (2010)

Private Members

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

Public Members

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

Ans.

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

8) Define a class HOTEL in C++ with the following description: (2009 OD)

Private Members:

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

Public Members

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

Ans

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

```
void HOTEL::Checkin()
{          cin>>Rno;
           gets (Name);
           cin>>Tariff;
           cin>>NOD;
}

void HOTEL::Checkout()
{         cout<<Rno<<" "<<Name<<" "<<Tariff<<"
                  "<<NOD<<CALC ( )<<endl;
}
```

9) Define a class named HOUSING in C++ with the following descriptions: (2006 OD)

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.
}
```

10) Declare a class myfolder with the following specifications: (2004)

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;
        }
   }
```

11) Define a class Student for the following specifications. (2002)

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"<<arks[2]<<"\t";
  cout<<marks[3]<<"\t"<<marks[4]<<"\n";
  cout<<"Percentage ="<<percentage;
 }
};
```

12) 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. **(2001)**
(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;
 }
};
```

13) Define a class worker with the following specification. (2000)
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;
 }
```

14) Define a class Teacher with the following class specification: (1999)

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;
    }
};
```

15) Define a class student with the following specifications: (1998)

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;
   }
 };
```

16)Define a class in C++ with following description:

Private Members (2009-10 MP2) (2008-09MP2)

*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;;
}
```

17) Define a class TEST in C++ with following description: (2008-09MP1) (2009-10 MP1)

Private Members

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

Public Members

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

A)

```
class TEST
{          int TestCode;
           char Description[20];
           int NoCandidate,CenterReqd;
           void CALCNTR();
   public:
           void SCHEDULE();
           void 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();
}
{   cout<<"Test Code :"<<TestCode<<endl;
    cout<<"Description :"<<Description<<endl;
    cout<<"Number :"<<NoCandidate<<endl;;
    cout<<"Centres :"<<CenterReqd<<endl;;
}
```

MODEL 1B: Define a class (with strings) 4 Marks

1) Write the definition of a class GRAPH in C++ with the following description: (2019)

Private Members

- XUnit //integer
- YUnit //integer
- Type //char array of size 20
- AssignType( ) /*Member function to assign value of Type based upon XUnit and YUnit as follows: */

Condition	Type
XUnit = 0 or YUnit = 0	None
XUnit is more than YUnit	Bar
XUnit is less than or equal to YUnit	Line

Public Members: *InXY( ) /* Function to allow user to enter values of XUnit and YUnit and then invoke AssignType( ) to assign value of Type */
*OutXY( ) //Function to display XUnit, YUnit and Type

2.Define a class DanceAcademy in C++ with following description: (2017 MP)

Private Members

- Enrollno of type in
- Name of type string
- Style of type string
- Fee of type float
- A member function chkfee( ) to assign the value of fee variable according to the style entered by the user according to the criteria as given below:

Style	Fee
Classical	10000
Western	8000
Freestyle	11000

Public Members:

*A function enrollment() to allow users to enter values for Enrollno,Name, Style and call function chkfee()to assign value of fee variable according to the Style entered by the user.
*A function display() to allow users to view the details of all the data members.

Ans)

```
class DanceAcademy
{  int Enrollno;
   char Name[20];
   char Style[20];
   float Fee;
   void chkfee()
   {  if(strcmpi(Style, "Classical")= =0)
         Fee=10000;
      else if(strcmpi(Style, "Western")= =0)
         Fee=8000;
      else if(strcmpi(Style, "Freestyle")= =0)
        Fee=11000;
   }
public:
   void enrollment()
   { cout<<"Please enter Enrollno,Name,Style";
     cin>>Enrollno;
     gets(Name);
     gets(Style);
     chkfee();
   }
   void display()
  {cout<<"\n Entered Enrollno, Name, Style and Fee is:"
      <<Enrollno<<"\t"<<Name<<"\t"<<Style<<"\t"<<Fee;
   }
};
```

3)Write the definition of a class Photo in C++ with followingdescription: (2015)

Private Members

Pno //Data member for Photo Number(an integer)
Category //Data member for Photo Category(a string)
Exhibit //Data member for Exhibition Gallery(a string)
FixExhibit //A member function to assign Exhibition //Gallery as per Categoryas shown in the following table

Category	Exhibit
Antique	Zaveri
Modern	Johnsen
Classic	Terenida

Public Members

Register()//A function to allow user to entervalues //Pno,Category and call FixExhibit()function
ViewAll()//A function to display all the datamembers

Ans)

```
class Photo
{  int Pno;
   char Category[20];
   char Exhibit[20];
   void FixExhibit();
public:
   void Register();
   void ViewAll();
};
void Photo::FixExhibit()
{ if(strcmpi(Category,"Antique")= =0)
          strcpy(Exhibit,"Zaveri");
   else if(strcmpi(Category,"Modern")= =0)
          strcpy(Exhibit,"Johnsen");
   else if strcmpi(Category,"Classic")= =0)
          strcpy(Exhibit,"Terenida");
}
void Photo::Register()
{ cin>>Pno;
   gets(Category);
```

```
  FixExhibit();
}
void Photo:: ViewAll()
{     cout<<Pno<<Category<<Exhibit<<endl;
}
```

4) Define a class RESTRA in C++ with following description : 2012

Private Members

FoodCode of type int
Food of type string
FType of type string
Sticker of type string
A member function GetSticker ( ) to assign the following value for Stickeras per the given FType:

FType	Sticker
Vegetarian	GREEN
Contains Egg	YELLOW
Non-Vegetarian	RED

Public Members

A function GetFood () to allow user to enter values for FoodCode.
Food, FType and call function GetSticker() to assign Sticker.
A function ShowFood() to allow user to view the content of all the datamembers.

Ans

```
class RESTRA
{   int FoodCode;
   char Food[20], FType [20],Sticker[20];
   void GetSticker () ;
public:
   void GetFood () ;
   void ShowFood () ;
} ;
void RESTRA::GetSticker()
{   if (strcmp (FType, "Vegetarian") = =0)
         strcpy (Sticker,"GREEN") ;
   else if (strcmp (FType,"Contains Egg")= =0)
        strcpy (Sticker, "YELLOW") ;
  else if (strcmp (FType,'Non-Vegetarian")= =O)
       strcpy(Sticker,"RED");
}
void RESTRA::GetFood()
{  cin>>FoodCode;
   gets (Food);
   gets (FType) ;
   GetSticker () ;
}
void RESTRA::ShowFood ()
{
cout<<FoodCode<<":"<<Food<<FType<<":"<<Sticker<<e
ndl;
}
```

MODEL 1C: Define a class (Using Constructors) 4 Marks

1) Define a class Tourist in C++ with the following specification: (2014)

Data members:

- CNO – to store Cab no
- CType – to store a character 'A','B' or 'C' as City type
- PerKM – to store per kilometer charges
- Distance – to store distance travelled (in km)

Member functions:

- A constructor function to initialize CType as 'A' and CNo as '0000'
- A function CityCharges( ) to assign PerKM as per the following table.

Type	PKM
A	20
B	18
C	15

- A function RegisterCab( ) to allow administration to enter the values for CNo and CType. Also, this function should call CityCharges( ) to assign PerKM Charges.
- A function Display( ) to allow user to enter the value of Distance and display CNo, CType, PerKM, PerKM*Distance(as Amount) on screen.

Answer:

```
class Tourist
{  int CNo;
 char CType;
 int PerKM;
int Distance;
public:
 Tourist( )
{  CType='A';
   CNo=0;
 }
 void CityCharges( )
{  if(CType= ='A')
       PerKM=20;
    else if(CType= ='B')
      PerKM=18;
   else if(CType= ='C')
     PerKM=15;
}
void RegisterCab( )
{ cout<<"Enter the CabNo";
  cin>>CNo;
  cout<<"Enter Cab Type";
  cin>>CType;
  cityCharges( );
}
void Display( )
{    cout<<"Enter the distance";
     cin>>Distance;
     cout<<"Cab No is: "<<CNo<<endl;
  cout<<"Cab Type is : "<<CType<<endl;
  cout<<"Per Kilometer charges is :"<<PerKM<<endl;
  cout<<"Amount is: "<<PerKM*Distance;
}
};
```

2) Define a class Bus in C++ with the following specifications: (2013)

Date Members:

- Busno – to store Bus No
- From – to store Place name of origin
- To – to store place name of destination
- Type – to store Bus Type such as 'O' for ordinary
- Distance – to store the Distance in Kilometers
- Fare – to store the Bus Fare

Member Functions:

- A constructor function to initialize Type as 'O' and Fare as 500
- A function CalcFare( ) to calculate Fare as per the following criteria:

TYPE	FARE
'O'	15*Distance
'E'	20*Distance
'L'	24*Distance

- A function Allocate( ) to allow user to enter values for Busno, From, To, Type and Distance. Also, this function should call CalcFare( ) to calculate Fare.
- A function Show( ) to display the content of all the data members on screen.

Answer:
```
#include<iostream.h>
#include<conio.h>
class Bus
{ private:
        char From[20],To[20];
        int fare,busno,distance;
       char Type;
public:
        Bus( );//Constructor
       ~Bus( );//Destructor
        int CalcFare( );
       void Allocate( );
       void Show( );
};
Bus::Bus( )
{      Fare=500;          Type='O';
}
void Bus::Allocate( )
{     cout<<"Enter the Bus no: ";
      cin>>busno;
      cout<<"From: ";
     cin>>From;
     cout<<"To: ";
     cin>>To;
     cout<<"Enter the Type: ";
     cin>>Type;
     cout<<"Enter the distance: ";
     cin>>distance;
     CalcFare( );
}
int Bus::CalcFare( )
{  if(Type= ='O')
     fare=15*distance;
   else if(Type= ='E')
     fare=20*distance;
   else if(Type= ='L')
      fare=24*distance;
   else
      cout<<Wrong Type";
    return fare;
}
void Bus::Show( )
{cout<<"Bus no: "<<busno<<endl;
 cout<<"From: "<<From<<endl;
 cout<<"To: "<<To<<endl;
 cout<<"Type: "<<Type<<endl;
 cout<<"Distance: "<<distance<<endl;
 cout<<"Total Fare: "<<fare<<endl;
}
Bus::~Bus( )
{    cout<<"Bus Object is Deleted";
}
```

3) Define a class clothing in c++ with the following descriptions : (2008OD)

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( );
}
```

4) Define a class Travel in C++ with the description given below : (2007 OD)

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( )
 {  Travel T;
   T.EnterTravel( );
   T.ShowTravel( );
 }
```

5) Define a class Travel in C++ with the following descriptions: (2005 OD)

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();
}
```

6) Define a class Play in C++ with the following specifications: (2003 D)

Private members of class **Play**

*Play code	integer
*Playtime	25 character
*Duration	float
*Noofscenes	integer

Public member function of class Play

*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( )
        { 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( );
      }
```

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

1) Given the following class Test and assuming all necessary header file(s) included, answer the questions that follow the code: (2019)

```
class Test
{  int Marks;
   char TName[20];
public:
   Test(int M)                    //Function 1
    {   Marks = M;
    }
    Test(char S[ ])               //Function 2
    {   strcpy (TName, S);
    }
    Test (char S[ ], int M)       //Function 3
    {    Marks = M;
         strcpy(TName, S);
    }
    Test (Test &T)                //Function 4
    {    Marks = T.Marks +10;
         strcpy (TName, T.TName);
    }
};
void main ( )
{     Test T1(10);                //Statement I
      Test T2(70);                //Statement II
     Test T3(30, "PRACTICAL");    //Statement III
      _____ ;                     //Statement IV
}
```

(i) Which of the statement(s) out of (I), (II), (III), (IV) is/are incorrect for object(s) of the class Test?

Ans) Statement III

(ii) What is function 4 known as ? Write the statement IV, that would execute Function 4.

Ans) Function 4 is copy constructor.

```
Test T4(T2);          //Statement IV
```

2) Observe the following C++ code and answer the questions (i) and (ii). (2019)

Note: Assume all necessary files are included.

```
class Point
{   int X,Y;
public:
  Point (int I=10, int J=20)      //Function 1
  {   X = J;
      Y = I;
  }
  void Show ( )                   //Function 2
  { cout<<"Points are "<<X<<"&"<<Y<<endl;
  }
  ~Point( )                       //Function 3
  {  cout<<"Points Erased"<<endl;
  }
};
void main( )
{   Point P(5);
    P.Show( );
}
```

(i) For the class Point, what is Function 3 known as ? When is it executed? 1

Ans) Function 3 is destructor. It will be automatically invoked when the scope of the object gets over.

(ii) What is the output of the above code, on execution?1

Ans) Points are 20 & 5
Points Erased

3) Answer the question (i) & (ii) after going through the following code. (assume all necessary header files are included in program):- (2018 MP) 2

```
class Game
{   char Name[21];
    int No_of_Players;
Public:
   Game( )          //Function 1
   {   strcpy (Name, "Cricket");
       No_of_Players = 11;
       cout<<"New Game Starts\n";
   }
Game(char N[ ], int No)      //Function 2
{     strcpy(Name, N);
      No_of_Players = No;
     cout<<Name<<"comprises"<<No_of_Players
                 <<" number of players\n";
}
~Game( )                     //Function 3
   {    cout<<"Game Ends\n";
    }
};
```

(i) Give the name of the feature of OOP which is implemented by Function 1 & 2 together in the above class Game.

Ans) Polymorphism or Function Overloading or Constructor Overloading

(ii) Anuj made changes to the above class Game and made Function 3 private. Will he be able to execute the Line 1 successfully given below? Justify.

```
void main()
{ Game ABC; //Line 1   }
```

Ans) Yes, an error "Destructor for Game is not accessible" will come. As there is a destructor defined in the class and it cannot be made private.

4. Observe the following C++ code and answer the questions (i) and (ii). (2017)

Note: Assume all necessary files are included.

```
class TEST
{long TCode;
char TTitle[20];
float Score;
public:
TEST()                  //Member Function 1
{ TCode=100;
  strcpy(TTitle,"FIRST Test");
  Score=0;
}
TEST(TEST &T)       //Member Function 2
{ TCode=E.TCode+1;
  strcpy(TTitle,T.TTitle);
   Score=T.Score;
}
};
void main()
{_____ //Statement 1
_____ //Statement 2
}
```

i) Which Object Oriented Programming feature is illustrated by the Member Function 1 and Member Function 2 together in the class TEST?

A) Polymorphism OR Constructor overloading OR Function Overloading

ii) Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively.

A)
```
TEST T1;
   TEST T2(T1); //Statement 2
                  OR
    TEST T2=T1; //Statement 2
```

5.Answer the questions(i) and (ii) after going through the following class: (2017 MP)

```
class planet
{char name[20];char distance[20];
public:
 planet() //Function 1
 {strcpy(name, "Venus");
  strcpy(distance,"38 million km");
}
void display(char na[],char d[]) //Function 2
{cout<<na<<"has"<<d<<"distancefromEarth"<<endl;
}
planet(char na[], char d[]) //Function 3
{   strcpy(name,na);
    strcpy(distance,d);
}
~planet() //Function 4
{    cout<<"Planetarium time over!!!"<<endl;
}
};
```

I. What is Function 1 referred as? When will it be executed?

II. Write suitable C++ statement to invoke Function 2.

AnsI. Constructor. It will be executed at the time of object creation.

II.
```
planet p;
   p.display("Pluto","7.5 Billion Km");
```

6) Observe the following C++ code and answer the questions (i) and (ii). Assume allnecessary files are included: (2016)

```
class BOOK
{    long Code ;
   char Title[20];
   float Price;
public:
   BOOK()                          //Member Function 1
   {   cout<<"Bought"<<endl;
       Code=10;
       strcpy(Title,"NoTitle");
       Price=100;
   }
   BOOK(int C,char T[],float P) //Member Function 2
   { Code=C;
     strcpy(Title,T);
     Price=P;
   }
   void Update(float P)            //Member Function 3
   {   Price+=P;
   }
   void Display()                  //Member Function 4
   {cout<<Code<<":"<<Title<<":"<<Price<<endl;
   }
   ~BOOK() //Member Function 5
   {   cout<<"Book Discarded!"<<end1;
    }
};
void main()                                  //Line 1
{                                            //Line 2
   BOOK B,C(101,"Truth",350};                //Line 3
   for (int I=0;I<4;I++)                     //Line 4
   {                                         //Line 5
     B.Update(50);C.Update(20);              //Line 6
     B.Display();C.Display();                //Line 7
   }                                         //Line 8
}                                            //Line 9
```

(i) Which specific concept of object oriented programming out of the following isillustrated by Member Function 1 and Member Function 2 combined together?

● Data Encapsulation ● Polymorphism
● Inheritance ● Data Hiding

Ans Polymorphism

(ii) How many times the message "Book Discarded!" will be displayed afterexecuting the above C++ code? Out of Line 1 to Line 9, which line isresponsible to display the message "Book Discarded!"

Ans 2 times
Line 9

7)Observe the following C++ code and answer the questions (i) and (ii) : (2015)

```
class Passenger
{long PNR;
char Name [20] ;
public:
Passenger()                          //Function 1
{ cout<<"Ready"<<endl;
}
void Book(long P,char N[])           //Function 2
{ PNR = P; strcpy(Name, N);
}
void Print()                         //Function 3
{ cout«PNR << Name <<endl;
}
~Passenger()                         //Function 4
{ cout<<"Booking cancelled!"<<endl;
}
};
```

(i) Fill in the blank statements in Line 1 and Line 2 to executeFunction 2 and Function 3 respectively in the following code:

```
v oid main()
{Passenger P;
_____ //Line 1
_____ //Line 2
}//Ends here
```

Ans P.Book(1234567,"Ravi"); //Line 1
P.Print(); //Line 2

(ii) Which function will be executed at }//Ends here? What is thisfunction referred as ?

AnsFunction 4OR~Passenger(). It is a Destructor function.

8)Answer the questions (i) and (ii) ater going through the following class: (2014)

```
class Hospital
{   int Pno,Dno;
  public:
    Hospital(int PN); //Function 1
   Hospital( );        //Function 2
   Hospital (Hospital &H); //Function 3
  void In( );   //Function 4
  void Disp ( ); //Function 5
};
void main( )
{  Hospital H(20);    //Statement 1
}
```

(i) Which of the function out of function 1,2,3,4 or 5 will get executed when the statement 1 is executed in the above code?

A) Function 1 will be executed when the statement 1 is executed.

(ii) Write a statement to declare a new object G with reference to already existing object H using Function 3.

A) Hospital G(H);

9) Answer the questions (i) and (ii) after going through the following class: (2013)

```
class Race
{int CarNo,Track;
public:
   Race( );//Function 1
  Race(int CN);//Function 2
  Race(Race &R);//Function 3
void Register( );//Function 4
void Drive( );//Function 5
};
void main( )
{
  Race R;
  ----
  ----
}
```

(i) Out of the following, which of the option is correct for calling Function 2?

(a) Option 1 – Race T(30);
(b) Option 2 – Race U(R);

Ans) (a) Option 1 – Race T(30);

(ii) Name the feature of Object Oriented Programming which is illustrated by Function 1, Function 2 and Function 3 combined together.

Anser) Constructor Overloading.

10) Answer the questions (i) and (ii) after going through the following class (2012)

```
class Travel
{int PlaceCode; char Place[20] ; float Charges;
public:
Travel ()                                   //Function 1
{PlaceCode=l;strcpy (Place, "DELHJ:") ; Charges = 1000;
}
void TravelPlan (float C)                   //Function 2
{cout<<PlaceCode<<":"<<Place«":"<<Charges<<endl;
}
~Travel ( ) //Function 3
{Cout<<"Travel Plan Cancelled"<<endl;
}
Travel (int PC, char P[], float C) //Function 4
{PlaceCode=PC;strcpy(Place,P); Charges=C;
}
} ;
```

(i) In Object Oriented Programming, what are Function 1 and Function 4combined together referred as?

Ans (i) Polymorphism OR Constructor Overloading OROverloaded ConstructorORFunction Overloading OROverloaded FunctionsOR
Default Constructor and Parameterized Constructor

(ii) In Object Oriented Programming, which concept is illustrated byFunction 3? When is this function calledlinvoked?

Ans. (ii) Destructor. It is called / Invoked when an object of the class goes outof scope.

11) Answer the questions (i) and (ii) after going through the following class: (2010OD)

```
class Exam
{    int Rno,MaxMarks,MinMarks,Marks;
public:
   Exam ( )                                 //Module 1
  {  Rno=101;
    MaxMarks=l00;
     MinMarks=40;
     Marks=75;
    }
    Exam (int Prno, int Pmarks)        //Module 2
    { Rno=Prno;
     MaxMarks=l00;
     MinMarks=40;
     Marks=Pmarks;
     }
     ~Exam ()                              //Module 3
     {          cout<<“Exam Over”<<endl;
      }
      void Show ()                         //Module 4
      {
cout<<Rno<<“:”<<MaxMarks<<“:”<<MinMarks<<endl;
cout<<“[Marks Got]”<<Marks<<endl;
       }
};
```

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

Ans. Polymorphism (OR) Constructor Overloading (OR) Function Overloading

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

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

12) Answer the questions (i) and (ii) after going through the following class: (2009 OD)

```
class Job
{           int JobId;
            char JobType;
public:
            ~Job ( )                                  //Function 1
            {    cout<< “Resigned” <<end1;
            }
            Job ( )                                   //Function 2
            {  JobId=10 ;
               JobType =‘T” ;
            }
            void TellMe( )                            //Function 3
            { cout<<JobId<< “: ” <<JobType<<end1;
            }
            Job (Job &J)                              //Function 4
            {   JobId=J.JobId+10;
              JobType=J.JobType+l;
            }
};
```

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

Ans Function 1.
Destructor.

(ii) Job P ; //Line 1
Job Q(P) ; //Line 2

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

Ans Function 4. Copy Constructor.

13) Answer the questions (i) and (ii) after going through the following program: (2008OD)

```
#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**

14) Answer the questions (i) and (ii) after going through the following class : (2007OD)

```
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.

15) Answer the following questions (i) and (ii) after going through the following class. (2006 OD)

```
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;
}
```

16) Answer the following questions (i)and (ii) after going through the following class. (2005 OD)

```
        class Exam
        {       int Marks;
                char Subject[20];
        public:
             Exam()                         //Function 1
             {    strcpy(Subject,"Computer");
                  Marks=0;
              }
             Exam(char S[])                 //Function 2
             {     strcpy(Subject,S);
                   Marks=0;
             }
             Exam(int M)                    //Function 3
             {   strcpy(Subject,"Computer");
                 Marks=M;
              }
              Exam(char S[],int M)   //Function4
              {   Strcpy(Subject,P);
                  Marks=M;
              }
        };
```

(i)Write statements in C++ that would execute Function 3 and Function 4 of class Exam.

```
        (let    char name[20];
                int X=60;
  strcpy(name,"COMPUTERSCIENCE");
       are declared in the program)
   (i)     Exam  A(X);
       //Will execute 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).

17) Given the following C++ code, answer the questions (i)and(ii) (2004 D)

```
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 ofdestruction 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.

18)Answer the questions (i) and (ii) after going through the following class: (2009-10 MP1) (2008-09MP1)

```
class Seminar
{  int Time;
  public:
 Seminar()                                  //Function 1
 {  Time=30;cout<<"Seminar starts now"<<end1;
 }
```

```
 void Lecture()                          //Function 2
 { cout<<"Lectures in the seminar on"<<end1;
}
Seminar(int Duration)                    //Function 3
{Time=Duration;cout<<"Seminar starts now"<<end1;
}
~Seminar()                               //Function 4
 {     cout<<"Vote of thanks"<<end1;
 }
};
```

i)In Object Oriented Programming, what is Function 4 referred as and when does it get invoked/called?

Answer: Destructor, it is invoked as soon as the scope of the object gets over.

ii) In Object Oriented Programming, which concept is illustrated by Function 1 and Function 3 together? Write an example illustrating the calls for these functions.

Answer:

Constructor Overloading (Polymorphism)

Seminar S1,S2(90);

19) Answer the questions (i) and (ii) after going through the following program: (2008-09 MP2) (2009-10 MP2)

```
class Match
{          int Time;
   public:
          Match()                        //Function 1
          {
          Time=0;
          cout<<"Match commences"<<end1;
          }
          void Details()                 //Function 2
          {
          cout<<"Inter Section Basketball Match"<<end1;
          }
          Match(int Duration)            //Function 3
          {Time=Duration;
           cout<<"Another Match begins now"<<end1;
          }
          Match(Match &M)                //Function 4
          {Time=M.Duration;
           cout<<"Like Previous Match "<<end1;
          }
};
```

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

A) Copy constructor, It will help to copy the data from one object to another

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

```
A) Match M;                    //Function 1
   Match N(10);                //Function 3
```

MODEL 3): Output**(Using Class Concept)–3M**

1.Write the output of the following C++ program code:Note: Assume all required header files are already being included inthe program.3

class seminar **(2017 MP)**

```
{char topic[30];
 int charges;
public:
 seminar()
 {strcpy(topic,"Registration");
  charges=5000;
 }
 seminar(char t[])
 { strcpy(topic,t);
   charges=5000;
 }
 seminar(int c)
 {strcpy(topic,"Registration with Discount");
  charges=5000-c;
 }
 void regis(char t[],int c)
 {  strcpy(topic,t);
    charges=charges+c;
  }
  void regis(int c=2000)
  { charges=charges+c;
   }
  void subject(char t[],int c)
  {  strcpy(topic,t);
     charges=charges+c;
  }
  void show()
  {  cout<<topic<<"@"<<charges<<endl;
  }
};
void main()
{
seminar s1,s2(1000),s3("Genetic Mutation"),s4;
s1.show();
s2.show();
s1.subject("ICT",2000);
s1.show();
s2.regis("Cyber Crime",2500);
s2.show();
s3.regis();
s3.show();
s4=s2;
s4.show();
getch();
}
```

A) Registration@5000
Registration with Discount@4000
ICT@7000
Cyber Crime@6500
Genetic Mutation@7000
Cyber Crime@6500

2)Find and write the output of the following C++ program code: (2016)

Note: Assume all required header files are already being included in the program. 3

```
class Share
{ long int Code;
  float Rate;
  int DD;
public:
  Share()
  {   Code=1000;Rate=100;DD=1;
   }
   void GetCode(long int C,float R)
   {   Code=C;
       Rate=R;
    }
    void Update(int Change,int D)
    {   Rate+=Change;
        DD=D;
     }
```

```
   void Status()
  {   cout<<"Date:"<<DD<<endl;
   cout<<Code<<"#"<<Rate<<endl;
  }
};
void main()
{ Share S,T,U;
  S.GetCode(1324,350);
  T.GetCode(1435,250);
  S.Update(50,28);
  U.Update(25,26);
  S.Status();
  T.Status();
  U.Status();
}
```

A) **Date:28**
1324#400
Date:1
1435#250
Date:26
1000#125

3)Write the output of the following C++ program code:
Note: Assume all required header files are already being includedin the program. (2015) 3

```
class Eval
{ char Level;
  int Point;
public:
   Eval()
  { Level='E';
    Point=0;
   }
  void Sink(int L)
   { Level  - =  L;
    }
   void Float(int L)
   { Level += L;
     Point++;
   }
   void Show()
  {cout<<Level<<"#"<<Point<<endl;
   }
};
void main()
{ Eval E;
  E.Sink(3);
  E.Show();
  E.Float(7);
  E.Show();
  E.Sink(2);
  E.Show();
}
```

A)
```
B#0
I#1
G#1
```

4) Obtain the output of the following C++ Program, which wll appear on the screen after its execution 3
Important Note: **(2014)**
-All the desired header files are already included in the code, which are required to run the code.

```
class Game
{  int Level, Score;
   char Type;
public:
   Game(char GType='P')
   {      Level=1;
         Score=0;
         Type=GType;
    }
   void play(int GS);
   void Change( );
   void Show( );
   {
  cout<<Type<<"@"<<Level<<endl;
  cout<<Score<<endl;
   }
};
void main( )
{     Game A('G'),B;
      B.Show( );
      A.Play(11);
      A.Change( );
      B.Play(25);
      A.Show( );
      B.Show( );
}
void Player:: Change( )
{      Type = (Type = ='P')?'G':'P';
}
void Game::Play(int GS)
{  Score+=GS;
    if(Score>=30)
            Level=3;
    else if(Score>=20)
            Level=2;
     else
            Level=1;
}
```

A)
```
 P@1
0
P@1
11
P@2
25
```

5) Observe the following C++ code carefully and obtain the output,which will appear on the screen after execution of it? **(2013)**

```
#include<iostream.h>
class Aroundus
{  int Place, Humidity, Temp;
 public:
    Aroundus(int P=2)
    {   Place=P;
        Humidity=60;
        Temp=20;
     }
     void Hot(int T)
     { Temp+=T;
      }
     void Humid(int H)
     {  Humidity+=H;
      }
  void JustSee( )
 {cout<<Place<<":"<<Temp<<"&"<<Humidity<<"%"
                  <<endl;
  }
};
void main( )
{ Aroundus A,B(5);
```

```
  A.Hot(10);
  A.JustSee( );
  B.Humid(15);
  B.Hot(2);
  B.JustSee( );
  A.Humid(5);
  A.JustSee( );
}
```

A) **2:30&60%**
5:22&75%
2.30&65%

6.Find the output of the following program: 3 **(2012)**

```
#include <iostream.h>
class METRO
{ int Mno,TripNo,PassengerCount;
public:
  METRO(int Tmno=l)
 {Mno=Tmno;TripNo=0;PassengerCount=0;
  }
  void Trip(int PC=20)
 {TripNo++;PassengerCount+=PC;
  }
void StatusShow ()
{cout<<Mno<<":"<<TripNO<<":"
      <<PassengerCount<<endl:
 }
};
void main ()
{  METRO M(5), T;
  M. Trip () ;
  M. StatusShow() ;
  T.Trip(50);
  T. StatusShow() ;
  M.Trip(30);
  M. Status Show () ;
}
```

Ans: **5:1:20**
1:1:50
5:2:50

7)Write the **output** of the following program.

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

MODEL 4): Rewrite the following program after removing the syntactical errors (if any). Underline each correction (Using Class) -2 Marks

1)Rewrite the following program after removing the syntactical errors(if any). Underline each correction.2 **(2017 MP)**

```
#include<conio.h>
#include<iostream.h>
#include<string.h>
#include<stdio.h>
class product
{   int product_code,qty,price;
   char name[20];
public:
    product()
   {  product_code=0;qty=0;price=0;
      name=NULL;
    }
    void entry()
   {cout<<"\n Enter code,qty,price";
    cin>>product_code>>qty>>price;
     gets(name);
    }
    void tot_price()
   {  return qty*price;
    }
};
void main()
{p product;
 p.entry();
 cout<<tot_price();
}
```

A)

```
#include<conio.h>
#include<iostream.h>
#include<string.h>
#include<stdio.h>
class product
{
        int product_code,qty,price;
        char name[20];
public:
        product()
        {
        product_code=0;qty=0;price=0;
        strcpy(name,NULL);
        }
        void entry()
        {cout<<"\n Enter code,qty,price";
        cin>>product_code>>qty>>price;
        gets(name);
        }
        int tot_price() {return qty*price;}
};
void main()
{
        product p;
        p.entry();
        cout<<p.tot_price();
}
```

2) Rewrite the following program after removing the syntactical errors (if any). **(2012 OD)**
Underline each correction. 2

```
#include <iostream.h>
Class tem
{   long IId, Qty;
```

```
public :
  void Purchase
  {cin>>IId>>Qty;
   }
  void Sale ( )
 {cout«setw(5)<<IId<<"Old:"<<Qty<<endl;
  cout<<"New: "<<Qty«end1;
  }
} ;
void main ( )
{   Item I ;
   Purchase ( ) ;
   I.Sale ( ) ;
   I.Sale ( )
}
```

Ans

```
#include<iosteam.h>
class Item                              // C  Capital
{   long IId,Qty;
public:
   void Purchase ( )
  {cin>>IId>>Qty;
   }
  void Sale ( )
 { cout<<setw(5)<<IId<<" Old: "<<Qty<<endl;
       //Either the statement setw(5) is removed
      //or header file included as#include<iomanip.h>
    cout<<"New:"<<--Qty<<endl;
   }
} ;
void main ( )
{ Item I;
  I.Purchase( );                        // Object missing
  I. Sale ( ) ;
  I. Sale ( ) ;                          // ; is missing
}
```

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

include<iostream.h> **2(2010 OD)**

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

Ans.

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

4)Rewrite the following program after removing the syntactical errors (if any). **(2009 OD)2**
Underline each correction.

```
include <iostream.h>
include <stdio.h>
class MyStudent
{ int StudentId = 1001;
  char Name [20] ;
public
  MyStudent( )
  { }
  void Register ( )
  {cin>>StudentId; gets (Name) ;}
  void Display ( )
  {cout<<StudentId<< ":" <<Name<<end1;
 }
} ;
void main ( )
{MyStudent MS ;
Register.MS( ) ;
MS.Display( ) ;
}
```

Ans

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

5) Rewrite the following program after removing the syntactical errors (if any). **(2009 D)**
Underline each correction.2

```
#include [iostream.h]
#include [stdio.h]
```

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

Ans

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

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

```
#include [iostream.h]                    (2008-09 MP1)
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();
           }
```

7) Rewrite the following program after removing the syntactical errors (if any). **(2009-10 MP1)** Underline each correction. 2

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

A)

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

MODEL 5: Theory Questions (Classes)

1.

Difference between	Year
protected and private	2017, 2008 OD
Public and Private	2012D, 2008D

What is the difference between the members in private visibility mode and the members in public visibility mode inside a class? Also, give a suitable C++ code to illustrate both.

DIFFERENCE BETWEEN PUBLIC & PRIVATE

(**Access Specifiers:** It is used to define the behaviour of the variable and function in a class. It tells which object can access the variable and function. It is public, private and protected. It is therefore used in class.

Visibility Mode: It is used in C++ to show the relationship between the base and the derived class. It specifies what the derived class can derive from the base class. It is therefore used in inheritance.)

(**Important Note: For** Visibility modes differences, in the marking schemes answers were given for access specifier differences. So Student is adviced to differentiate in context of access specifiers as well as visibility modes)

Public Visibility	Private visibility
Members in public visibility mode of the class are accessible from within the class as well as outside of the class ie (member functions of the class & objects of the class.)	Members in private visibility mode of the class are accessible from within the class only (member functions of the class only). They cannot access from objects of the class.
Must keep keyword "**public**" to make a member as public. (explicit visibility mode)	It is default visibility mode. (implicit visibility mode)

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.

Public and private visibility modes in context of INHERITANCE:

Public visibility mode: With publicly derived class, the public members of the base class become the public members of the derived class, the protected members of the base class become the protected members of the derived class and the private members of the base class are not accessible in the derived class.

Private visibility mode: With privately derived class, the public and protected members of the base class become private members of the derived class and the private members of the base class are not accessible in 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	
privatee	Private	private	

DIFFERENCE BETWEEN PROTECTED & PRIVATE

Protected Visibility	Private visibility
Members in protected visibility mode of the class are accessible to the member functions of the same class as well as that of its derived class only (They cannot access from outside of the class ie from objects.)	Members in private visibility mode of the class are accessible from within the class only (member functions of the class only). They cannot access from objects of the class. They cannot accessible from derived classess.
Must keep keyword **"protected"** to make a member as public. (explicit visibility mode)	It is default visibility mode. (implicit visibility mode)

The concept of data hiding is implemented through the private access specifier only.

Eg:

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

Here, since rno and name are declared in private, they can be accessed only inside the class.(They are not accessible from derived class)

Where as age is derived privately, it can be accessed only inside the class .(They can also accessible from derived class)

Protected and private visibility modes in context of INHERITANCE:

Protected visibility mode: 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.

Private visibility mode: With privately derived class, the public and protected members of the base class become private members of the derived class and the private members of the base class are not accessible in 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	

2) What do you understand about a member function? How does a member function differ from an ordinary function? (2002)

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.

3) Illustrate the use of Inline function in C++ with the help of an example. (2006)

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. 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.

MODEL 6: Theory Questions (Constructors)

1) What is a default constructor? How does it differ from destructor? (2006 OD)

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.What is a copy constructor? Illustrate with a suitable C++ example. (2019SP)(2015)(2009D)

Ans: A copy constructor is an overloaded constructor in which an object of the same class is passed as reference parameter.

(It is used when an object's data value is related to or is initialised using another object's data value of the same class. In the example below the values of data members of object P2 are dependent on the values of data members of object P1)

Ex:

```
class X
{   int a;
public:
    X()
   {  a=0;
    }
   X(X &ob) //copy constructor
  { a=ob.a;
   }
};
void main()
{
Point  P1;
Point  P2(P1);          //Copy constructor is called here
                        //OR Point p3=p1;
}
```

3) Differentiate between a default constructer and copy constructer, giving suitable examples of each. (2005 OD)

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.

4. Write any four differences between Constructor and Destructor function with respect to object oriented programming(2019SP)2

Constructor	Destructor
Name of the constructor function is same as that of class	Name of the destructor function is same as that of class preceded by ~
Constructor functions are called automatically at the time of creation of the object	Destructor functions are called automatically when the scope of the object gets over
Constructor can be overloaded	Destructor ca not be overloaded
Constructor is used to initialize the data members of the class	Destructor is used to de- initialize the data members of the class

5) Write any two similarities between constructor and destructor. Write the function headers for constructor and destructor of a class Flight. (2013)

Answer: Similarities:

(i) Constructors and destructors have the name of the class (destructor name will be prexixed by ~), do not have any return type not even void, they will be called automatically.

(ii) Pointers and references cannot be used on constrctors and destructors because their addresses cannot be taken.

Example:

```
class Student
{ char name[30];
  float m1,m2,m3;
public:
  Student( );                  //Constructor for class Student
 ~Student( );                  //Destructor for class Student
};
```

6) Differentiate between Constructor and Destructor function in context of Classes and Objects Using C++? (2011) (2007 D)

Ans: 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.

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 or declaration of the object. Ie Implicite calling	**Calling:** It is automatically called and executed when scope of an object gets over. Ie Implicite calling
Return Type: No return type not even void ---------- Constructor can be overloaded ---------- It is defined in public visibility mode	**Return Type:** No return type not even void ---------- Destructors cannot be overloaded ---------- It is defined in public visibility mode

Pointers and references cannot be used on constrctors and destructors because their addresses cannot be taken.
Example:
class Area
{
float l,b,a;
public:
Area( )
{ l=b=a=0.0; }
 	
---------- 	
---------- 	
};
	Pointers and references cannot be used on constrctors and destructors because their addresses cannot be taken.
	Example:
	class Area
	{
	float l,b,a;
	public:
	---------- 	
	---------- 	
	~Area( )
	{ cout<<"One Object
	destroyed";
	}
	---------- 	
	---------- 	
	};

7) Why is destructor function required in classes? Illustrate with the function with an example. (2000 D)

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.

8) What is a copy constructor? What do you understand by constructer overloading? (1998D)

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:

(It is given in Constructors – Material)

MATERIAL
CHAPTER 5 - CONSTRUCTORS& 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 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();
}
```

6.INHERITANCE (4 Marks)

IMPORTANT QUESTION WHICH COVERS MORE MODELS

Answer the questions based on the following code:

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

a) Which type of inheritance is depicted by above example?
A) Multi level inheritance
b) How many bytes will be required by an object of class Student, Teacher, HM?
A) Student Object – 30,
Teacher Object –30 + 46 = 76,
HM object - 30 + 46 + 66 = 142
c) Write the names of all members accessible from objects of class HM.
A) Data Members: NIL
Member Functions: hmtake( ),hmdisplay( ), Ttake(),Tdisplay( ),sTake( ),sdisplay( )
d) Write the names of data members accessible from member functions of class HM.
A) Data Members: hmname, hmsalary, hmplace, noofsubjects, Tqua, admno;
e) Write the names of member functions accessible from member functions of class HM.
Member Functions: hmtake( ),hmdisplay( ),hmprocess(), hmrno( ), Ttake( ),Tdisplay( ),Tprocess( ),Stake( ), sdisplay( ),sprocess( )
f) Write the names of all members which are accessible from objects of class Teacher.
A) Data Members: NIL
Member functions : Ttake( ), Tdisplay( ), stake( ), sdisplay ()
g) Write the names of members which are accessible from member functions of class Teacher.
A) Data Members: Tqua, tname, salary, tid, admno;
Member functions:
Ttake( ), Tdisplay( ), TProcess(), TTest( ), stake( ),sdisplay( ),sprocess( );
h) What is the base class and derived class of 'Teacher'?
A) Base class of Teacher – Student
Derived class of Teacher - HM
i) If HM class derived privately from class Teacher, write the names of all members which are accessible from objects of class HM.
A) Data Members: NIL
Member Functions: hmtake( ), hmdisplay( );

Note: Number of bytes for the following data type

Date Type	No.of Bytes
char	1
int (short int)	2
long (long int)	4
float	4
long long	8
double	8
long double	10

Note 2: long result( ); It is a function returning long value, but it is not a variable as it consists paranthesis ( ).

Model 1

1) Answer the questions (i) to (iv) based on the following: (2019) 4

```
class Ground
{      int Rooms;
  protected:
       void Put( );
  public:
       void Get( );
};
class Middle: private Ground
{       int Labs;
public:
       void Take( );
       void Give( );
};
class Top : public Middle
{   int Roof;
public:
    void In( );
   void Out( );
};
void main( )
{    Top T;
}
```

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

(ii) Write the n ames of all the members, which are directly accessible by the member function Give( ) of class Middle.
(iii) Write the names of all the members, which are directly accessible by the member function Out( ) of class Top.
(iv) Write the names of all the members, which are directly accessible by the object T of class Top declared in the main() function.

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

(2019SP)4

```
class Faculty
{  int FCode;
protected:
   char FName[20];
public:
   Faculty();
   void Enter();
   void Show();
};
class Programme
{  int PID;
protected:
  char Title[30];
public:
   Programme();
   void Commence();
   void View();
};
class Schedule: public Programme, Faculty
{   int DD,MM,YYYY;
public:
   Schedule();
   void Start();
   void View();
};
void main()
{   Schedule S; //Statement 1
    _____ //Statement 2
}
```

(i) Write the names of all the member functions, which are directly accessible by the object S of class Schedule as declared in main() function.
Ans: Start(), Schedule::View(), Commence(), Programme::View()
(ii) Write the names of all the members, which are directly accessible by the memberfunction Start( ) of class Schedule.
Ans:DD,MM,YYYY, Schedule::View()
Title, Commence( ), Programme::View()
Fname, Enter(), Show()
(iii) Write Statement 2 to call function View( ) of class Programme from the object S of class Schedule.
Ans: S.Programme::View( );
(iv) What will be the order of execution of the constructors, when the object S of class Schedule is declared inside main()?
Ans: Programme( ), Faculty( ), Schedule( )

3) Answer the questions (i) to (iv) based on the following: 2018)

```
class Teacher
{     int TCode;
protected:
      char Name[20];
public:
      Teacher( );
      void Enter( );
      void show( );
};
class Course
{     int ID;
protected:
      char Title[30];
public:
      Course( );
      void Initiate( );
      void Display( );
};
class Schedule: public Course, private Teacher
{       int DD,MM,YYYY;
public:
       Schedule( );
       void Start( );
       void View( );
};
void main( )
{     Schedule S;
}
```

(i) Which type of Inheritance out of the following is illustrated in the above Example?
Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance.
A) Multiple Inheritance
ii) Write the names of all the members, which are directly accessible by the member function View( ) of class Schedule.
A) Data members: DD,MM,YYYY,Title,Name
Member functions: Start( ), Initiate( ), Display( ), Enter( ), Show( );

iii) Write the names of all the members, which are directly accessible by the object S of class Schedule declared in the main( )function.
A) **Data Members:** Nil
Member Functions: Start( ), View( ), Initiate( ), Display( );
iv) What will be the order of execution of the constructors, when the object S of class Schedule is declared inside the main( ) function ?
A) Course( ), Teacher( ), Schedule( )

4) Answer the question from (i) to (iv) based on the given below code(assume all necessary header files are included in program):- (2018 MP)

```
class City
{
        int City_Id;
        char City_Name[30];
protected:
        int City_Population;
public:
        City();
        void Get_Population();
        void New_City();
        void Show_City();
};
class State : public City
{
        int State_Id;
        char State_Name[25];
protected:
        int State_Population;
public:
        State();
        void New_State();
        void Print_State();
};
```

```
class Country : private State
{
        int Country_Id;
        char Country_Name[25];
public:
        Country();
        void New_Country();
        void Display_Country();
};
```

(i) Write name of the class whose constructor is invoked first on the creation of a new object of class Country.
Ans) class City
(ii) Write name of the data members which are accessible through the object of class Country.
Ans) None
(iii) List name of the members which are accessible through the member function "void New_Country()".
Ans) D ata members: Country_Id, Country_Name[25], State_Population, City_Population
Member functions: Display_Country(), New_State(), Print_State(), Get_Population(), New_City(), Show_City()
(iv) What will be the size(in bytes) of an object of class Country & State respectively.
Ans) 90 bytes for object of class Country & 63 bytes for object of class State

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

```
class First                                          (2017)
{  int X1;
protected:
   float X2;
public:
   First();
   void Enter1();
   void Display1();
};
class Second : private First
{    int Y1;
protected:
     float Y2;
public:
     Second();
     void Enter2();
     void Display();
};
class Third : public Second
{      int Z1;
public:
      Third();
      void Enter3();
      void Display();
};
void main()
{  Third T; //Statement 1
   _____;//Statement 2
}
```

i) Which type of Inheritance out of the following is illustrated in the above example?
Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance
A) Multilevel Inheritance
ii) Write the names of all the member functions, which are directly accessible by theobject T of class Third as declared in main() function.
A) Enter2( ), Display( ) of class Second
Enter3(), Display() of class Third

OR

Enter2( )
Second::Display()
Enter3()
Display() OR Third::Display()

iii) Write Statement 2 to call function Display() of class Second from the object T of
class Third.
A) T.Second::Display();
iv) What will be the order of execution of the constructors, when the object T of class
Third is declared inside main()?
A) First, Second, Third

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

```
class indoor_sports                                  (2017 MP)
{ int i_id;
  char i_name[20];
  char i_coach[20];
protected:
   int i_rank,i_fee;
   void get_ifee();
public:
   indoor_sports();
   void iEntry();
   void ishow();
};
class outdoor_sports
{   int o_id;
   char o_name[20];
   char o_coach[20];
protected:
   int orank,ofee;
   void get_ofee();
public:
   outdoor_sports();
   void oEntry();
   void oshow();
};
class sports:public indoor_sports,protected outdoor_sports
{   char rules[20];
public:
   sports();
   void registration();
   void showdata();
};
```

(i) Name the type of inheritance illustrated in the above C++ code.
Ans. Multiple Inheritance
(ii) Write the names of all the members, which are accessible from the objects belonging to class outdoor_sports.
Ans Data Members: None
Member Functions: oEntry(), oShow()
(Note:No marks to be awarded for any partial or additional answer(s))
(iii) Write the names of all the member functions, which are accessible from the member function of class sports.
Ans registration(), showdata(), oEntry(), oShow(), get_ofee(), iEntry(),
iShow(), get_ifee()
(iv) What will be the size of the object belonging to class indoor_sports?
Ans 46 Bytes

7) Answer the questions (i) to (iv) based on the following: (2016)

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

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

Ans Multiple Inheritance

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

Ans Name, Location, Manager, Qty

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

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

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

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

8) Answer the questions (i) to (iv) based on the following: 2015

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

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

Ans Multi Level Inheritance

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

Ans WallArea, ColorCode,Type, Advance

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

Ans Bill(), BillPrint(), PBook(), PView(), Book(), View()

● *Constructors can be ignored*

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

Ans Interior, Painting, Billing

9) Consider the following C++ code and answer the question from (i) to (iv). (2014)

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

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

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

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

A)Member functions:

void Enroll( ); void View( ); void Enter( );void Show( );

(iii) Write the anem of those data members , which can be directly accessible from the member functions of class student.
A)Data Members: long Rollno;char Name[20];double Budget;
(iv) Is it possible to directly call function Display ( ) of class university from an object of class Department? (Answer as YES or NO).
A) No, it is not possible because Display( ) function of Campus becomes private for the object of Department class.

10) Consider the following C++ code and answer the questions from (i) to (iv). (2013)

```
class Personal
{       int Class, Rno;
        char Section;
protected:
        char Name[20];
public:
        Personal( );
        void pentry( );
        void Pdisplay( );
};
class Marks: private Personal
{       float M[5];
protected:
        char Grade[5];
public:
        Marks( );
        void Mentery( );
        void Mdisplay( );
};
class Result:public Marks
{       float Total,Avg;
public:
        char FinalGrade,comments[20];
        Result( );
        void Rcalculate( );
        void Rdisplay( );
};
```

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

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

```
class COMPANY                                   (2012)
{       char Location[20] ;
        double Budget, Income ;
protected:
        void Accounts () ;
public:  COMPANY( ) ;
        void Register();
        void Show() ;
} ;
class FACTORY:public COMPANY
{       char Location[20] ;
        int Workers;
protected:
        double Salary ;
        void Computer() ;
public:
        FACTORY () ;
        void Enter () ;
        void Show() ;
} ;
class SHOP:private COMPANY
{
char Location[20] ;
float Area;
double Sale;
public:
SHOP () ;void Input( ) ;void Output ( ) ;
} ;
```

(i) Name the type of inheritance illustrated in the above C++ code.
Ans Hierarchical Inheritance
(ii) Write the name of data members, which are accessible from memberfunctions of class SHOP.
Ans Location, Area, Sale
(iii) Write the names of all the member functions, which are accessible fromobjects belonging to class FACTORY.
Ans Enter ( ), FACTORY::Show ( ), Register ( ), COMPANY::Show ( )

OR

Enter ( ), Show ( ), Register ( ) // Show function may be present twice
(iv) Write the names of all the members, which are accessible from objects of class SHOP
Ans Input ( ), Output ( )

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

```
class Student                                   ( 2011)
{       int Rollno:
        char SName[20];
        float Marksl;
protected: void Result ( ) ;
public:   Student ( ) ;
        void Enroll ( ) ;
        void Display ( ) ;
} ;
class Teacher
{       long TCode;
        char TName [20];
protected:
        float Salary;
public:
        Teacher ( );
        void Enter ( ) ;
        void Show ( ) ;
} ;
class Course: public Student, private Teacher
{       long CCode [10];
        char CourseName [50];
        char StartDate[8],EndDate [8];
public:
        Course ( ) ;
        void Commence ( );
        void CDetail ( ) ;
} ;
```

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

13) Answer the questions (i) to (iv) based on the following: (2010 D)

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

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

14) Answer the questions (i) to (iv) based on the following: (2010)

```
class Director
{ long DID; //Director Identification Number
  char Name[20];
protected:
  char Description[40];
  void Allocate () ;
public:
  Director() ;
  void Assign () ;
  void Show () ;
} ;
class Factory:public Director
{  int FID; //Factory ID
   char Address[20];
protected:
   int NOE; //No. of Employees
public:
   Factory();
  void Input ();
  void Output ();
};
class ShowRoom:private Factory
{   int SID; //Showroom ID
  char City[20];
public:
  ShowRoom();
  void Enter ();
  void Display ();
};
```

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

15) Answer the questions (i) to (iv)based on the following: (2009)

```
class Regular
{    char SchoolCode[10];
public:
   void InRegular( );
   void OutRegular( );
} ;
class Distance
{ char StudyCentreCode [5] ;
public:
   void InDistance( );
   void OutDistance( );
} ;
class Course: public Regular, private Distance
{    char Code [ 5] ;
     float Fees;
     int Duration;
```

```
public:
   void InCourse( );
   void OutCourse( );
} ;
```

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

Ans Multiple Inheritance

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

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

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

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

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

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

16) Answer the questions (i) to(iv) based on the following code : (2008)

```
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( )

17) Answer the questions (i) to(iv) based on the following code: (2007)

```
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( )

18)Answer the questions (i) to(iv) based on the following code: (2006)

```
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( )

19) Answer the questions (i) to(iv) based on the following code: (2005)

```
class Drug
{     char Category[10];
      char Date_of_manufacture[10];
      char Company[20];
public:
      Medicines();
      void enterdrugdetails();
      void showdrugdetails();
};
class tablet:public Drug
{ protected:
      char tablet_name[30];
      char volume_lable[20];
   public:
      float Price;
      Tablet();
      void entertabletdetails();
      void showtabletdetails();
};
class PainReliever:public Tablet
{      int Dosage_units;
      char side_effects[20];
      int Use_within_days;
public:
      PainReliever();
      void enterdetails();
      void showdetails();
};
```

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

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

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

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

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

Ans: Data Members:

Tablet::tablet_name[30];
Tablet::volume_lable[20];
Tablet::Price;

Member Functions:

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

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

Ans: Data Members: Tablet::Price

20) Given the following definitions answer the following:

```
class livingbeing                    (2004 D)
{     char specification[20];
      int average;
public:
      void read();
      void show();
};
class ape: private livingbeing
{      int no_of_organs,no_of_bones;
protected:
      int iq_level;
public:
      void readape();
      void showape();
};
class human:public ape
{     char race[20];
      char habitation[30];
public:
      void readhuman();
};
```

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

Ans: Data Members - ape::iq_level
human::race
human::habitation
Member Function – ape::readape( )
ape::showape( )

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

Ans: Data Members - No data members can be accessed.
Member Functions: ape::readape();
ape::showape();
human::readhuman();

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

Ans: 78 Bytes.

21)Consider the following and answer the questions given below. (2003 D)

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

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

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

Ans: 133 Bytes

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

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

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

Ans: MNC::Country

22)Consider the following and answer the questions given below: (2000 D)

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

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

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

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

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

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

Ans: Teacher::Display( )

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

Ans: Yes. Since it is public member function.

23)Consider the following declarations and answer the questions below: (1999 D)

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

(i) Name the base class and derived class of the class heavy_vehicle.
Ans: Base class of heavy_vehicle – vehicle
Derived class of heavy_vehincle – bus
(ii) Name the data member(s) that can be accessed from function displaydata.
Ans: bus::make
heavy_vehicle::load
vehicle::passenger
(iii) Name the data member(s) that can be accessed by an object of bus class.
Ans: No data member can be accessed by an object of bus class.
(iv) Is the member function outputdata accessible to the objects of heavy_vehicle class?
Ans: No.

24) Consider the following declarations and answer the questions below: (1998 D)

```
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.

29) Answer the questions (i) to (iv) based on the following: (2008-09 MP2)

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

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

25) Answer the questions (i) to (iv) based on the following: (2008-09 MP1) (2009-10 MP1)

```
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 belong-ing
to class AUTHOR.
Ans) None of data members are accessible from objects belonging to class AUTHOR.
(ii) Write the names of all the member functions which are accessible from ob-jects
belonging to class BRANCH.
Ans) Haveit( ), Giveit( )
(iii) Write the names of all the members which are accessible from member func-tionsof class AUTHOR.
Ans) Data members: Employees, Acode, Aname, Amount
Member function: Register(), Enter(), Display(), Haveit(), Giveit(), Start(), Show(),
(iv) How many bytes will be required by an object belonging to class AUTHOR?
Ans) 70

MODEL 1B)

1) Consider the following class HeadQuarter

class HeadQuarter **2019**

```
{    int Code;
     char Des[20];
protected :
     char Address[40];
public:
     void Get( )
    {   cin>>Code;
        gets(Des);
        gets(Address);
    }
   void Put( )
   { cout<<Code<<Des<<Address<endl;
   }
};
```

Write a code in C++ to protectedly derive another class FrontOffice from the base class HeadQuarter with following members.

Data Members

Location of type character of size 10
Budget of type double

Member Functions

A constructor function to assign Budget as 100000
Assign( ) to allow user to enter Location and Budget
Display( ) to display Location and Budget

2. Consider the following class State : 2019SP4

```
class State
{  protected :
        int tp;
    public :
        State( )
     { tp=0;
     }
     void inctp( )
     { tp++;
     }
     int gettp( )
     { return tp;
     }
};
```

Write a code in C++ to publically derive another class 'District' with the following additional members derived in the public visibility mode.

Data Members :

Dname string
Distance float
Population long int

Member functions :

DINPUT( ):To enter Dname, Distance and population
DOUTPUT( ):To display the data members on the screen.

Answer:

```
class District : public State
{   public :
     char Dname[20];
     float Distance;
     long int Population;
     void DINPUT( )
     {  gets(Dname);
        cin>>distance;
        cin>>Population;
     }
     void DOUTPUT( )
     {  cout<<Dname<<endl;
        cout<<Distance<<endl;
        cout<<population<<endl;
     }
};
```

MODEL 2

1. Observe the following C++ code and answer the questions (i) and (ii). Note: Assume all necessary files are included. (2018)

```
class FIRST
{   int Num1;
   public:
     void Display( )                //Member Function 1
      {  cout<<Num1<<endl;
       }
};
class SECOND:public FIRST
{    int Num2;
   public:
      void Display( )               //Member Function 2
      {   cout<<Num2<<endl;
       }
};
void main( )
{   SECOND S;
     _____ //Statement 1
      _____ //Statement 2
}
```

(i) Which Object Oriented Programming feature is illustrated by the definitions of classes FIRST and SECOND?

A) Inheritance **(OR Encapsulation OR Data Abstraction OR Data Hiding)**

(ii) Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively using the object S.

A) S.FIRST::Display( ); // Statement 1
S.SECOND::Display( ); Statement 2
// or S.Display( );

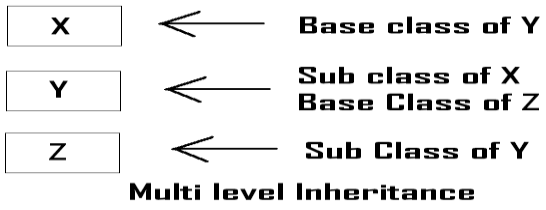
MODEL 3 – THEORY QUESTION

1) Differentiate between Protected and Private members of a class in context of inheritance using C++. (2007 OD)

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) Define Multilevel and Multiple inheritance in context of Object Oriented Programming. Give suitable example to illustrate the same (2006 D)

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

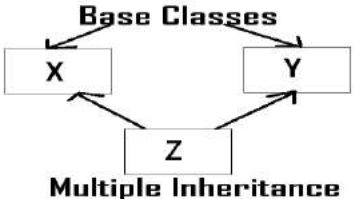


Eg: (for Multi Level Inheritance)

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

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

Eg: (for Multiple Inheritance)




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

3) Illustrate the concept of Inheritance with the help of an example. (2002 D)

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.

4) Reusability of classes is one of the major properties of OOP. How is it implemented in C++. (2001)

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++.)**

5)What do you understand by visibility modes in class derivations? What are these modes? (1999)

7.DATA FILE HANDLING (6Marks)

MODEL 1a: Output 1 Mark

1) Find the output of the following C++ code considering that the binary file STOCK.DAT exists on the hard disk with the following 5 records for the class STOCK containing Name and Price.
(2019)

Name	Price
Rice	110
Wheat	60
Cheese	200
Pulses	170
Sauce	150

```
void main( )
{ fstream  File;
  File.open (“STOCK.DAT”, ios::binary|ios::in);
  Stock S;
  for(int I=1;I<=2;I++)
  {  File.seekg((2*I-1)*sizeof(S));
     File.read((char*)&S, sizeof(S));
     cout<<”Read : “<<File.tellg( )/sizeof(S)<<endl;
   }
   File.close( );
 }
```

Ans)

2. Find the output of the following C++ code considering that the binary file PRODUCT.DAT exists on the hard disk with a list of data of 500 products. 2019SP

```
class PRODUCT
{   int PCode;char PName[20];
  public:
    void Entry();
    void Disp();
};
void main()
{
fstream In;
In.open("PRODUCT.DAT",ios::binary|ios::in);
PRODUCT P;
In.seekg(0,ios::end);
cout<<"Total Count: "<<In.tellg()/sizeof(P)<<endl;
In.seekg(70*sizeof(P));
In.read((char*)&P, sizeof(P));
In.read((char*)&P, sizeof(P));
cout<<"At Product:"<<In.tellg()/sizeof(P) + 1;
In.close();
}
```

Ans) Total Count:500
At Product: 73

3. Which file stream is required for seekg()?
Ans) fstream/ ifstream **2019SP**

4. Find the output of the following C++ code:
Considering that the binary file SCHOOLS.DAT exists on the hard disk with the following records of 10 schools of the class SCHOOLS as declared in the following class. **2018**

```
class SCHOOLS
{     int SCode;                    //School Code
      char SName[20];               //School Name
      int NOT;   //Number of Teachers in the school
public:
     void Display( )
     {  cout<<SCode<<”#”<<SName<<”#”<<NOT<<endl;
      }
      int RNOT( )
     {   return NOT;
     }
};
```

SCode	SName	NOT
1001	Brains School	100
1003	Child Life School	115
1002	Care Share School	300
1006	Educate for Life School	50
1005	Guru Shishya Sadan	195
1004	Holy Education School	140
1010	Play School	95
1008	Innovate Excel School	300
1011	Premier Education School	200
1012	Uplifted Minds School	100

```
void main( )
{ fstream SFIN;
  SFIN.open(“SCHOOLS.DAT”,ios::binary|ios::in);
  SCHOOLS S;
  SFIN.seekg(5*sizeof(S));
  SFIN.read((char*)&S, sizeof(S));
  S.Display();
  cout<<”Record :”<<SFIN.tellg( )/sizeof(S) +1<<endl;
  SFIN.close();
}
```

Ans) **1004#Holy Education School#140**
Record :7

5. Find the output of the following C++ code considering that the binary fileCLIENTS.DAT exists on the hard disk with a data of 200 clients.

```
class CLIENTS                          (2017)
{  int CCode;char CName[20];
public:
   void REGISTER();
   void DISPLAY();
};
void main()
{
fstream File;
File.open("CLIENTS.DAT",ios::binary|ios::in);
CLIENTS C;
File.seekg(6*sizeof(C));
File.read((char*)&C, sizeof(C));
cout<<"Client Number:"<<File.tellg()/sizeof(C) + 1;
File.seekg(0,ios::end);
cout<<" of "<<File.tellg()/sizeof(C)<<endl;
File.close();
}
```

Ans) Client Number 8 of 200

6. Find the output of the following C++ code considering that the binary file sp.dat already exists on the hard disk with 2 records in it.

```
class sports                                    (2017MP)
{ int id;
  char sname[20];
  char coach[20];
public:
  void entry();
  void show();
  void writing();
  void reading();
};
void sports::reading()
{ ifstream i;
  i.open("sp.dat");
  while(1)
  { i.read((char*)&s,sizeof(s));
    if(i.eof())
       break;
   else
       cout<<"\n"<<i.tellg();
  }
  i.close();
}
void main()
{  s.reading();
}
```

Ans) **42**
84

7. Find the output of the following C++ code considering that the binary file CLIENT.DAT exists on the hard disk with a data of 1000 clients.

```
class CLIENT                                    (2016)
{    int Ccode;
     char CName[20];
public:
   void Register();
   void Display();
};
void main()
{ fstream CFile;
  CFile.open("CLIENT.DAT",ios::binary|ios::in);
  CLIENT C;
  CFile.read((char*)&C, sizeof(C));
  cout<<"Rec:"<<CFile.tellg()/sizeof(C)<<endl;
  CFile.read((char*)&C, sizeof(C));
  CFile.read((char*)&C, sizeof(C));
  cout<<"Rec:"<<CFile.tellg()/sizeof(C)<<endl;
  CFile.close();
}
```

Ans) Rec:1
Rec:3

8. Find the output of the following C++ code considering that thebinary file MEMBER.DAT exists on the hard disk with records of 100 members: **(2015)**

```
class MEMBER
{    int Mno; char Name[20];
public:
    void In( );void Out( );
};
void main()
{
fstream MF;
MF.open("MEMBER.DAT",ios::binary|ios::in);
MEMBER M;
MF.read((char*)&M,sizeof(M));
MF.read((char*)&M,sizeof(M));
MF.read((char*)&M,sizeof(M));
int POSITION=MF.tellg()/sizeof(M);
cout<<"PRESENT RECORD:"<<POSITION<<endl;
MF.close();
}
```

Ans) PRESENT RECORD: 3

9) **(2006 D)**

```
 void main( )
{  char ch = 'A' ;
   fstream fileout("data.dat", ios::out) ;
   fileout<<ch ;
   int p = fileout.tellg( )
   cout<<p ;
}
```

What is the output if the file content before the execution of the program isthe string "ABC"**(Note that " " are not part of the file).**

Ans)1 (Since, the file is opened in out mode, it looses all the previous content, if the file mode is app, then result will be 4)

10) **(2006 OD)**

```
void main( )
{ char ch = 'A' ;
 fstream fileout("data.dat", ios :: app);
 fileout<<ch ;
 int p = fileout.tellg( ) ;
 cout << p ;
}
```

What is the output if the file content before the execution of the program is the string "ABC" ?
(Note that " " are not part of the file)

Ans) **4**

(Since, the file is opened in app mode, it retains the previous content also, if the file mode is out, then result will be 0 since it will loose all the old content of the file.)

MODEL 1b):FILL IN THE BLANKS (1 Mark)

1. **(2018 MP)**

```
class Route
{   int Route_No;          //Route Number
    char Route_Name[21];   //Name of Route
    int No_Kms;          //Distance in Kms on Route
public:
   void New_Route();  //Accepts details of new Route
   void Show_Route(); //Display details of a Route
    int Get_RouteNo( ) //Return the Route Number
    {      return Route_No;
    }
   void Update_Kms(int K)
   {   No_Kms=K;
   }
};
```

```
void Update_Route(int No, int New_Kms)
//Update No_Kms of a Route
{   Route R;
   fstream File("ROUTE.DAT", ios::in |ios::out|
ios::binary);
   while(!File.eof( ))
   {    File.read((char *)&R, sizeof®);
        if((R.Get_RouteNo()==No))
        {   R.Update_Kms(New_Kms);
            _____ //Statement 1
            _____ //Statement 2
            Cout<<"Route Details Updated\n";
        }
   File.close( );
}
```

i) Write Statement 1 to position the file pointer to the appropriate place so that the data updation is done for the correct Route.

A) File.seekg (-sizeof(R), ios::cur);

ii) Write Statement 2 to perform the write operation so that the updation is done in the binary file "ROUTE.DAT".

A) File.write ((char*)&R,sizeof(R));

2. Fill in the blanks marked as the Statement 1 and the Statement 2, in the program segment given below the appropriate functions for the required task. (2014)

```
class Agency
{    int ANo;
  char Name[20];  //Agent Code
  chart Mobile[12]; //Agent Mobile
public:
  void Enter( ) //Function to enter details of agent
  void Disp( ); //Function to display details of agent
  int RANo( )
 {return ANo;
  }
  void UpdateMobile( )//Function to change Mobile
 {   cout<<"Update Mobile: ";
     gets(Mobile);
  }
};
void AgentUpdate( )
{   fstream F;
  F.open("AGENT.DAT",ios::binary|ios::in|ios::out);
  int Updt=0;
  int UAno;
  cout<<"Ano (Agent No – To update Mobile): ";
  cin>>UAno;
  Agency A;
  while(!Updt && F.read((char *)&A,sizeof(A)))
  {if(A.RAon( )= =UAno)
    {//Statement 1: To call the function to update Mobile No.
       _____
 //Statement 2: To reposition file pointer to re-write the
//updated object back in the file
    _____
    F.write((char *)&A,sizeof(A));
     Updt++;
   }
}
if(Updt)
  cout<<"Mobile Update for Agent"<<UAno<<endl;
  else
 cout<<"Agent not in the Agency"<<endl;
F.close( );
}
```

Answer) Statement 1:A.UpdateMobile( );
Statement 2: F.seekg(-1*sizeof(A),ios::cur);

3. Fill in the blanks marked as Statement 1 and Statement 2, in the program segment given below with appropriate functions for the required task.

```
class Club                                    (2013)
{long int MNo;//Member Number
  char MName[20];//Member Name
  char Email[30];//Email of Member
public:
   void Register( );//Function to register member
   void Disp( );//Function to display details
   void ChangeEmail( ) //Function to change Email
   {   cout<<"Enter Changed Email: ";
       cin>>Email;
    }
    long int GetMno( )
   {          return MNo;
    }
};
void ModifyData( )
{ fstream File;
 File.open("CLUB.DAT", ios::binary |
ios::in|ios::out);
int Modify=0, Position;
long int ModiMno;
cout<<"Mno – Whose email required to be modified: ";
cin>>ModiMno;
Club CL;
while(!Modify && File.read((char *)&
                    CL.sizeof(CL)))
{  if(CL.GetMno( )==ModiMno)
    {   CL.ChangeEmail( );
        Position=File.tellg( )-sizeof(CL);
  //Statement 1: To place file pointer to the required
  // position
    _____
  //Statement:To write the object CL on to the binary file
    _____
    Modify++;
   }
}
if(Modify)
   cout<<"Email changed….."<<endl;
else
cout<<"Member not found…."<<endl;
File.close( );
}
```

Ans)
Statement 1: File.seekp(Position);
Statement 2: File.write((char *)&CL,sizeof(CL));

4) Observe the program segment given below carefully and the questions that follow: (2012)

```
class Stock
{    int Ino, Qty ;
     char Item [20];
public:
    void Enter()
   {cin>>Ino;
    qets(Item) ;
    cin>>Qty;
    }
   void issue(int Q)
  {Qty+=O;
  }
  void Purchase(int Q)
  {Q -= Q;
  }
  int GetIno ()
  {return Ino;
  }
};
void PurchaseItem(int Pino,int PQty)
{ fstream File;
  File.open("STOCK.DAT", ios::binary|ios: :in|ios: :out);
  Stock S;
  int Success=O;
  while (Success==O && File.read((char*)&S,sizeof(S)))
  {
   if (Pino==S. GetIno())
      {  S.PurchaSe(PQ) ;
         _____ // Statement 1
         _____ // Statement 2
         Success++;
       }
  }
}
if (Success=l)
      cout<<"Purchase Updated"<<endl;
else
      cout<<"Wronq Item No"<<endl;
File.close() ;
}
```

(i) Write statement 1 to position the file pointer to the appropriate place so that the data ucdation is done for the reauired item.

Ans File.seekp(File.tellg() - sizeof(Stock));
OR File. seekp (-sizeof (Stock) ,ios::cur));

(ii) Write statement 2 to perform the write operation so that the updation is done in the binary file.

Ans File.write((char*)&S,sizeof(S));
OR File.write((char*)&S,sizeof(Stock));

5. Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekg( ), seekp( ) tellp( ) and tellg( ) functions for performing the required task.

```
#include <fstream.h>                    (2011)
class ITEM
{  int Ino;char Iname[20]; float Price;
public:
void ModifyPrice() ;//The function is to modify
price of a particular ITEM
} ;
void item: :ModiyPrice()
{fstream File;
  File.open ("ITEM.DAT", ios::binary | ios::in | ios: :out);
  int CIno;
  cout<<"Item No to modify price:";cin>>CIno;
  while (file.read ((char*) this, sizeof (ITEM)))
 { if (CIno==Ino)
   {      cout<<"Present Price:"<<Price<<end1;
          cout<<"Changed price:"; cin>>Price;
          int FilePos = _____ ; //Statement 1,
          _____; //Statement 2
         File.write((char*)this,sizeof(ITEM)) ;
         // Re-writing the record
    }
 }
 File.close( ) ;
}
```

Ans Option 1

Statement 1: File.tellp ( ) ; OR File. tellg ( ) ;
Statement 2: File.seekp (FilePos - sizeof (ITEM)) ;
OR File.seekp (-sizeof (ITEM), ios: :cur));
OR File.seekg(FilePos - sizeof (ITEM));
OR. File.seekg(-sizeof (ITEM), ios: :cur));

Option 2

Statement 1: File. tellp ( ) – sizeof (ITEM) ;
OR File.tellg()- sizeof (ITEM) ;
Statement 2: File.seekp (FilePos) ;
OR File.seekg (FilePos) ;

6) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using tellg() and seekp() functions for performing the required task. (2010)

```
#include <fstream.h>
class Customer
{   long Cno;
    char Name[20],Mobile[12];
public:
    void Enter( );
//Function to allow user to enter the Cno, Name,Mobile
    void Modify( );
//Function to allow user to enter modify mobile number
     long GetCno( ) //Function to return value of Cno
     {        return Cno;
     }
};
void ChangeMobile( )
{Customer C;
fstream F;
F.open("CONTACT.DAT",ios::binary|
              ios::in|ios::out);
long Cnoc;
//Customer no. whose mobile numberneeds to be changed
cin>>Cnoc;
while (F.read((char*)&C,sizeof(C)))
{   if (Choc==C.GetCno( ))
  {     C.Modify( );
        int Pos=_____ //Statement 1
```

```
//To find the current position of file pointer
                _____ //Statement 2
//To move the file pointer to write the modified //record
back onto the file for the desired Cnoc
    F.write((char*)&C, sizeof(C));
  }
}
 F. close ( );
}
```

Ans)

Statement 1: F.tellg( ) ;

Statement 2 : F.seekp(Pos-sizeof(C));

OR File.seekp(-l*sizeof(C),ios::cur);

7) Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

(2009)

```
#include <fstream.h>
class Library
{  long Ano;   //Ano - Accession Number of the Book
   char Title[20]; //Title - Title of the Book
    int Qty;       //Qty - Number of Books in Library
public:
    void Enter (int);    //Function to enter the content
    void Display();    //Function to display the content
    void Buy(int Tqty) //Function to increment in Qty
    {       Qty+=Tqty;
     }
     long GetAno( )
    {       return Ano;
     }
};
void BuyBook(long BANo,int BQty)
//BANo  ->Ano of the book purchased
//BQty    ->Number of books purchased
{ fstream File;
File.open("STOCK.DAT",ios::binary|ios::in|ios::out);
int position=-l;
Library L;
while(Position==-l && File.read((char*)&L,sizeof(L)))
if (L.GetAno()==BANo)
  {L.Buy(BQty);
//To update the number of Books
Position = File.tellg()-sizeof(L) ;
_____;
//Line 1: To place the file pointer to the required position
_____;
//Line 2:To write the object L on to the binary file
}
if (Position==-l)
cout<< "No updation done as
            required Ano not found..";
File.close( );
}
```

Ans)Statement 1: File.seekp(Position);

OR File. seekp (-sizeof (L), ios::cur);

Statement 2: File.write((char*)&L, sizeof(L));

OR

File.write((char*)&L,sizeof(Library));

8. Observe the program segment given below carefully, and answer the question that follows

(2008)

```
class candidate
{    long Cid ;          // Candidate's Id
     char CName[20]; // Candidate's Name
     float Marks ;       // Candidate's Marks
public ;
    void Enter( ) ;
    void Display( ) ;
    void MarksChange( ) ;
                  //Function to change marks
    long R_Cid( )
    {       return Cid;
    }
};
void MarksUpdate (long Id)
{   fstream File ;
   File.open ("CANDIDATE.DAT", ios ::
            binary|ios::in|ios :: out) ;
   Candidate C ;
   int Record = 0, Found = 0 ;
while (!Found&&File.read((char*)&C, sizeof(C)))
 {
   if (Id = =C.R_Cid( ))
   {     cout << "Enter new Marks" ;
         C.MarksChange( ) ;
         _____  //Statement1
         _____  //Statement  2
        Found = 1 ;
    }
   Record++ ;
 }
if (Found = = 1)
    cout << " Record Updated" ;
 File.close( ) ;
 }
```

Write the Statement to position the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 to write the updated Record at that position.

Ans)

Statement 1: File.seekp(File.tellp( )-sizeof(C));

OR File.seekp(Record*sizeof(C));

Statement 2: File.write((char*)&C,sizeof(C));

OR File.write((char*)&C,sizeof(Candidate));

9. Observe the program segment given below carefully,and answer the question that follows:

(2007)

```
class Labrecord
{   int Expno;
    char Experiment[20] ;
    char Checked ;
    int Marks ;
 public :
    void EnterExp( ) ;
       //function to enter Experiment details
   viod ShowExp( ) ;
         //function to display Experiment details

 char  RChecked( )    //function to return Expno
```

```
    {       return Checked;
    }
   void Assignmarks  (int M)
        //function to assign Marks
    {       Marks = M;
    }
} ;
void ModifyMarks( )
{  fstream File ;
  File.open ("Marks.Dat", ios :: binary l
          ios :: in l ios :: out) ;
  Labrecord L ;
  int Rec=0 ;
while (File.read ( (char*) &L,sizeof (L)))
{  if (L.RChecked( )= ='N')
           L.Assignmarks(0)
   else
           L.Assignmarks (10)
    _____;  //Statement   1
    _____;//Statement  2

    Rec++ ;
  }
    File.close( ) ;
}
```

If the function ModifyMarks ( ) is supposed to modify marks for the records in the file MARKS.DAT based on their status of the member Checked (containg value either 'Y' or 'N').Write C++ statements for the statement 1 and statement 2,where, statement 1 is required to position the file write pointer to an appropriate place in the file and statement 2 is to perform the write operation with the modified record.

Ans) Statement 1: File.seekp(File.tellp( )-sizeof(L));
OR File.seekp(Rec*sizeof(L));
Statement 2: File.write((char*)&L,sizeof(L));
OR File.write((char*)&L,sizeof(Labrecord));

10) Observe the program segment given below carefully and answer the question that follows

(2005)

```
class Member
{   int Member_no ;
  char Member_name[20] ;
public :
   void enterdetails ( );//function to enter Member
details
  void showdetails ( );//function to display Member details
  int RMember_no( )
  {     return Member_no;
  } //function to return Member_no
} ;
void Update (Member NEW)
{   fstream File ;
 File.open("MEMBER.DAT" , ios ::binary |ios :: in | ios :: out) ;
  Member OM ;
  int Recordsread = 0, Found = 0 ;
  while (!Found && File.read((char*) &OM, sizeof(OM)))
      { Recordsread++ ;
      if (NEW.RMember_no( ) == OM.RMember_no( ))
      {    _____  //Missing Statement
        File.write((char*) & NEW ,
             sizeof(NEW) ;
        Found = 1 ;
      }
      else
        File.write((char*) & OM,
            sizeof(OM)) ;
      }
if (!Found)
   cout<<"Record for modification does not exist" ;
File.close( ) ;
}
```

If the function Update( ) is supposed to modify a record in file MEMBER.DAT with the values of Member NEW passed to its argument, write the appropriate statement for **Missing statement** using seekp( ) or seekg( ), whichever needed, in the above code that would write the modified record at its proper place.

Ans) File.seekp((Recordsread-1)*sizeof(OM));
OR File.seekp(Recordsread*sizeof(OM));
OR File.seekp(-l*sizeof(OM),ios::curr);
OR File.seekp(file.tellg()-sizeof(OM));

11. Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement2 using seekp( ) and seekg( ) functions for performing the required task.

(MP109-10)

```
#include <fstream.h>
class Item
{   int Ino;
  char Item[20];
public:
  void Search(int );
//Function to search and display the
//content from a particular record number
  void Modify(int);
//Function to modify the content of a
//particular record number
};
void Item::Search(int RecNo)
{fstream File;
File.open("STOCK.DAT",ios::binary|ios::in);
_____ //Statement 1
File.read((char*)this,sizeof(Item));
cout<<Ino<<"==>"<<Item<<endl;
File.close( );
}
void Item::Modify(int RecNo)
{fstream File;
File.open("STOCK.DAT",ios::binary|ios
                ::in|ios::out);
cout>>Ino;cin.getline(Item,20);
_____ //Statement 2
File.write((char*)this,sizeof(Item));
File.close( );
}
```

Ans)
Statement 1: File.seekg(RecNo*sizeof(Item));
Statement 2 : File.seekp(RecNo*sizeof(Item));

12. 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. (MP209-10)

```
#include <fstream.h>
class Employee
{     int Eno;char Ename[20];
public:
     int Countrec( );
 //Function to count the total number of records
};
int Item::Countrec( )
{fstream File;
File.open("EMP.DAT",ios::binary|ios::in);
_____ //Statement 1
int Bytes =_____  //Statement 2
int Count = Bytes/sizeof(Item);
File.close( );
return Count;
}
```

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

13. 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.

```
#include<fstream.h>                    (MP108-09)
class Item
{     int Ino;char Item[20];
public:
     void Search(int );
  //Function to search and display the content
   //from a particular record number
    void Modify(int);//Function to modify the content
//of a particular record number
};
void Item::Search(int RecNo)
{fstream File;
File.open("STOCK.DAT",ios::binary|ios::in);
_____          //Statement 1
File.read((char*)this,sizeof(Item));
cout<<Ino<<"==>"<<Item<<endl;
File.close( );
}
void Item::Modify(int RecNo)
{fstream File;
File.open("STOCK.DAT",ios::binary|ios
          ::in|ios::out);
cout>>Ino;
cin.getline(Item,20);
_____          //Statement 2
File.write((char*)this,sizeof(Item));
File.close( );
}
```

Answer:
Statement 1 : File.seekg(RecNo*sizeof(Item));
Statement 2 : File.seekp(RecNo*sizeof(Item));

MODEL 1C): Theory Question (1 Mark)

1) Differentiate between seekg( ) and tellg( ) (2019)

2)What is the difference between pub( ) and write()?(2002)

3)Distinguish between ios::out and ios::app. (2001)

Ans) The ios::out mode opens the file in output mode only. The ios::app mode opens the file in append mode, where the file can be appended.

4) Name two member functions of ofstream class. (2000)

5) Differentiate between functions read()and write() (1999)

6) Write name of two member functions belonging to fstream class. (1998)

7) Explain different file modes.

8) Differentiate between text files and binary files.

9) Explain and differentiate between get and getline.

10) Explalin about seekg(),seekp(),tellg() and tellp() functions.

11) Explain about curr, beg and end related to files.

MODEL 2:
Function using files (without objects) (2M)

PRACTICE PROGRAMS – TEXT FILES

1. To store marks of a student in a file

```
#include<fstream.h>
#include<conio.h>
void main()
{ clrscr();
  float marks;
  ofstream fout;
  fout.open("marks.txt",ios::out);
  cout<<"\nEnter marks : ";
  cin>>marks;
  fout<<marks;
}
```

2. To retrieve marks of a student from a file

```
#include<fstream.h>
#include<conio.h>
void main()
{ clrscr();
  float marks;
  ifstream fin;
  fin.open("marks.txt",ios::in);
  fin>>marks;
  cout<<"\nMarks from the file: "<<marks;
  getch();
}
```

CHARACTERWISE OPERATIONS

1) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT".
Ans) (MP209-10) (MP208-09)

```
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;
}
```

2.Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK.txt". 2019SP

```
int Countalpha()
{  ifstream fin ("BOOK.txt");
   char ch;
   int count =0;
   while (!fin.eof())
   {   fin.get(ch);
       if(islower(ch))
            count ++;
    }
    fin.close();
    return (count)
}
```

3)Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT". (2008 OD)
Solution:

```
void UpperLetters( )
{  ifstream fin("ARTICLE.TXT",ios::in);
   char ch;
   int uppercount=0;
   while(fin)
   { fin.get(ch);
     if(isupper(ch))
          uppercount++;
  }
  cout<<"\nTotal number of Uppercase
       alphabets in the file = "<<uppercount;
  }
```

4)Write a function to count the number of words present in a text file named "PARA.TXT". Assume that each word is separated by a single blank/space character and no blanks/spaces in the beginning and end of the file. (2006 D)

Solution:

```
void WordsCount( )
{ clrscr( );
  ifstream fin("PARA.TXT",ios::in);
  char ch;
  int Words=1;
  if (!fin)
  { cout<<"No words at all in the file";
    exit(0);
  }
    while(fin)
    {  fin.get(ch);
       if(ch= =' ')
          Words++;
     }
 cout<<"\nTotal number of Words in the file = "<<Words;
 getch( );
}
```

5) Write a function in C++ to count the words "to" and "the" present in a text file "POEM.TXT".
[Note that the words "to" and "the" are complete words] **(2010) (2009)**
Ans)

```
void COUNT( )
{ ifstream Fil;
Fil. open ("POEM.TXT");      //OR ifstream
Fill("POEM.TXT");
char Word[8O], Ch;
int Cl =0, C2=0, i=0;
while(Fil.get(Ch))
{ if (Ch! = ' ')
        Word[i++] = Ch;
 else
 { Word[i] = '\0';
   if (strcmp (Word, "to") = =0)
      Cl++;
   else if (strcmp (Word, "the") = =0)
      C2++;
    i=0;
 }
}
cout<<"Count of -to- in file:"<<Cl;
cout<<"Count of -the- in file:"<<C2;
Fil.close( );
}
```

6)Write a function to count the number of blanks present in a text file named "PARA.TXT".
Solution: (2006)(2003)

```
void BlanksCount( )
{  ifstream fin("PARA.TXT",ios::in);
   char ch;
   int Blanks=0;
   if(!fin)
   {cout<<"No words at all in the file.So no blank spaces";
    exit(0);
   }
   while(fin)
   {fin.get(ch);
    if(ch= =' ')
         Blanks++;
   }
  cout<<"\nTotal number of Blank
       Spaces in the file = "<<Blanks;
}
```

7)Write the function AECount( ) in C++, which should read character of a text file NOTES.txt, should count and display the occurrence of alphabets A and E (including small case a and e too) (2014)2

Example:

If the file content is as follows:
CBSE enhanced its
CCE guidelines further.
The AECount( ) function should display the output as
A:1
E:7

Answer)

```
void AECount( )
{  char Ch;
   ifstream fcin("NOTES.txt");
   int count1=0,count2=0;
  while(!fcin.eof( ))
  {   fcin.get(CH);
      if(Ch= ='A'||Ch=='a')
            count1++;
     else if (Ch= ='E'||Ch=='e')
            count2++;
   }
   fcin.close( );
   cout<<"A: "<<count1<<endl;
    cout<<"E:"<<count2<<endl;
}
```

8) A text file named MATTER.TXT contains some text, which needs to be displayed such that every next character is separated by a symbol '#'.

Write a function definition for **HashDisplay( )** in C++ that would display the entire content of the file MATTER.TXT in the desired format. **(2018)(3)**

Example:

If the file MATTER.TXT has the following content stored in it:
The WORLD IS ROUND
The function **HashDisplay( )** should display the following content:
T#H#E# #W#O#R#L#D# #I#S#
#R#O#U#N#D#

Answer:

```
void HashDisplay( )
{ char ch;
  ifstream F("MATTER.TXT" );
    /* ifstream F;
        F.open("MATTER.TXT");      */
  while(F.get(ch))
    cout<<ch<<"#";
}
F.close();
}
```

9. Polina Raj has used a text editing software to type some text in an article. Aftersaving the article as MYNOTES.TXT , she realised that she has wrongly typed alphabetK in place of alphabet C everywhere in the article.Write a function definition for PURETEXT() in C++ that would display the correctedversion of the entire article of the file MYNOTES.TXT with all the alphabets "K" tobe displayed as an alphabet "C" on screen. **(2017)**

Note: Assuming that MYNOTES.TXT does not contain any C alphabet otherwise.

Example:

If Polina has stored the following content in the file MYNOTES.TXT :
I OWN A KUTE LITTLE KAR.
I KARE FOR IT AS MY KHILD.
The function PURETEXT() should display the following content:
I OWN A CUTE LITTLE CAR.
I CARE FOR IT AS MY CHILD.

Ans)

```
void PURETEXT( )
{   char ch;
     ifstream F("MYNOTES.TXT" );
    while(F.get(ch))
    {if(ch= ='K')
              ch='C';
     cout<<ch;
     }
     F.close();
}
```

10) Write a C++ program, which initializes a string variable to the content "Time is a great teacher but unfortunately it kills all its pupils. Berlioz" and outputs the string one character at a time to the disk file OUT.TXT. You have to include all the header files if required. (2002)

Ans)

WORDWISE OPERATIONS

1)Write function definition for TOWER( ) in C++ to read the content of a text file WRITEUP.TXT, count the presence of word TOWER and display the number of occurrences of this word.

Note : The word TOWER should be an independent word - Ignore type cases (i.e. lower/upper case)

Example: (2015)2

If the content of the file WRITEUP.TXT is as follows:
Tower of hanoi is an interesting problem.
Mobile phone tower is away from here. Views from EIFFEL TOWER are amazing.
The function TOWER () should display the following:3

Ans)

```
void TOWER()
{  int count=0;
   ifstream f("WRITEUP.TXT");
   char s[20];
   while (!f.eof())
    {       f>>s;
            if (strcmpi(s,"TOWER")= =0)
                 count++;
     }
    cout<<count;
    f.close();
}
```

2) Write a function in C++ to count the no. of "He" or "She" words present in a text file "STORY. TXT".

If the file "STORY. TXT" content is as follows:
He is playing in the ground. She is Playing with her dolls.
The output of the function should be
Count of He/She in file: 2

Ans **(2011 OD)2**

```
void COUNT ( )
{   ifstream Fil ("STORY.TXT");
    char STR [10];
    int count = 0;
    while (!Fil.eof ( ))
    {Fil>>STR ;
   if (strcmp (STR, "He") ==0 | | strcmp (STR, "She")= =0)
                count++;
    }
   cout<<"Count of He/She in file : "<<count<<end1;
   Fil.close( );
}
```

3)Write a function CountYouMe( ) in C++ which reads the contents of a text file story.txt and counts the words You and Me (not case sensitive)

For example, if the file contains: **(2013) (2010D)2**
You are my best friend.
You and me make a good team.
The function should display the output as
Count for You: 2
Count for Me: 1

Answer)

```
#include<conio.h>
#include<iostream.h>
#include<fstream.h>
#include<string.h>
void COUNT( )
{  ifstream File;
 File.open("STORY.TXT");
char Word[80];
int C1=0,C2=0;
while(!File.eof( ))
{   File>>Word;
     if(strcmpi(Word,"You")= =0)
          C1++;
     else if(strcmpi(Word,"me")= =0)
           C2++;
}
cout<<"Count for you: "<<C1<<endl;
cout<<"Count for me: "<<C2;
File.close( );
}
```

4)Write a function in C++ to print the count of the word the as an independent word in a text file STORY.TXT.

For **example**,if the content of the file STORY.TXT is
There was a monkey in **the** zoo.**The** monkey was very naughty. **(2007 OD)**
Then the output of the program should be 2

Solution:

```
void COUNT_THE ( )
{ ifstream Fil;       //OR ifstream Fi1("NOTES.TXT");
   Fil.open("STORY.TXT")
 char Word[80],Ch;
 int Count =0, I=0;
 while(Fil.get(Ch))
 {  if (Ch!= ' ')
     Word [I++] = Ch;
  else
  { Word[I] = '\0';
    if (strcmp (strupr(Word), "THE") = =0)
       Count++;
    I=O;
   }
}
Fil.close( );
cout<<"Count of-the- in file: "<<Count;
}
```

5) Write a user defined function word_count() in C++ to count how many words are present in a text file named "opinion.txt". For example, if the file opinion.txt contains following text:Co-education system is necessary for a balanced society. Withco-education system, Girls and Boys may develop a feeling of mutual respect towards each other.

The function should display the following:
Total number of words present in the text file are: 24

Ans) **(2017MP)2**

```
void word_count()
{ifstream i;char ch[20];int c=0;
i.open("opinion.txt ");
while(!i.eof())
{  i>>ch;
   c=c+1;
}
cout<<" Total number of words present in the
                                text file are: "<<c;
}
```

6)Write function definition for DISP3CHAR( ) in C++ to read the content of a text file KIDINME.TXT, and display all those words, which have three characters in it.

Example: **(2016)2**
If the content of the file KIDINME.TXT is as follows:
When I was a small child, I used to play in the garden with my grand mom. Those days were amazingly funful and I remember all the moments of that time

The function DISP3CHAR() should display the following:
was the mom and all the

Ans)

```
{   ifstream Fil;
    Fil.open("KIDINME.TXT");
    char W[20];
    Fil>>W;
   while(!Fil.eof())                // OR while(Fil)
   {   if (strlen(W)) = = 3)
              cout<<W<< " ";
       Fil>>W;
   }
   Fil.close();
}
```

7) Write a function in C++ to count the number of lines present in a text file "STORY.TXT".
Ans) (MP109-10) (MP108-09)

```
void CountLine()
{
ifstream FIL("STORY.TXT");
int LINES=0;
char STR[80];
while (FIL.getline(STR,80))
       LINES++;
cout<<"No. of Lines:"<<LINES<<endl;
f.close( );
}
```

8) Write a function in C++ to read the content of a text file "DELHI.TXT" and display all those lines on screen, which are either starting with 'D' or starting with 'M'. (2012) 2
(starting with I or M - 2018 MP)

Ans)

```
void DispDorM()
{  if stream File("DELHI.TXT");
  char Str[80];
  while(File.getline(Str,80))
  {     if(Str[0]='D' || Str[0]='M')
          cout«Str«endl;
   }
   File.close();
}
```

9)Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT". (2005 D)
Example :
If the file "LINES.TXT" contains the following lines,
A boy is playing there.
There is a playground.
An aeroplane is in the sky.
Alphabets and numbers are allowed in the password.
The function should display the output as **3**

Ans)

```
void counter( )
{  char Aline[80];
   int Count=0;
   ifstream Fin ("LINES.TXT");
   while(Fin.getline(Aline,80, '\n'))
   if (Aline[0]== 'A')
       Count++;
  Fin.close( );
  cout<<Count<<endl;
}
```

10) Write a function in C++ to count and display the number of lines not starting with alphabet 'A' present in a text file "STORY.TXT". (2005 OD)
Example :
If the file "STORY.TXT" contains the following lines,
The rose is red.
A girl is playing there.
There is a playground.
An aeroplane is in the sky.
Numbers are not allowed in the password.
The function should display the output as **3**

Ans)

```
void COUNTALINES()
{ ifstream FILE("STORY.TXT");
  int CA=0;
  char LINE[80];
  while (FILE.getline (LINE,80))
   if (LINE[0]!='A')
          CA++;
   cout<<"Not Starting with A counts to "<<CA<<endl;
  FILE.close( );
}
```

11)Write a function RevText( ) to read a text file "Input.txt " and Print only word starting with 'I' in reverse order . 2019SP
Example: If value in text file is: INDIA IS MY COUNTRY
Output will be: AIDNI SI MY COUNTRY
Answer:

```
void RevText( )
{ ifstream Fin("Input.txt");
  char Word[20];
  while(!Fin.eof())
  {  Fin>>Word;
     if(Word[0]= ='I')
          strrev(Word);
    cout<<Word<< " ";
  }
  Fin.close( );
}
```

12) Assuming that a text file named FIRST.TXT contains some text written into it, write a function named vowelwords( ), that reads the file FIRST.TXT and creates a new file named SECOND.TXT, to contain only those words from the file FIRST.TXT which start with start with a lowercase vowel (i.e. with 'a', 'e', 'I', 'o', 'u'). For example if the file FIRST.TXTcontains
Carry umbrella and overcoat when it rains
Then the file SECOND.TXT shall contain:
umbrella and overcoat it (2004)

13) A text file named MESSAGE.TXT contains some text. Another text file names SMS.TXT needs to be created such that it would store only the first 150 characters from the file MESSAGE.TXT. Write a user-defined function LongToShort() in C++ that would perform the above task of creating SMS.TXT from the already existing file MESSAGE.TXT. (2019)

14) A text file named CONTENTS.TXT contains some text. Write a user-defined function LongWords( ) in C++ which displays all such words of the file whose length is more than 9 alphabets. (2019)

For example : if the file CONTENTS.TXT contains:

"Conditional statements of C++ programming language are if and switch"

Then the function LognWords( ) should display the output as :

Conditional
Statements
Programming

MODEL 3: USING CLASS CONCEPT. 3 Mark

1) Write a user-defined function TotalPrice( ) in C++ to read each object of a binary file STOCK.DAT, and display the Name from all such records whose Price is above 150. Assume that the file STOCK.DAT is created with the help of objects of class Stock, which is defined below: 2019

```
class Stock
{
char Name[20], float Price;
public:
   char* RName( ) { return Name; }
   float RPrice( ) { return Price; }
};
```

2) A binary file DOCTORS.DAT contains records stored as objects of the following class: 2019

```
class Doctor
{  int DNo;
   char Name[20];
   float Fees;
public:
    int *GetNo( )
   { return DNo;
   }
   void Show( )
   {
cout<<Dno<<"*"<<Name<<"*"<<Fees<<endl;
    }
};
```

Write definition for function Details(int N) in C++, which displays the details of the Doctor from the file DOCTORS.DAT, whose DNo matches with the parameter N passed to the function. 2

3. Write a function in C++ to search and display details, whose destination is "Cochin" from binary file "Bus.Dat". Assuming the binary file is containing the objects of the following class:

```
class BUS                                   2019SP
{ int Bno;                    // Bus Number
  char From[20];              // Bus Starting Point
   char To[20];               // Bus Destination
public:
    char * StartFrom ( )
    { return From;
     }
    char * EndTo( )
   { return To;
    }
void input()
 { cin>>Bno>>; gets(From); get(To);
 }
void show( )
 { cout<<Bno<< ":"<<From << ":" <<To<<endl;
 }
};
```

Answer:

```
void Read_File( )
{
BUS B;
ifstream Fin;
Fin.open("Bus.Dat", ios::binary);
while(Fin.read((char *) &B, sizeof(B)))
{  if(strcmp(B.EndTo(), "Cochin")= =0)
   {   B.show( ) ;
    }
 }
Fin.close( );
}
```

4. Write a function in C++ to add more new objects at the bottom of a binary file "STUDENT.dat", assuming the binary file is containing the objects of the following class : 2019SP

```
class STU
{  int Rno;
   char Sname[20];
public:
   void Enter()
   {   cin>>Rno;gets(Sname);
    }
    void show()
   {  count << Rno<<sname<<endl;
    }
};
```

Answer:

```
void Addrecord()
{ ofstream ofile;
  ofile.open("STUDENT.dat", ios ::out);
  STU S;
  char ch='Y';
  while (Ch=='Y' || Ch = = 'y')
  {  S.Enter();
     ofile.write (Char*) & S, sizeof(s));
      cout << "more (Y/N)";
      cin>>ch;
      }
   ofile.close();
}
```

5) Write a definition for a function TotalTeachers() in C++ to read each object of a binary file SCHOOLS.DAT, find the total number of teachers, whose data is stored in the file and display the same. Assume that the file SCHOOLS.DAT is created with the help of objects of class SCHOOLS, which is defined below:

```
class SCHOOLS                               2018(2)
{     int SCode;            //School Code
      char SName[20];   //School Name
     int NOT;   //Number of Teachers in the school
public:
 void Display( )
{cout<<SCode<<"#"<<SName<<"#"<<NOT<<endl;
 }
 int RNOT( )
 {   return NOT;
  }
};
```

Ans)

```
void TotalTeachers()
{
ifstream F;
F.open("SCHOOLS.DAT",ios::binary);
int Count=0;
SCHOOLS S;
while(F.read((char*)&S,sizeof(S)))
Count += S.RNOT();
cout<<"Total number of teachers"<<Count<<endl;
F.close();
}
```

OR

```
void TotalTeachers()
{
ifstream F;
F.open("SCHOOLS.DAT",ios::binary);
SCHOOLS S;
while(F.read((char*)&S,sizeof(S)))
cout<<S.RNOT()<<endl;   //OR S.Display();
F.close();
}
```

6. Consider the following class Item:

```
class Item                                  (2018 MP)
{ int ItemId;
   int Quantity;
   float Price;
public:
   void NewItem( )
   {    cin>>ItemId>>Quantity>>Price;
   }
   void ShowItem( )
   { cout<<ItemId<<":"<<Quantity<<":"<<Price<<endl;
   }
```

```
   void Set_Price(float P)
   {     Price = P;
   }
   int Ret_Id( )
   {   return ItemId;
   }
};
```

Write a function named **Change_Item(int Id, float Pr)** to modify the price of the item whose Itemid & new price are passed as an argument.

A)

```
void Change_Item(int Id, float Pr)
{  fstream File("ITEM.DAT", ios::in
|ios::out|ios::binary);
  Item I;
  while (!File.eof( ))
  {    File.read ((char *)&I, sizeof(I));
       if(I.Ret_Id( )==Id)
       {   I.Set_Price(Pr);
           File.seekg(-sizeof(I), ios::cur);
          File.write((char *)&I, sizeof(I));
       }
  }
  File.close( );
}
```

7. Write a definition for function COUNTPICS() in C++ to read each object of abinary file PHOTOS.DAT, find and display the total number of PHOTOS of typePORTRAIT. Assume that the file PHOTOS.DAT is created with the help of objects of class PHOTOS, which is defined below:

```
class PHOTOS                                    (2017)
{   int PCODE;
char PTYPE[20]; //Photo Type as "PORTRAIT","NATURE"
public:
  void ENTER()
  {  cin>>PCODE;gets(PTYPE);
  }
  void SHOWCASE()
  { cout<<PCODE<<":"<<PTYPE<<endl;
  }
  char *GETPTYPE()
  {return PTYPE;
   }
};
```

Ans)

```
void COUNTPICS()
{ifstream F;
  F.open("PHOTOS.DAT",ios::binary);
  int count=0;
  PHOTOS obj;
  while(F.read((char*)&obj, sizeof(obj)))
  { if(strcmp(obj.GETPTYPE(),"PORTRAIT")= =0)
            count++;
   }
   cout<<"Number of PORTRAIT photos :"<<count;
   F.close();
}
```

8.Write a function display () in C++ to display all the students who have got a distinction(scored percentage more than or equal to 75) from a binary file "stud.dat", assuming the binary file is containing the objects of the following class:

```
class student                                   (2017MP)3
{  int rno;
    char sname [20];
    int percent;
public:
    int retpercent()
   { return percent;
   }
   void getdetails()
  { cin>>rno;
    gets(sname);
    cin>>percent;
  }
  void showdetails()
    {   cout<<rno;
        puts(sname);
        cout<<percent;
    }
};
```

Ans)

```
void display()
{ student s;
   ifstream i("stud.dat");
   while(i.read((char*)&s,sizeof(s)))
   { if(s.retpercent()>=75)
          s.showdetails();
    }
     i.close();
}
```

9. Write a definition for function ONOFFER( ) in C++ to read each object of a binary file TOYS.DAT, find and display details of those toys, which has status as "ÖNOFFER". Assume that the file TOYS.DAT is created with the help of objects of classTOYS, which is defined below: **(2016)3**

```
class TOYS
{ int TID;char Toy[20],Status[20]; float MRP;
public:
  void Getinstock()
  { cin>>TID;gets(Toy);gets(Status);cin>>MRP;
  }
void View()
{cout<<TID<<":"<<Toy<<":"<<MRP
                        <<"":"<<Status<<endl;
}
char *SeeOffer()
 {return Status;
  }
};
```

Ans)

```
void ONOFFER()
{ TOYS T;
    ifstream fin;
    fin.open("TOYS.DAT", ios::binary);
    while(fin.read((char*)&T, sizeof(T)))
    {     if(strcmp(T.SeeOffer(),"ON OFFER")= =0)
              T.View();
      }
     fin.close();
}
```

10. Write a definition for function COSTLY() in C++ to read each record of a binary file GIFTS.DAT, find and display those items,which are priced more that 2000. Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below: (2015)3

```
class GIFTS
{   int CODE;
    char ITEM[20];
    float PRICE;
public:
   void Procure()
   {cin>>CODE;
    gets(ITEM);
    cin>>PRICE;
  }
 void View()
 {cout<<CODE<<":"<<ITEM<<":"<<PRICE<<endl;
  }
  float GetPrice()
  {return PRICE;
  }
};
```

Ans)

```
void COSTLY()
{     GIFTS G;
      ifstream fin("GIFTS.DAT",ios::binary);
       while (fin.read((char *)&G,sizeof(G)))
      {   if(G.GetPrice()>2000)
              G.View();
      }
      fin.close();
}
```

11. Assume the class TOYS as declared below, write a function in C++ to read the objects TOYS from binary file TOYS.DAT and display those details of those TOYS, which are meant for children of AgeRange "5 to 8".

```
class TOYS                                    (2014) 3
{ int ToyCode;
  char ToyName[10];
  char AgeRange;
public:
 void Enter( )
{cin>>ToyCode;
  gets(ToyName);
  gets(AgeRange);
 }
 void Display( )
 {cout<<ToyCode<<":"<<ToyName<<endl;
   cout<<AgeRange<<endl;
  }
  char *WhatAge( )
  {return AgeRange;
  }
};
```

Answer)

```
void Show( )
{  TOYS T;
 ifstream fcin("TOY.DAT",ios::in|ios::binary);
 while(fcin)
 {    fcin.read((char *)&T,sizeof(T));
      if(strcmp((T,WhatAgeR( ),"5 to 8")= =0)
          T.Display(  );
 }
 fcin.close( );
}
```

12. Assuming the class ANTIQUE as declared below, write a function in C++ to read the objects of ANTIQUE from binary file ANTIQUE.DAT and display those antique items, which are priced between 10000 and 15000. (2013)

```
class ANTIQUE
{  int ANO;
   char Aname[10];
   float Price;
public:
  void BUY( )
  { cin>>ANO;
    gets(Aname);
    cin>>price;
  }
  void SHOW( )
  { cout<<ANO<<endl;
    cout<<Aname<<endl;
    cout<<Price<<endl;
   }
  float GetPrice( )
  {  return Price;
  }
};
```

Answer)

```
void Search(float pr)
{ ifstream ifile("ANTIQUE.DAT",ios::in|ios::binary);
   if(!file)
   {    cout<<"Could not open ANTIQUE.DAT file";
        exit(0);
   }
  else
  {   ANTIQUE A;
      int found=0;
     while(!file.read((char *)&A,sizeof(A)))
     {   pr=A.GetPrice( );
         if(pr>=10000 && pr<=15000)
        {     A.SHOW( );
              found=1;
              break;
        }
      }
  }
  if(found= =0)
      cout<<"Given Price not Match";
}
```

13) Write a function in C++ to search for the details (Phone no and Calls) of those Phones, which have more than 800 calls from a binary file "phones.dat" Assuming that this binary file

contains records/objects of class Phone, which is defined below. (2012)

```
class Phone
{ char Phoneno [10] ; int Calls ;
public:
  void Get 0
  {gets (Phoneno) ; cin>>ea11s;
   }
   void Bi11ing( )
  {cout<<Phoneno<<"#"<<Ca11s«end1:
   }
   int GetCa11s ()
  {return Ca11s;
    }
} ;
```

Ans

```
void Search ( )
{Phone P;
fstream fin;
fin. open ("phones. dat", ios: :binary| ios: :in);
whi1e (fin.read((char*) &P, sizeof (P)))
{       if(P.GetCa11s ( ) > 800)
            P.Billing ( ) ;
}
fin.c1ose () ;
 }
```

14) Write a function in C++ to search for a camera from a binary file "CAMERA.DAT" containing the objects of class" CAMERA (as defined below). The user should enter the Model No and the function should search display the details of the camera. (2011)

```
class CAMERA
{   long ModelNo;
  float MegaPixel;
  int Zoom;
  char Details[120];
 public:
  void Enter ( )

{cin>>ModelNo>>MegaPixel>>Zoom;gets(Details);
   }
   void Display ( )
{cout<<ModelNo<<MegaPixel<<Zoom<<Details<<endl;
 }
  long GetModelNo ( )
 {return ModelNo;
  }
};
```

Ans

```
void Search ( )
{  CAMERA C;
   long modelnum;
   cin>>modelnum;
   ifstream fin;
   fin.open ("CAMERA.DAT", ios: :binary | ios: :in) ;
   while (fin.read((char*) &C,sizeof (C)))
   {       if (C. GetModelNo ( ) modelnum)
                   C.Display() ;
    }
   Fin.close( ) ;
 }
```

OR

```
void Search (long modelnum)
{   CAMERA C;
    ifstream fin;
   fin.open ("CAMERA.DAT", ios: :binary | ios: :in);
   while(fin.read((char*)&C,sizeof(C)))
   {       if (C.GetModelNo() = = modelnum)
                   C. Display ();
    }
    Fin.close( );
}
```

15) Write a function in C++ to search and display details. of all trains, whose destination is "Delhi" . from a binary file "TRAIN.DAT". Assuming the binary file is containing the objects of the following class. (2010)

```
class TRAIN
{   int Tno;                  // Train Number
    charFrom[20];          // Train Starting Point
    charTo [20];           // Train Destination
public:
  char* GetFrom( )
  {      return From;
  }
  char* GetTo( )
  {       return To;
  }
  void Input( )
  {       cin>>Tno;
      gets(From);
      gets(To);
  }
  void Show( )
 {
   cout<<Tno<<":"<<From<<":"<<To<<endl;
  }
};
```

Ans)

```
void Read ( )
{
TRAIN T;
ifstream fin;
fin. open ("TRAIN.DAT",ios::binary);
   //OR ifstream fin ("TRAIN.DAT", ios::binary);
while(fin.read((char*)&T, sizeof(T)))
{   if(strcmp(T.GetTo(),"Delhi")==O)
         T.Show( ) ;
}
fin.close( );
}
```

16) Write a function in C++ to read and display the detail of all the members whose membership type is 'L' or 'M' from a binary file "CLUB.DAT". Assume the binary file "CLUB.DAT" contains objects of class CLUB,which is defined as follows:

```
class CLUB                                   (2009)
{  int Mno;                  //Member Number
   char Mname [20];      //Member Name
   char Type; //Member Type: L Life Member M
                  //Monthly Member G Guest
public:
   void Register( ); //Function to enter the content
   void Display( ); //Function to display all data
members
   char WhatType( )
   {     return Type;
   }
} ;
```

Ans)

```
void DisplayL_M( )
{ CLUB C;
fstream fin;
fin. open ("CLUB.DAT",ios::binary|ios::in);
   //OR ifstream fin ("CLUB.DAT", ios::binary);
while(fin.read((char*)&C, sizeof(C))
{ if(C.WhatType()=='L'||C.WhatType()=='M')
         C .Display ( );
}
fin.close( );
}
```

OR

```
void Disp1ayL_M ( )
{ CLUB C;
fstream fin;
fin.open ("CLUB.DAT", ios::binary | ios::in);
//ifstream fin ("CLUB.DAT",ios::binary);
if(fin)
{fin.read((char*)&C, sizeof(C));
  while(!fin.eof())
  { if(C.WhatType()=='L'||C.WhatType()=='M')
           C. Display( );
      fin.read((char*)&C, sizeof(C));
    }
  }
  fin.close( );
}
```

17) Given a binary file TELEPHON.DAT, containing records of the following class Directory

```
class Directory                              (2008)
{    char Name[20] ;
     char Address[30] ;
     char AreaCode[5] ;
     char phone_No[15] ;
 public ;
     void Register( ) ;
     void Show( ) ;
     int CheckCode(char AC[ ])
    {       return strcmp(AreaCode, AC) ;
     }
 } ;
```

Write a function COPYABC( ) in C++, that would copy all those records having AreaCode as "123" from TELEPHON.DAT to TELEBACK.DAT.

Solution:

```
void COPYABC( )
{ ifstream fin("TELEPHON.DAT',ios::in|ios::binary);
ofstream
fout("TELEBACK.DAT",ios::out,ios|binary);
 Directory D;
 while(fin)  // or while(!fin.eof( ))
 {  fin.read((char*)&D,sizeof(D));
      if(D.CheckCode("123")= = 0)
       fout.write((char*)&D,sizeof(D));
 }
 fin.close( );
 fout.close( );
}
```

18)Given a binary file SPORTS.DAT,containg records of the following structure type: (2007)

```
struct Sports
{  char Event[20] ;
   char Participant[10][30] ;
} ;
```

Write a function in C++ that would read contents from the file SPORTS.DAT and creates a file named ATHLETIC.DAT copying only those records from SPORTS.DAT where the event name is "Athletics".

Solution:

```
void AthletsList( )
{
 ifstream   fin("SPORTS.DAT',ios::in, ios::binary););
 ofstream fout("ATHLETIC.DAT", ios::out|ios::binary);
Sports S;
while(fin)              // or while(!fin.eof( ))
{  fin.read((char*)&S,sizeof(Sports));
    if(strcmp(S.Event,"Athletics")= = 0)
    fout.write((char*)&S,sizeof(S));
}
     fin.close( );
     fout.close( );
}
```

19) Following is the structure of each record in a data file named "PRODUCT.DAT". (2006)

```
struct PRODUCT
{  char Product_Code[10] ;
   char Product_Description[10] ;
   int Stock ;
};
```

Write a function in C++ to update the file with a new value of Stock. The Stock and the Product_Code, whose Stock to be updated, are read during the execution of the program.

Solution:

```
void Update( )
{   fstream finout("PRODUCT.DAT",  ios::in|ios::out);
     PRODUCT P;
     finout.seekg(0);
     while(finout)
        {finout.read((char *)&P, sizeof(P));
          cout<<"\nThe Product Code is"
```

```
                        <P.Product_Code;
        cout<<"\nThe Product Description is"
                        <<P.Product_Description;
        cout<<"\nEnter the Stock:  ";
        cin>>P.Stock;
        finout.seekp(finout.seekp( )-sizeof(P));
        finout.write((char *)&P,sizeof(P));
       }
}
```

20)Given a binary file STUDENT.DAT, containing records of the following class Student type

```
class Student                                   (2005D)
{   char S_Admno[10] ;   //Admission number of student
   char S_Name[30] ;      //Name of student
   int Percentage ;          //Marks Percentage of student
public :
   void EnterData( )
   {   gets(S_Admno);
      gets(S_Name);
      cin >> Percentage ;
   }
  void DisplayData( )
   { cout << setw(12) << S_Admno ;
     cout << setw(32) << S_Name ;
     cout << setw(3) << Percentage << endl ;
   }
   int ReturnPercentage( )
   {      return Percentage;
   }
} ;
```

Write a function in C++, that would read contents of file STUDENT.DAT and display the details of those Students whose Percentage is above 75.

Ans)

```
void Distinction()
{ Student S;
  fstream Fin;
  Fin.open("STUDENT.DAT",
        ios::binary|ios::in);
  while(Fin.read((char*)&S, sizeof(Student))
  if (S.ReturnPercentage()>75)
        S.DisplayData();
  Fin.close();
}
```

21)Assuming a binary file FUN.DAT is containing objects belonging to a class LAUGHTER . (as defined below). (2003)

```
class LAUGHTER
{     int Idno;          // Identification number
     char Type[5];    //LAUGHTER Type
     char Desc[255];//Description
public :
     void Newentry( )
     {     cin>>Idno;gets(Type);gets(Desc);
     }
     void Showonscreen( )
    {  cout<<Idno<<":"<<Type<<endl<<Desc<<endl;
    }
};
```

Write a user defined function in C++ to add more objects belonging to class LAUGHTER at the bottom of it.

22) Assuming the class FLOPPYBOX, write a function in C++ to perform following:

```
class FLOPPYBOX
{   int size;
   char name[10];
public:
   void getdata()
    {       cin>>size;gets(name);
     }
   void showdata(){cout<<size<<" <<name<<endl;}
};
```

(i) Write the objects of FLOPPYBOX to a binary file.

(ii) Reads the objects of FLOPPYBOX from binary file and display them on screen. (1999)

23) Assuming the class EMPLOYEE given below, write functions in C++ to perform the following:

```
class EMPLOYEE                          (1998)
{       int ENO;
       char ENAME[10];
public:
       void GETIT( )
       {      cin>>ENO;
          gets(ENAME);
       }
       void SHOWIT( )
      {   cout<< ENO<<ENAME<<endl;
      }
};
```

(i) Write the objects of EMPLOYEE to a binary file.

(ii) Read the objects of EMPLOYEE from binary file and display them on the screen.

24) Assuming the class DRINKS defined below, write functions in C++ to perform the following:

```
class DRINKS
{ int DCODE;
  char DNAME[13];  //Name of the drink
  int DSIZE,;          //Size in liters
  float DPRICE;
public:
  void getdrinks( )
  { cin>>DCODE>>DNAME>>DSIZE>>DPRICE;
   }
 void showdrinks( )
 { cout<<DCODE<<DNAME<<DSIZE<<DPRICE<<endl;
 }
 char *getname( )
 {return DNAME;
  }
};
```

(i)Write the objects of DRINKS to a binary file.

(ii) Read the objects of DRINKS from binary file and display them on screen when DNAME has value "INDY COLA". (2000)

25) 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.

```
class BOOK                                   (MP109-10)
{int Bno;
char Title[20];
public:
   int RBno( )
  {return Bno;}
   void Enter( )
  {cin>>Bno;gets(Title);}
   void Display( )
  {cout<<Bno<<Title<<endl;}
};
```

Ans)

```
void BookSearch()
{fstream FIL;
FIL.open("BOOK.DAT",ios::binary|ios::in);
BOOK B;
int bn,Found=0;
cout<<"Enter Book No. to search…"; cin>>bn;
while (FIL.read((char*)&S,sizeof(S)))
   if (FIL.RBno()==bn)
   {   S.Display();
       Found++;
    }
if (Found==0)
    cout<<"Sorry! Book not found!!!"<<endl;
FIL.close( );
}
```

26) 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. (MP209-10)

```
class STUD
{   int Rno;
   char Name[20];
public:
   void Enter( )
   {  cin>>Rno;gets(Name);
   }
   void Display( )
   {  cout<<Rno<<Name<<endl;
}
};
```

Ans)

```
void Addnew( )
{fstream FIL;
FIL.open("STUDENT.DAT",ios::binary|ios::app);
STUD S;
char CH;
do
{   S.Enter();
    FIL.write((char*)&S,sizeof(S));
    cout<<"More(Y/N)?";cin>>CH;
}
while(CH!='Y');
FIL.close( );
}
```

Model 4 : Complete the function definitions of class

4.b) Consider the class declaration

```
class FLIGHT
{    protected:
         int flight_no;
          char destination[20];
          float distance;
public:
 void INPUT( );  //To read an object from the
keyboard
 void write_file(int);  //To write N objects into the file,
//Where N is passed as argument.
void OUTPUT( );  //To display the file contents on the
monitor.
};                                           (2001)
```

Complete the member functions definitions.

8.POINTERS

Model 1 : Output (Without Class) - 2 Marks

1) Find and write the output of the following C++ program code: (2019)

Note: Assume all required header files are already included in the program.

```
void Alter(char *S1, char *S2)
{ char *T;
  T=S1;
  S1=S2;
  S2=T;
  cout<<S1<<"&"<<S2<<endl;
}
void main( )
{  char X[ ]="First", Y[ ]="Second";
   Alter(X,Y);
   cout<<X<<"*"<<Y<<endl;
}
```

Ans: **Second&First**
First*Second

2. Find and write the output of the following C++ program code: Note: Assume all required header files are already being included in the program.

```
void main( )                                   2019SP(3)
{  int Ar[ ] = { 6 , 3 , 8 , 10 , 4 , 6 , 7} ;
   int *Ptr = Ar , I ;
   cout<<++*Ptr++ << '@' ;
   I = Ar[3] - Ar[2] ;
   cout<<++*(Ptr+I)<<'@'<<"\n" ;
   cout<<++I + *Ptr++ << '@' ;
   cout<<*Ptr++ <<'@'<< '\n' ;
   for( ; I >=0 ; I -=2)
         cout<<Ar[I] << '@' ;
}
```

Ans: **7@11@**
6@8@
11@3@

3) Find and write the output of the following C++ program code: (2018)

Note: Assume all required header files are already included in the program (2)

```
#define Modify(N)  N*3+10
void main( )
{   int LIST[ ]={10,15,12,17};
    int *P=LIST,C;
    for(C=3;C>=0;C- -)
       LIST[C]=Modify(LIST[C]);
   for(C=0;C<=3;C++)
   {   cout<<*P<<":";
       P++;
   }
}
```

Ans) 40:55:46:61:

(Note: Actually LIST[I]]=Modify(LIST[I]);Was printed on paper, Considered LIST[I] replaced with LIST[C])

4. Find and write the output of the following C++ program code: (2017)3

Note: Assume all required header files are already being included in the program.

```
void main( )
{  int *Point, Score[]={100,95,150,75,65,120};
   Point = Score;
   for(int L = 0; L<6; L++)
   {  if((*Point)%10==0)
         *Point /= 2;
      else
         *Point -= 2;
      if((*Point)%5==0)
         *Point /= 5;
      Point++;
   }
   for(int L = 5; L>=0; L--)
      cout<<Score[L]<<"*";
}
```

Ans) 12*63*73*15*93*10*

5) Write the output of the following C++ program code(assume all necessary header files are included in program): (2018 MP) 2

```
void Encrypt(char *S, int key)
{   char *Temp=S;
    if(key%2= =0)
    {   key- -;
    }
    while (*Temp!='\0')
    {   *Temp+=key;
        Temp+=key;
    }
}
void main( )
{ int Key_Set[ ]={1,2,3};
  char Pvt_Msg[  ]="Computer2017";
  for(int C=0;C<2;C++)
  { Encrypt(Pvt_Msg, Key_Set[C]);
    cout<<"New Encrypted Message after Pass"
          <<C+1<<" is : "<<Pvt_Msg;
    cout<<endl;
  }
}
```

A)

New Encrypted Message after Pass 1 is : Dpnqvufs3128
New Encrypted Message after Pass 2 is : Eqorwvgt4239

6) Write the output of the following C++ program code: Note: Assume all required header files are already being included in the program.

```
void change(int *s)                            (2017 MP)
{ for(int i=0;i<4;i++)
  {  if(*s<40)
     {   if(*s%2==0)
            *s=*s+10;
         else
            *s=*s+11;
     }
     else
     {  if(*s%2==0)
            *s=*s-10;
        else
            *s=*s-11;
     }
     cout<<*s<<" ";
     s++;
  }
}
```

```
void main()
{  int score[]={25,60,35,53};
   change(score);
}
```
A) 36 50 46 42

7) Obtain the output of the following C++ program as expected to appear on the screen after its execution.2
Important Note: (2014)
- All the desired header files are already included in the code, which are required to run the code.

```
void main( )
{ char *Text=”AJANTA”;
  int *P,Num[ ]={1,5,7,9};
  P=Num;
  cout<<*P<<Text<<endl;
  Text++;
  P++;
  cout<<*P<<Text<<endl;
}
```
A) 1AJANTA
5JANTA

8) Observe the following C++ code carefully and obtain the output, which will appear on the screen after execution of it.
Important Note: (2013 D)2
-All the desired header files are already included in the code, which are required to run the code.

```
void main( )
{  char *String=”SHAKTI”;
   int *Point,Value[ ]={10,15,70,19};
   Point=Value;
   cout<<*Point<<String<<endl;
   String++;
   Point++;
   cout<<*Point<<String<<endl;
}
```
A) 10SHAKTI
15HAKTI

9) Find the output of the following program: 2
(2012 OD)

```
#include <iostream.h>
#include <ctype.h>
typedef char str80 [80] ;
void main ( )
{  char *Notes ;
   str80 str="vR2GooD";
   int L=6;
   Notes=Str;
  while (L>=3)
  { Str[L]=(isupper(Str[L])?tolower(Str[L]):
     toupper(Str[L]));
    cout<<Notes<<endl;
     L--;
     Notes++;
   }
}
```
Ans: **vR2Good**
R2GoOd
2GOOd
gOOd

10.Find the output of the following program: 2
(2011OD)

```
#include<iostream.h>
void main ( )
{int *Queen, Moves [ ] = {11, 22, 33, 44};
Queen = Moves;
Moves [2] + = 22;
Cout<< "Queen @"<<*Queen<<end1;
*Queen - = 11;
Queen + = 2;
cout<< "Now @"<<*Queen<<end1;
Queen++;
cout<< "Finally@"<<*Queen«end1;
cout<< "New Origin @"<<Moves[0]<<end1;
}
```
Ans Queen @11
Now @55
Finally @44
New origin @0

11) Find the output of the following program (2009 OD)

```
#include<iostream.h>
void main( )
{int A[ ] = {10, 15, 20, 25, 30}
int *p = A;
while (*p < 30)
{   if (*p%3 ! = 0)
          *p = *p + 2 ;
  else
          *p = *p + 1;
  p++;
}
for (int J = 0; J<=4; J++)
{     cout << A[J] << “*” ;
      if ( J%3 = = 0)
           cout<<end1;
}
cout<<A[4] * 3<<end1;
}
```
Ans) 12*
16*22*27*
30*90

12)Find the output of the following program: (2007 OD)

```
#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#

13) What will be the output of the following program:
(2004)

```
#include<iostream.h>
#include<conio.h>
#include<ctype.h>
#include<string.h>
void ChangeString(char Text[],int &Counter)
{  char *Ptr=Text;
    int Length=strlen(Text);
  for(;Counter<Length- 2;   Counter+=2,Ptr++)
    {   *(Ptr+Counter)=toupper(*(Ptr+Counter));
     }
}
```
Output:
PoiNteRs Fun@10

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

14) Give the output of the following program segment. (Assuming all required header files are included in the program) (2001)

```
void main( )
{  int a=32,*x=&a;
  char ch=65,&cho=ch;
  cho+=a;
   *x+=ch;
  cout<<a<<','<<ch<<endl;
}
```

Output:

129,a

15) Give the output of the following program. (1999)

```
#include<stdio.h>
void main( )
{  char *p="Difficult";
   char c;
   c=*p++;
printf("%c",c);
}
```

Output:

D

16) Find the output of the following program:2

```
#include <iostream.h>                    (MP2 2008-09)
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

Model 2 : Output (Within Class) - 2 Marks

1) Find the output of the following program. (2006 OD)

```
#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

2) Give the output of the following program **(2001)**

```
#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

Model 3 : Theory Question - 2 Marks

1) What is "this" pointer? Give an example to illustrate the use of it in C++. **(2006 OD)**

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();
}
```

2) Distinguish between

```
int *ptr=new int(5);
int *ptr=new int[5];
```

(2001)

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).

Model 4 : Errors/Rewrite - 2 Marks

1) Identify the syntax error(s), if any, in the following program.Also give reason for errors. **(2001)**

```
void main( )
{       const int i=20;
        const int* const ptr=&i;
        (*ptr)++;
        int j=15;
        ptr=&j;
}
```

Ans:

Error Line 5 : Cannot modify a const object.
Error Line 7 : Cannot modify a const object.
Warning Line 8 : 'j' is assigned a value that is never used.
Warning Line 8 : 'ptr' is assigned a value that is never used.

Explanation:

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

9.ARRAYS (8 Marks)

MODEL 1: Function to Receive an array and ChangeElements. (2 or 3 Marks)

(1) Write definition for a function ColSwap(int A[4][4]) in C++, which swaps the contents of the first column with the contents of the third column. (2019)

For Example:

ORIGINAL ARRAY A			
10	15	20	25
30	35	40	45
50	55	60	65
70	75	80	85

CHANGED ARRAY A			
20	15	10	25
40	35	30	45
60	55	50	65
80	75	70	85

Note: Do not display the changed array contents.
Do not use any other array to transfer the contents of array A.
Ans)

2) Write definition for a function XOXO (char M[4][4]) in C++, which replaces every occurrence of an X with an O in the array, and vice versa. (2019)2

For Example:

ORIGINAL ARRAY M			
X	X	O	X
O	X	O	O
O	O	X	X
X	X	O	O

CHANGED ARRAY M			
O	O	X	O
X	O	X	X
X	X	O	O
O	O	X	X

Note: Do not display the changed array contents.
Do not use any other array to transfer the contents of array M.
Ans)

3) Write a user-defined function ReArrange(int Arr[ ], int N) in C++, which should swap the contents of the first half locations of the array Arr with the contents of the second half locations. N (which is an even integer) represents the total number of elements in the array Arr. (2019) 3

Example:
If the array Arr contains the following elements (for N = 6)

0	1	2	3	4	5
12	5	7	23	8	10

Then the function should rearrange the array to become

0	1	2	3	4	5
23	8	10	12	5	7

Note: Do not display the changed array contents
Do not use any other array to transfer the contents of array Arr.
Ans)

4. Write a user defined function Reverse(int A[],int n) which accepts an integer array and its size as arguments(parameters) and reverse the array.
Example : if the array is 10,20,30,40,50 then reversed array is 50,40,30,20,10 **2019SP3**
Answer:

```
void Reverse( int A[ ] , int n)
{ int temp;
  for(int i=0;i<n/2;i++)
  {  temp=A[i];
     A[i]=A[n-1-i];
     A[n-1-i]=temp;
   }
}
```

5) Write the definition of a user-defined function REPEAT_ROW(int A[][3],int R, int C) in C++ that will store the elements in the following manner
1. All row elements except the 1st element replaced by the 1st element,
2. All row elements except the 1st & 2nd element replaced by the 2nd element,
3. All row elements except the 1st , 2nd & 3rd element replaced by the 3rd element and so on. **(2018 MP)**

For example: if initially the array was:

5	6	10	2
2	6	9	12
18	14	5	6

Then, the contents of the array after execution of the above function will be:-

5	5	5	5
2	6	6	6
18	14	5	5

Ans)

```
void REPEAT_ROW(int A[ ][3], int R, int C)
{       for(int I=0;I<R;I++)
        {       int X=A[I][I];
                for(int J=I+1; J<C;J++)
                {       A[I][J] = X;
                }
        }
}
```

6. Write the definition of a function AddUp(intArr[ ], int N) in C++, in which all even positions (i.e. 0,2,4,...) of the array should be added with the content of the element in the next position and odd positions (i.e. 1,3,5,...) elements should be incremented by 10. (2017)3

Example: if the array Arr contains

23 30 45 10 15 25

Then the array should become

53 40 55 20 40 35

NOTE: ● The function should only alter the content in the same array.

● The function should not copy the altered content in another array.

● The function should not display the altered content of the array.

● Assuming, the Number of elements in the array are Even.

Ans)

```
void AddUp(intArr[], int N)
{ for(int i=0; i<N; i++)
  { if(i%2= =0)
        Arr[i]=Arr[i]+Arr[i+1];
    else
        Arr[i]=Arr[i]+10;
  }
}
```

7)Write the definition of function named **Array_Swap()** that will accept an integer array & its size as arguments and the function will interchange/swap elements in such a way that the first element is swapped with the last element, second element is swapped with the second last element and so on, only if anyone or both the elements are odd.

E.g. if initially array of seven elements is: **(2018 MP)**3

5, 16, 4, 7, 19, 8, 2

After execution of the above function, the contents of the array will be: 2,16, 19, 7, 4, 8, 5

Solution:

```
void Array_Swap(int A[ ], int size)
{   int Temp, I;
    for(I=0; I<size/2; I++)
    {  if((A[I]%2!=0)||(A[size-1-I]%2!=0))
       {       Temp = A[I];
               A[I] = A[size–1–I];
               A[size–1–I] = Temp;
       }
    }
}
```

8. Write a user-defined function swap_row (int ARR[][3],intR,int C) in C++ to swap the first row values with the last row values: (2017MP) (2009 OD)2

For example if the content of the array is:

10 20 30
40 50 60
70 80 90

Then after function call, the content of the array should be:

70 80 90
40 50 60
10 20 30

Ans)

```
void swap_row(int ARR[][3],intR,int C)
{ int i,j,temp;
  for( i=0,j=0;j<C;j++)
  {    temp=ARR[i][j];
       ARR[i][j]=ARR[R-1][j];
       ARR[R-1][j]=temp;
  }
}
```

OR

```
void swap_row(int ARR[3][3])
{ int Temp, j;
  for (j=0; j<3; J++)
  { Temp = A[0][j];
    A[0][j] = A[2][j];
    A[2][j] = Temp;
  }
}
```

9) Define a function SWAPCOL ( ) in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function. (2009 D)

Example: If the two dimensional array contains

2	1	4	9
1	3	7	7
5	8	6	3
7	2	1	2

After swapping of the content of 1st column and last column, it shoud be

9	1	4	2
7	3	7	1
3	8	6	5
2	2	1	7

Ans)

```
void SWAPCOL(int A[][100], int M, int N)
{   int Temp, I;
    for(I=O; I<M; I++)
  {     Temp = A [I][0] ;
        A[I][0] = A[I][N-l];
        A[I][N-l] = Temp;
   }
}
```

OR

```
void SWAPCOL(int A[4][4])
{ int Temp, I;
  for(I=O; I<4; I++)
  {
      Temp = A[I][0];
      A[I][0] = A[I][3];
      A[I][3] = Temp;
   }
}
```

10.Write the definition of a function grace_score (int score [], int size) in C++, which should check all the elements of the array and give an increase of 5 to those scores which are less than 40. (2016)3

Example: if an array of seven integers is as follows:

45, 35, 85, 80, 33, 27, 90

After executing the function, the array content should be changed as follows:

45, 40, 85, 80, 38, 32, 90

Ans)

```
void grace_score(int score[],int size)
{ for(int i=0;i<size;i++)
  { if(score[i]<40)
        score[i]=score[i]+5;
    cout<<score[i]<<" ";
  }
}
```

11.Write the definition of a function FixSalary(float Salary[], int N) in C++, which should modify each element of the array Salary having N elements, as per the following rules: (2016) 2

Existing Salary Values	Required Modification in Value
If less than 100000	Add 35% in the existing value
If >=100000 and <20000	Add 30% in the existing value
If >=200000	Add 20% in the existing value

A) void FixSalary(float Salary[ ], int N)

```
{ for (int i=0;i<N;i++)
  if(Salary[i]<100000)
     Salary[i]+= 0.35 *Salary[i];
  else if (Salary[i]>=100000 && Salary[i]<20000)
     Salary[i]+= 0.3 * Salary[i];
  else if(Salary[i]>=200000)
     Salary[i]+= 0.20 * Salary[i];
 }
```

12.Write the definition of a function Change(int P[], int N) in C++,which should change all the multiples of 10 in the array to 10and rest of the elements as 1. For example, if an array of 10integers is as follows:(2015)2

P[0]	P[1]	P[2]	P[3]	P[4]	P[5]	P[6]	P[7]	P[8]	P[9]
100	43	20	56	32	91	80	40	45	21

After executing the function, the array content should be changed as follows:

P[0]	P[1]	P[2]	P[3]	P[4]	P[5]	P[6]	P[7]	P[8]	P[9]
10	1	10	1	1	1	10	10	1	1

A)

```
void Change(int P[ ],int N)
{   for (int i=0;i<N;i++)
      if(P[i]%10==0)
        P[i]=10;
      else
        P[i]=1;
}
```

13.Write a code for function EvenOdd(int T[ ], int C) in C++, to add 1 in all the odd values and 2 in all the even values of the array T. (2014) 3

Example: If the original content of an array S is

T[0]	T[1]	T[2]	T[3]	T[4]
35	12	16	69	26

The modified content will be:

T[0]	T[1]	T[2]	T[3]	T[4]
36	14	18	70	28

Answer)

```
void EvenOdd(int T[ ],int C)
{ int I;
  for(i=0;i<C;i++)
  {  if(T[i]%2==0)
        T[i]=T[i]+2;
     else
        T[i]=t[i]+1;
   }
   cout<<"Modified content will be: ";
  for(i=0;i<C;i++)
        cout<<T[i];
 }
```

14.Write code for a function void ChangOver(int P[],int N) in C++, which repositions all the elements of the array by shifting each of them to the next position and by shifting the last element to the first position.

For example: if the content of array is (2013) 3

0	1	2	3	4
12	15	17	13	21

The changed content will be

0	1	2	3	4
21	12	15	17	13

Ans)

```
void Change(int P[ ], int N)
{  int temp;
   int temp1;
  for(int i=0;i<(N-1);i++)
  {    temp=P[size-1];
       P[N-1]=P[i];
       P[i]=temp;
  }
}
```

15) Write a function SWAP2BEST (int ARR[], int Size) in C++ to modify the content of the array in such a way that the elements, which are multiples of 10 swap with the value present in the very next position in the array. (2012) 3

For example:

If the content of array ARR is
90, 56, 45, 20, 34, 54
The content of array ARR should become
56, 90, 45, 34, 20, 54

Ans

```
void SWAP2BEST(int ARR[], int Size)
{ int t;
  for(int i=0;i<Size-1;i++)
  {    if (ARR[i] %10=0)
       {       t=ARR[i];
               ARR[i]=ARR[i+1];
               ARR[i+1]=t;
       }
  }
}
```

16.Write a Get2From1() function in C++ to transfer the content from one array ALL[] to two different arrays Odd[] and Even[]. The Odd[] array should contain the values from odd positions (1,3,5,...) of ALL[] and Even [] array should contain the values from even positions (0, 2, 4,…..) of ALL [ ]. (2011 OD) 3

Example

If the ALL[ ] array contains
12, 34, 56, 67, 89, 90
The Odd[ ] array should contain
34, 67, 90
And the Even [ ] array should contain
12,56,89

Ans

```
void Get2From1 (int All [],int Even [], int Odd [], int Size)
{  int J=0,K=0;
   for (int I=0 ;I<Size; 1++)
   {   if (I%2==0)
       {       Even [J]=All[I] ;
               J++;
       }
       else
       {       Odd[K]=All[I);
               K++;
       }
   }
}
```

17) Write a function REASSIGNO in C++, which accepts an array of integers and its size as parameters and divide all those array elements by 5 which are divisible by 5 and multiply other array elements by 2.

Sample Input Data of the array

A[0]	A[1]	A[2]	A[3]	A[4]
20	12	15	60	32

Content of the array after calling REASSIGNO function

A[0]	A[1]	A[2]	A[3]	A[4]
4	24	3	12	64

Ans) (2010)

```
void REASSIGN (intArr[ ], int Size)
{ for (int i=0;i<Size;i++)
    if (Arr[i]%5==0)
        Arr[i]/=5;
    else
        Arr[i]*=2;
}
```

OR

```
void REASSIGN(intArr[ ],int Size)
{   for (int i=0;i<Size;i++)
      Arr[i]%5 ? Arr[i]/=5 : Arr[i] *= 2;
}
```

18) Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse. (2008D)

Example:

If an array of nine elements initially contains the elements as 4, 2, 5, 1, 6, 7, 8, 12, 10

Then the function should rearrange the array as 10,12, 8, 7, 6, 1, 5, 2, 4

Solution:

```
void receive(int A[ ], int size)
{   int temp;
  for(i=0,j=size-1;i<size/2;i++,j--)
   {    temp=A[i];
     A[i]=A[j];
     A[j]=temp;
    }
 }  //end of receive function.
```

19)Write a function in C++, which accepts an integer array and its size as arguments and swap the elements of every even location with its following odd location.

Example : **(2008OD)**

If an array of nine elements initially contains the elements as 2,4,1,6,5,7,9,23,10

then the function should rearrange the array as 4,2,6,1,7,5,23,9,10

```
void SwapArray(int A[ ], int N)
{ inti,j,temp;
/*  cout<<"\nThe elements before doing the desired
alterations…";
for(i=0;i<N;i++)
        cout<<A[i]<<'\t';        */
 for(i=0;i<N-1;i+=2)
 {      temp=A[i];
       A[i]=A[i+1];
       A[i+1]=temp;
  }
/*  cout<<"\nThe elements after completed the desired
alterations…";
for(i=0;i<N;i++)
        cout<<A[i]<<'\t';  */
}
```

20)Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having even values with its half and elements having odd values with twice its value . (2007)

Example : If an array of five elements initially contains the elements as 3, 4, 5, 16, 9

then the function should rearrange content of the array as 6, 2, 10, 8, 18

Solution:

```
void accept(int a[ ],int size)
{ for (int i=0;i<size;i++)
  { if (a[i]%2= =0)
        a[i]=a[i]/2;
    else
        a[i]=a[i]*2;
cout<<a[i]<<',';
  }
}
```

21)Write function in C++ which accepts an integer array and size as arguments and assign values into a 2D array of integers in the following format : (2006D)

If the array is 1, 2, 3, 4, 5, 6

The resultant 2D array is given below

```
1  2  3  4  5  6
1  2  3  4  5  0
1  2  3  4  0  0
1  2  3  0  0  0
1  2  0  0  0  0
1  0  0  0  0  0
```

If the array is 1, 2, 3

The resultant 2D array is given :

```
1  2  3
1  2  0
1  0  0
```

Solution:

```
void input (int a[ ],int size)
{  int b[size] [size];
   for (int i=0;i.<size;i++)
   { for (int j=0;j<size;j++)
     {     if(( i+j)>=size)
               b[i][j]=0;
           else
               b[i][j]=a[j];
           cout<<b[i][j]<<'\t';
      }
cout<<endl;
   }
}
```

22)Write function in C++ which accepts an integer array and size as arguments and assign values into a 2D array of integers in the following format : (2006OD)

If the array is 1, 2, 3, 4, 5, 6

The resultant 2D array is given below :

```
1  0  0  0  0  0
1  2  0  0  0  0
1  2  3  0  0  0
1  2  3  4  0  0
1  2  3  4  5  0
1  2  3  4  5  6
```

If the array is 1, 2, 3

The resultant 2D array is given:

```
1  0  0
1  2  0
1  2  3
```

Solution:

```
void input (int a[ ],int size)
{ int b[size] [size];
   for (int i=0;i.<size;i++)
```

```
  { for (int j=0;j<size;j++)
    {       if(( i<j)
                  b[i][j]=0;
            else
                  b[i][j]=a[j];
            cout<<b[i][j]<<'\t';
     }
cout<<endl;
     }
}
```

OR

```
constint R = 100, C = 100;
void Arrayconvert(int A1D[ ], int N)
{    int A2D[R][C]={0};
   for(int I = 0; I<N; I++)
     for (int J = 0; J <=I; J++)
       A2D[I][J] = A1D[J];
}
```

23)Write a function in C++ which accepts an integer array and its size as arguments and exchanges the values of first half side elements with the second half side elements of the array. (2005OD)

Example :

If an array of 8 elements initial content as

8, 10, 1, 3, 17, 90, 13, 60

The function should rearrange array as

17, 90, 13, 60, 8, 10, 1, 3

Ans)

```
void Exchange(int A[],int N)
{  for (int I=0;I<N/2;I++)
  {   int Temp=A[I];
     A[I]=A[N/2+I];
     A[N/2+I]=Temp;
   }
}
```

OR

```
void Exchange(int A[],int N)
{  for (int I=0,J=N/2;I<N/2;I++,J++)
  {      int Temp=A[J];
    for (int K=J;K>I;K--)
         A[K]=A[K-1];
   A[I]=Temp;
  }
}
```

OR

```
void Exchange(int A[],int N)
{  int M=(N%2=0)?N:N+l;
  for (int I=0;I<M/2;I++)
  {   int Temp=A[I];
     A[I]=A[M/2+I];
     A[M/2+I]=Temp;
   }
}
```

24 Define the function SwapArray(int[ ], int),that would expect a 1D integer array NUMBERS and its size N. the function should rearrange the array in such a way that the values of that locations of the array are exchanged. (Assume the size of the array to be even). (2004)

Example :

If the array initially contains

{2, 5, 9, 14, 17, 8, 19, 16}

Then after rearrangement the array should contain

{5, 2, 14, 9, 8, 17, 16, 19}

Solution:

```
void SwapArray(int NUMBERS[ ], int N)
{int  i,j,temp;
/* cout<<"\nThe elements before doing the desired
   alterations…";
   for(i=0;i<N;i++)
      cout<<NUMBERS[i]<<'\t';  */
   for(i=0;i<N-1;i+=2)
   {      temp=NUMBERS[i];
          NUMBERS[i]=NUMBERS[i+1];
          NUMBERS[i+1]=temp;
   }
/*  cout<<"\nThe elements after completed the desired
alterations…";
 for(i=0;i<N;i++)
          cout<<NUMBERS[i]<<'\t';  */
}
```

25) Write a user-defined function in C++ to find and display the sum of diagonal elements from a 2D array MATRIX[6][6] containing integers.

```
void displaysum( )
{ int i,j,D1=0,D2=0,MATRIX[6][6];
  cout<<"\nEnter any 36 values….";
  for(i=0;i<6;i++)
   for(j=0;j<6;j++)
    {  cin>>MATRIX[i][j];
      if(i= = j)
            D1=D1+MATRIX[i][j];
      else if ((i+j)= =(size-1))
            D2=D2+MATRIX[i][j];
   }
 cout<<"\nThe sum of the elements of the Main Diagonal = "
                    <<D1;
cout<<"\nThe sum of the elements of
        the Other Diagonal = "<<D2;
}
```

26) Write a function in C++ to combine the contents of two equi-sized arrays A and B by adding their corresponding elements as the formula A[i]+B[i]; where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array C. (MP209-10) 3

Ans)

```
void AddNSave(int A[ ],int B[ ],int C[ ],int N)
{    for (int i=0;i<N;i++)
          C[i]=A[i]+B[i];
}
```

27)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.

Ans) (MP208-09)4

```
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];
}
```

MODEL 2: Function to Display the array elements in a particular order.(2 or 3 Marks)

1) Write a user-defined function NoTwoThree(int Arr[ ], int N) in C++, which should display the value of all such elements and their corresponding locations in the array Arr(ie the array index), which are not multiples of 2 or 3, N represents the total number of elements in the array Arr, to be checked. (2019)

Example: If the array Arr contains

0	1	2	3	4
25	8	12	49	9

Then the function should display the output as :

25 at location 0

49 at location 3

Ans)

2. Write a user-defined function AddEnd4 (int A[][4],int R,int C) in C++ to find and display the sum of all the values, which are ending with 4 (i.e., unit place is 4).

For example if the content of array is: **2019SP2**

24	**16**	**14**
19	**5**	**4**

The output should be 42

Answer:

```
void AddEnd4(int A[ ][4], int R, int C)
{  int I,J,sum=0;
  for(I=0;I<R;I++)
  {   for(J=0;J<C;J++)
       if(A[I][J]%10 = =4)
         sum=sum+A[I][J];
   }
  cout<<sum;
}
```

3.Write a user defined function in C++ to find the sum of both left and right diagonal elements from a two dimensional array. 2019SP2

```
void Diagsumboth(int A[][4], int n)
{ int sumLt=0,sumRt=0;
  for(int i=0;i<n;i++)
  { sumLt+=A[i][i];
    sumRt+=A[n-1-i][i];
  }
cout<<"sum of left diagonal"<<sumlt<<endl;
cout<<"sum of right diagonal"<<sumRt<<endl;
}
```

4.Write a user-defined function EXTRA_ELE (int A[ ], int B[ ], int N) in C++ to find and display the extra element in Array A. Array A contains all the elements of array B but one more element extra. (Restriction: array elements are not in order) 2019SP3

Example If the elements of Array A is

14, 21, 5, 19, 8, 4, 23, 11

and the elements of Array B is

23, 8, 19, 4, 14, 11, 5

Then output will be 21

Answer:

```
void EXTRA_ELE(int A[], int B[],int N)
{ int i,j,flag=0;
 for(i=0;i<N;i++)
 { for(j=0;j<N;j++)
   {  if(A[i]==B[j])
     { flag=1;
       break;
      }
   }
  if(flag= =0)
  cout<<"Extra element"<<A[i];
  flag=0;
 }
}
```

5) Write the definition of a function SumEO (int VALUES[ ], int N) in C++, which should display the sum of even values and sum of odd values of the array separately. (2)

Example: If the array VALUES contains

25 20 22 21 53

Then the functions should display the output as

Sum of even values = 42 (ie 20 + 22)

Sum of odd values = 99 (ie 25+21+53)

Answer:

```
void SumEO(int VALUES[ ], int N)
{   int odd=0, even=0;
    for(int i=0;i<N;i++)
    {   if (VALUES[i] %2= = 0)
              even=even +VALUES[i];
        else
              odd=odd+VALUES[i];
     }
cout<<"\nSum of even values = "<<even;
cout<<"\nSum of Odd values = "<<odd;
}
```

6) Write a definition for a function UpperHalf(int Mat[4][4]) in C++, which displays the elements in the same way as per the example shown below:

For example, if the content of the array Mat is as follow:

25	24	23	22
20	19	18	17
15	14	13	12
10	9	8	7

The function should display the content in the following format:

25 24 23 22

20 19 18

15 14

10

Answer:

```
void UpperHalf(int Mat[4][4])
{  for (int I=0;I<4;I++)
   { for (int J=0;J<4-I;J++)
        cout<<MAT[I][J]<< " " ;
    cout<<endl;
   }
}
```

OR

```
void UpperHalf(int Mat[4][4])
{    for(int i=0;i<4;i++)
     {  for (int j=0;j<4;j++)
          if ((i+j)<=3)
              cout<<MAT[i][j]<< " " ;
       cout<<endl;
        /* for(int j=0;j<4;j++)
            if ( (i+j) > 3 )
                cout<<' ';
            else
                cout<<Mat[i][j];
         cout<<endl;
       */
   }
}
```

7. Write a definition for a function SUMMIDCOL(int MATRIX[][10],intN,int M) in C++,which finds the sum of the middle column's elements of the MATRIX (Assuming N represents number of rows and M represents number of columns, which is an odd integer).

Example: if the content of array MATRIX having N as 5 and M as 3 is as follows: **(2017)2**

1 2 1
2 1 4
3 4 5
4 5 3
5 3 2

The function should calculate the sum and display the following:Sum of Middle Column: 15

Ans)

```
{ int mid=M/2;
  int sum=0;
  for(int i=0; i<N; i++)
  {   sum=sum+MATRIX[i][mid];
  }
 cout<<" Sum of Middle Column"<<sum;
}
```

8.Write definition for a function DISPMID(int A[][5],intR,int C) in C++ to display the elements of middle row and middle column from a two dimensional array A having R number of rows and C number of columns. (2016)3

For example, if the content of array is as follows:

215	912	516	401	515
103	901	921	802	601
285	209	609	360	172

The function should display the following as output

103 901 921 802 601
516 921 609

Ans)

```
void DISPMID(int A[][5],intR,int C)
{for (int J=0;J<C;J++)
     cout<<A[R/2][J]<< " ";
 cout<<endl;
 for (int I=0;I<R;I++)
     cout<<A[I][C/2]<< " ";
}                          OR
void DISPMID(int A[][5],intR,int C)
{ if(R%2!=0)
 { for (int J=0;J<C;J++)
        cout<<A[R/2][J]<< " ";
 }
 else
    cout<<"No Middle Row";
 cout<<endl;
  if(C%2!=0)
 { for (int I=0;I<R;I++)
        cout<<A[I][C/2]<< " ";
  }
  else
     cout<<"No Middle Column";
}
```

9.Write a function REVROW(int P[][5],int N, int M) in C++ todisplay the content of a two dimensional array, with each rowcontent in reverse order. (2015) 3

For example, if the content of array is as follows:

15	12	56	45	51
13	91	92	87	63
11	23	61	46	81

The function should display output as:

51 45 56 12 15
63 87 92 91 13
81 46 61 23 81

A)

```
void REVROW(int P[][5],intN,int M)
{for(int I=0; I<N; I++)
  {   for(int J=M1;J>=0; J)
            cout<<P[I][J];
      cout<<endl;
   }
}                          OR
void REVROW(int P[ ][5],intN,int M)
{ for(int I=0; I<N; I++)
   {   for(int J=0; J<M/2; J++)
       { int T = P[I][J];
         P[I][J] = P[I][MJ1];
         P[I][MJ1] = T;
       }
    }
   for(I=0; I<N; I++)
  { for(int J=0; J<M; J++)
        cout<<P[I][J];
     cout<<endl;
   }
}
```

10.Write user-defined function AddEnd2(int A[ ][4], int N, int M) in C++ to find and display the sum of all the values which are ending with 2(ie units place is 2). For example if the content of array is (2014)

22	16	12
19	5	2

The output should be

36

Answer)

```
void AddEnd(int A[ ][4], int N, int M)
{ intI,j,Sum=0;
   for(i=0;i<N;i++)
   { for(j=0;j<M;j++)
     { if(A[i][j]%10==2)
            Sum=Sum+A[i][j];
      }
    }
    cout<<Sum;
}
```

11.Write a user defined function DispTen(int A[ ][4], intN,int M) in C++ to find and display all the numbers which are divisible by 10. For example, if the content of array is (2013) 2

12	20	13
2	10	30

The output should be

20 10 30

Answer)

```
void DispTen(int A[ ][3], intN,int M)
{ intI,j,S=0;
   for(i=0;i<N;i++)
    for(j=0;j<M;j++)
        if(A[i][j]%10= =0)
    cout<<A[i][j]<<" ";
}
```

12.Write a function ALTERNATE (int A[ ] [3], int N, int M) in C++ to display all alternate elements from two-dimensional array A (staring from A [0] [0]). (2012)1

For example:

If the array is containing:

23 54 76
37 19 28
62 13 19

The output will be

23 76 19 62 19

Ans.

```
void ALTERNATE (int A [] [3], int N, int M)
{int T=0;
 for (int I=0 ; I<N; I++)
   for (int J=0 ; J<M ; J++)
   {  if (T%2= =0)
        cout<<A[I] [J]<<" ";
     T++ ;
    }
}
```

OR

```
void ALTERNATE (int A[] [3], int N, int M)
{ int *P=&A[O] [0] ;
 for (int I=0; I<N*M ; I+=2)
 { cout<<*p<<" ";
   P+=2 ;
 }
}
```

13) Write a DSUMO function in C++ to find sum of Diagonal Elements from a NxN Matrix. (2011 OD) 2

(Assuming that the N is a odd number)

Ans

```
 void DSUM (int A [ ] [100] ,int N)
{int SUMR =0, SUML=0;
 for (int i=0; i<N;i++}
 { SUMR=SUMR + A[i] [i] ;
   SUML = SUML + A[i] [N-1-i] ;
  }
cout<< " Sum of Diagonal Elements = "
      <<SUMR + SUML –A[N/2] [N/2] ;
}
```

OR

```
void DSUM (int A[] [100], int N)
{int SUMR =0, SUML=0;
 for (int i=0; i<N; i++)
  { SUMR = SUMR + A[i] [i] ;
    SUML = SUML + A[i] [N-1-i] ;
   }
cout<< "Sum of Right Diagonal Elements = "
                  <<SUMR<<end1;
cout<< "Sum of Left Diagonal Elements = "
                   <<SUML<<end1;
}
```

OR

```
void DSUM (int A[] [100] , int N)
{  int SUMR =0, SUML=0;
 for (int i = 0; i<N; i++)
 {  for (int j = 0; j<N; j++)
    {  if (i==j)
            SUMR=SUMR + A[i] [j] ;
       else if (i+j == N-1)
            SUML = SUML + A[i] [j];
    }
 }
cout<< "Sum of Diagonal Elements ="
            << SUMR + SUML - A[N/2] [N/2];
}
```

14) Write a function int ALTERSUM (int B[ ] [5], int N, int M in C++ to find and return the sum of elements from all alternate elements of a two-dimensional array starting from B[0][0]. **(2010 OD)**

Hint: If the following is the content of the array:

B[0][0]	B[0][1]	**B[0][2]**
4	**5**	**1**
B[1][0]	**B[1][1]**	B[1][2]
2	**8**	**7**
B[2][0]	B[2][1]	**B[2][2]**
9	**6**	**3**

The function should add elements B[0][0], B[0][2], B[l][l], B[2][0] and B[2][2].

Ans)

```
int ALTERSUM(int B[ ][5] ,intN,int M)
{int Sum=0;
  for (int I=0;I<N;I++)
    for (int J=(I%2==0)?0:1;J<M;J+=2)
        Sum+=B[I][J] ;
  return Sum;
}
```

OR

```
int ALTERSUM(int B[ ][5],intN,int M)
{  int Sum=0,J=0;
   for (int I=0;I<N;I++)
   {for (;J<M;J+=2)
        Sum+=B[I][J] ;
     J-=M;
   }
   return Sum;
}
```

OR

```
int ALTERSUM(int B[ ][5],intN,int M)
{  int *P=&B[0][0],Sum=0;
  for (int I=0;I<M*N;I+=2)
  {    Sum+=(*P);
       P+=2;
   }
  return Sum;
}
```

OR

```
int ALTERSUM (int B[ ][5], int N, int M)
{ int S=0, C=0;
 for(int I = 0; 1< N; 1++)
    for (int J = 0; J<M; J++ )
    {
     if (C%2 == 0)
         S = S + B[I][J];
     C++;
    }
  return S;
}
```

OR

```
int ALTERSUM(int B[ ][5],intN,int M)
{  int Sum=0;
  for (int I=0;1<N;1++)
   for (int J=0;J<M;J++)
     if ((I+J)%2==0)
         Sum+=B [I][J] ;
    return Sum;
}
```

OR

```
int ALTERSUM(int B[ ][5],intN,int M)
{  int Sum=0;
  for (int I=0;1<N;1++)
   for (int J=0;J<M;J++)
  { if ((I%2==0 && J%2=0)||(1%2!=0
                    && J%2!=0))
    Sum+=B [I][J] ;
   }
  return Sum;
}
```

15)Write a function in C++ to print the product of each column of a two dimensional array passed as the arguments of the function. (2008D)

1	2	4
3	5	6
4	3	2
2	1	5

Example : If the two dimensional array contains
Then the output should appear as:
Product of Column 1 = 24
Product of Column 2 = 30
Product of Column 3 =240

```
void receive(int A[ ][ ],intr,int c)
{   inti,j,B[c];
    for(i=0;i<c;i++)
              B[i]=1;
    for(i=0;i<r;i++)
       for(j=0;j<c;j++)
            B[j]=B[j]*A[i][j];
    for(i=0;i<c;i++)
cout<<"\nProduct of Column "<<i+1<<" = "<<B[i];
}                          OR
void ProdCol(intArr[][100], int Row, int Col)
{ int i, j, Prod;
  for (j = 0; j < Col; j++)
  { Prod=1;
    for (i = 0; i < Row; i++)
    Prod * = Arr[i][j];
 cout<<"Product of Column"<<j<< "=" <<Prod<<endl;
   }
}
```

16)Write a function in C++ to print the product of each row of a two dimensional array passed as the arguments of the function (2008OD)
Example: if the two dimensional array contains

20	40	10
40	50	30
60	30	20
40	20	30

Then the output should appear as:
Product of Row 1 = 8000
Product of Row 2 = 6000
Product of Row 3 =3600
Product of Row 4 = 2400

```
void receive(int A[ ][ ],intr,int c)
{   inti,j,B[r];
    for(i=0;i<r;i++)
       B[i]=1;
    for(i=0;i<r;i++)
       for(j=0;j<c;j++)
            B[i]=B[i]*A[i][j];
    for(i=0;i<r;i++)
cout<<"\nProduct of Row "<<i+1<<
          " = "<<B[i];
}
```

17)Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements which lie on diagonals. [Assuming the 2D Array to be a square matrix with odd dimension i.e., 3x3, 5x5 ,7x7 etc…] (2007D)
Example : if the array content is
5 4 **3**
6 **7** 8
1 2 **9**
Out put through the function should be :
Diagonal One : 5 7 9
Diagonal Two : 3 7 1
Solution:

```
void accept(int a[ ][ ],int size)
{   inti,j;
cout<<"Diagonal One:";
  for (int i=0;i<size;i++)
     for(int j=0;j<size;j++)
           if (i= = j)
           cout<<a[i][j]<<'\t';
cout<<"\n Diagonal Two:";
  for (i=0;i<size;i++)
     for(j=0;j<size;j++)
           if((i+j)= =(size-1))
           cout<<a[i][j]<<'\t';
}
```

18)Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements of middle row and the elements of middle column. [Assuming the 2D Array to be a square matrix with odd dimensioni.e., 3x3, 5x5, 7x7 etc…] (2007OD)
Example : If the array content is
3 5 4
7 6 9
2 1 8
Output through the function should be :
Middle Row : 7 6 9
Middle Column : 5 6 1
Solution:

```
void accept(int a[ ][ ],int size)
{inti,j;
 cout<<"Middle Row:";
  for (int i=0;i<size;i++)
     for(int j=0;j<size;j++)
           if (i= = size/2)
           cout<<a[i][j]<<'\t';
cout<<"\n Middle Column:";
  for (i=0;i<size;i++)
     for(j=0;j<size;j++)
           if(j= =size/2)
           cout<<a[i][j]<<'\t';
}
```

19) Write a function in C++ to print sum of all values which either are divisible by 3 or divisible by 5 present in a 2D array passed as the argument of the function. Ans) (2005OD)

```
void Sum(int A[ ][ ],intR,int C)
{  int S=0,i,j;
  for(i=0;i<R;i++)
     for(j=0;j<C;j++)
       if((a[i][j]%3= =0)||(a[i][j]%5= =0))
          S=S+A[i][j];
cout<<" nThe Sum of all the values
       which are divisible by 3 or 5 in the array = "<<S;
}
```

20) Write a function in C++ to find the sum of diagonal elements from a 2D array of type float. Use the array and its size as parameters with float as its return type.
Solution: (2004)

```
float diasum(float A[ ][ ],intR,int C)
{ inti,j;
 float Dsum=0.0;
 for(i=0;i<R;i++)
 for(j=0;j<C;j++)
   if((i= = j)| | (i+j)= =(size-1))
         Dsum=Dsum+A[i][j];
 return Dsum;
}
```

21)Write a user-defined function in C++ to display those elements of 2D array T[4][4] which are divisible by 100. Assume the content of the array is already present and the function prototype is as follows: (2003)
void showhundred(int T[4][4]);

```
void showhundred(int T[4][4])
{ int i,j;
 cout<<"\nThe elements in the array
    which are divisible by 100 …..";
  for(i=0;i<4;i++)
    for(j=0;j<4;j++)
      if(T[i][j]%100= =0)
        cout<<T[i][j]<<'\t';
}
```

22)Write a user-defined function named Lower_half() which takes 2D array A, with size N rows and N columns as argument and prints the lower half of the array. (2001)
Eg: Input:

```
2  3  1  5  0
7  1  5  3  1
2  5  7  8  1
0  1  5  0  1
3  4  9  1  5
```

Output:

```
2
7  1
2  5  7
0  1  5  0
3  4  9  1  5
```

Solution:

```
void Lower_half( int A[ ][ ],int N)
{  inti,j;
   for(i=0;i<N;i++)
        for(j=0;j<N;j++)
         {   if(i<j)
                cout<<A[i][j]<<'\t';
        cout<<endl;
         }
}
```

23) Write a user-defined function in C++ to find and display the multiplication of row elements of two dimensional array A[4][6] containing integers. (1999)

```
void rowmul( )
{   int A[4][6],i,j,rowmul;
    cout<<"\nEnter any 24 values…";
    for(i=0;i<4;i++)
        for(j=0;j<6;j++)
          cin>>A[i][j];
    for(i=0;i<4;i++)
   {      rowmul=1;
          for(j=0;j<6;j++)
             rowmul=rowmul*A[i][j];
          cout<<"\nThe multiplication of "<<i+1
              <<" row = "<<rowmul;
     }
}
```

24) An array T[15][10] is stored in the memory with each element requiring 2 bytes of storage. If the base address of T is 2000, determine the location of T[7][8] when the array VAL is stored
(i) Row major (ii) Column major. (1998)
Solution: Children, Try this as an assignment.

25) Write a user-defined function in C++ to find and display the sum of diagonal elements from a 2D array R[7][7] containing integers. (1998)

```
void displaysum( )
{  int i,j,D1=0,D2=0,R[7][7];
   cout<<"\nEnter any 49 values….";
   for(i=0;i<7;i++)
      for(j=0;j<7;j++)
      {   cin>>R[i][j];
          if(i= = j)
              D1=D1+R[i][j];
          else if ((i+j)= =(size-1))
              D2=D2+R[i][j];
   }
cout<<"\nThe sum of the elements of
       the Main Diagonal = "<<D1;
cout<<"\nThe sum of the elements of
       the Other Diagonal = "<<D2;
}
```

26) Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (matrix). (MP108-09) (MP109-10) 2 Ans)

```
void DiagSum(int M[][4],intN,int M)
{  int SumD1=0,SumD2=0;
 for (int I=0;I<N;I++)
 {  SumD1+=M[I][I];SumD2+=M[N-I-1][I];
 }
cout<<"Sum of Diagonal 1:"  <<SumD1<<endl;
cout<<"Sum of Diagonal 2:" <<SumD2<<endl;
}
```

27) Write a function in C++ to find sum of rows from a two dimensional array. (MP209-10) (MP208-09)2 Ans)

```
void MatAdd(int M[][4],intN,int M)
{ for (int R=0;R<N;R++)
  {  intSumR=0;
     for (int C=0;C<M;C++)
          SumR+=M[C][R];
     cout<<SumR<<endl;
  }
}
```

MODEL 3A: Address Calculation of 2-D array. (Row-Major) (3 Marks)

(1) Let us assume P[20][10] is a two-dimensional array, which is stored in the memory along the row with each ot its elements occupying 2 bytes, find the address of the element P[10][5], if the address of the element P[5][5] is 25000. (2019)

2. An array A[30][10] is stored in the memory with each element requiring 4 bytes of storage ,if the base address of A is 4500 ,Find out memory locations of A[12][8], if the content is stored along the row. 2019SP

Loc of A[12][8]= B+W*(N*(I-LBR)+(J-LBC))
=4500+4*(10*12+8)
= 4500 4*(128)
=4500 + 512
= 5012

3) Let us assume Data[20][15] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying 2 bytes. Find the address of the element Data[10][5] , if the element Data[15][10] is stored at the memory location 15000. 2018

Answer:

Address of A[I][J] = B + W[(I-L_r)*C + (J-L_c)]

$L_r = 0$ $L_c = 0$ R = 20 C=15 W=2
Data[15][10]= 15000
Here I=15 J=10
Data[15][10] = B + 2(15*15 + 10)
15000 = B + 2 * 235
B= 15000 – 470 = 14530
Data[10][5] = 14530 + 2 [10 * 15 + 5]
= 14530 + 310 = 14840

OR

LOC(Data[10][5]) = LOC(Data[15][10])+2(15*(10-15)+(5-10))
= 15000 + 2((-75) + (-5))
= 15000 + 2(-80)
= 15000 - 160
= 14840

OR

LOC(Data[I][J]) = Base(Data)+W*(NC*(I-LBR)+(J-LBC))
Taking LBR=1, LBC=1
LOC(Data[15][10]) = Base(Data)+2*(15*14+9)
15000 = Base(Data)+2*(15*14+9)
Base(Data) = 15000 - 2*(219)
Base(Data) = 15000 - 438
Base(Data) = 14562
LOC(Data[10][5])= 14562 + 2*(15*9+4)
= 14562 + 2*(139)
= 14562 + 278
= 14840

4) An array A[50][30] is stored along the row in the memory with each element requiring 4 bytes of storage. If the element A[10][15] is stored at 21500, then find out the base address of the array and the memory address of element stored at location A[30][25]? (2018 MP)

A) **Row-major Formula:-**

A[I][J]= B+ W*((I-L_r)*N_c + (J-L_c))

Nr=50, Nc=30, B=?, W=4, Lr=0, Lc=0,
A(10,15)=21500
A[10][15]= B + 4*((10-0)*30 + (15-0))
21500= B + 4*(300+15)
21500=B + 4*315
B=21500 – 1260
B=20240
A[30][25] = 20240 + 4*((30-0)*30 + (25-0))
A[30][25] = 20240 + 4*(900+25)
A[30][25] = 20240 + 4*925
A[30][25] = 23940

5.ARR[15][20] is a two-dimensional array, which is stored in the memory along therow with each of its elements occupying 4 bytes. Find the address of the elementARR[5][15], if the element ARR[10][5] is stored at the memory location 35000. (2017)

Ans)
Loc(ARR[I][J]) =BaseAddress + W [(I – LBR)*C + (J – LBC)]
(where W=size of each element = 4 bytes, R=Number of Rows=15, C=Number of Columns=20)
Assuming LBR = LBC = 0
35000 = BaseAddress + W(I*C + J)
35000 = BaseAddress + 4(10*20 + 5)
35000 = BaseAddress + 4(205)
35000 = BaseAddress + 820
BaseAddress = 35000 – 820 = 34180
LOC(ARR[5][15])= BaseAddress + W(I*C + J)
= 34180 + 4(5*20 + 15)
= 34180 + 4(100 + 15)
= 34180 + 4 x 115
= 34180 + 460
= 34640

OR

Loc(ARR[I][J]) = Ref. Address + W ((I – LR)*C + (J – LC))
(where W=size of each element = 4 bytes,
R=Number of Rows =15, C=Number of Columns=20
Reference Address= Address of given cell
ARR[10][5]=35000
LR = Row value of given cell = 10
LC = Column value of given cell = 5
LOC(ARR[5][15]) = LOC(ARR[10][5]) + 4((5-10)*20 + (15-5))
LOC(ARR[5][15]) = 35000 + 4(-100 + 10)
= 35000 + 4[-90]
= 35000 -360
= 34640

6. R[10][50] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 8 bytes, find the address of the element R[5][15], if the element R[8][10] is stored at the memory location 45000. (2016)

A) Loc(R[I][J])
=BaseAddress + W [(I – LBR)*C + (J – LBC)]
(where
W=size of each element = 8 bytes,
R=Number of Rows=10, C=Number of Columns=50)
Assuming LBR = LBC = 0
LOC(R[8][10])
45000 = BaseAddress + W[I*C + J]
45000 = BaseAddress + 8[8*50 + 10]
45000 = BaseAddress + 8[400 + 10]
45000 = BaseAddress + 8 x 410
BaseAddress = 45000 3280
= 41720

LOC(R[5][15])= BaseAddress + W[I*C + J]
= 41720 + 8[5*50 + 15]
= 41720 + 8[250 + 15]
= 41720 + 8 x 265
= 41720 + 2120
= 43840

OR

Loc(R[I][J])
=Reference Address + W [(I – LR)*C + (J – LC)]
(where
W=size of each element = 8 bytes,
R=Number of Rows=10, C=Number of Columns=50)
Reference Address= Address of given cell R[8][10]=45000
LR = Row value of given cell = 8
LC = Column value of given cell = 10
LOC(R[5][15])= LOC(T[8][10]) + 8[(5 8)*50 + (15 10)]
LOC(R[15][5]) = 45000 + 8[3*50 + 5]
= 45000 + 8[150+ 5]
= 45000 + 8 x (145)
= 45000 1160
= 43840

7. A two dimensional array ARR[50][20] is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[30][10], if the elementARR[10] [5] is stored at the memory location 15000. (2015) 3

Loc(ARR[I][J]) along the row
=BaseAddress + W [(I – LBR)*C + (J – LBC)]
(where C is the number of columns, LBR = LBC = 0
LOC(ARR[10][5])
= BaseAddress + W [I*C + J]
15000 = BaseAddress + 4[10*20 + 5]
= BaseAddress + 4[200 + 5]
= BaseAddress + 4 x 205
= BaseAddress + 820
BaseAddress = 15000- 820 = 14180
LOC(ARR[30][10])= 14180 + 4[30 * 20 + 10]
= 14180 + 4 * 610
= 14180 + 2440
= 16620

OR

LOC(ARR[30][10])
= LOC(ARR[10][5])+ W[(ILBR)*
C + (JLBC)]
= 15000 + 4[(3010)*
20 + (105)]
= 15000 + 4[20*20 + 5]
= 15000 + 4 *405
= 15000 + 1620
= 16620

OR

Where C is the number of columns and LBR=LBC=1
LOC(ARR[10][5])
15000 = BaseAddress + W [(I1)*C + (J1)]
= BaseAddress + 4[9*20 + 4]
= BaseAddress + 4[180 + 4]
= BaseAddress + 4 * 184
= BaseAddress + 736
BaseAddress = 15000- 736 = 14264
LOC(ARR[30][10])
= 14264 + 4[(301)*20 + (101)]
= 14264 + 4[29*20 + 9]
= 14264 + 4[580 + 9]
= 14264 + 4*589
= 14264 + 2356
= 16620

8.An array A[20][30] is stored along the row in the memory with each element requiring 4 bytes of storage. If the base address of array A is 32000, find out the location of A[15][10]. Also find the total number of elements present in this array. (2014)

Answer)
B=32000 W=4
A[15][10]=32000+4[30(15-0)+(10-0)]
=32000 +4[450+10]
=32000+4[460]
=32000+1840
=33840
Location of a[10][15]=33840
Total number of elements present in this array = 20*30 = 600

9. An array T[15][10] is stored along the row in the memory with each element requiring 8 bytes of storage. If the base address of array T is 14000, find out the location of T[10][7]; (2013)3
Answer)
Address of T[10][7]=14000+(10*7+10)*8
=14000+(80)*8
=14000+640
=14640

10. An array G[50][20] is stored in the memory along the row with each of its elements occupying 8 bytes. Find out the location of G[10][15], if G[0][0] is stored at 4200. (2011 OD) 3
Ans Assuming LBR=LBC=0
B=4200
W=8 bytes
Number of Rows(N)=50
Number of Columns (M)=20
LOC(Arr[I] [J]) = B +(I*M + J) *W
LOC (Arr [10] [15]) = 4200+ (10*20+15)*8
= 4200 + (215*8)
= 4200+1720
= 5920

11) An array Arr[50][10] is store in the memory along the row with each element occupying 2 bytes. Find out the Base address of the location Arr[20][50], if the location Arr[10][25] is stored at the address 10000.
Ans) Assuming LBR=LBC=0 **(2008OD)**
S=2 bytes
Number of Rows (N)=50
Number of Columns (M)=100
LOC (Arr [I] [J]) = B + (I*M+J)*S
LOC (Arr [10] [25]) = B +(10*100+25)*2
10000 = B +(1000+25)*2
B = 10000-2050
B = 7950
LOC (Arr [20] [50]) = 7950+(20*100+50)*2
= 7950 + (2050*2)
= 7950+4100
= 12050

OR

Assuming LBR=LBC=1
S=2 bytes
Number of Rows (N) = 50
Number of Columns (M) =100
LOC (Arr [I] [J])

=B +((I-LBR)*M+(J-LBC))*S
LOC (Arr [10] [25])
=B +((10–1)*100+(25–1))*2
10000 = B +(900+24)*2
B = 10000-1848
B = 8152
LOC (Arr [20] [50])
= 8152+ ((20-1)*100+ (50-1))*2
= 8152 + (1949*2)
= 8152+3898
=12050

12)An array Arr[15][20] is stored in the memory along the row with each element occupying 4 bytes. Find out the Base address of the location Arr[3][2], if the location Arr[5][2] is stored at the address 1500. (2007OD)
Solution:
Given Data: Arr[15][20] W=4 B=? R=15 C=20
$L_r = 0$ $L_c = 0$
Address of Arr[3][2] = ?
Address of Arr[5][2] = 1500.
Address of an element (I,J) in row major
$= B+W(C(I-L_r)+(J-L_c))$
Therefore,
1500 = B+4(20(5-0)+(2-0))
1500 = B+4(20*5+2)
1500 = B+4*102
1500 = B+408
B =1500-408
B=1092
Address of Arr[3][2]
=1092+4(20*3+2)
=1092+4(62)
=1092+248
=1340.

13)An array MAT[20][10] is stored in the memory along the row with each element occupying 4 bytes of the memory. Find out the Base address and the address of element MAT[10][5] , if the location MAT[3][7] is stored at the address 1000. (2006OD)
Ans) For Row wise allocation
Address of A[I][J]
= BA + W((I-LBR) x N + (J-LBC))
Where
BA = Base Address
W = Size of each element in bytes
= 4 bytes (given)
N = No. of columns in the 2D Array
= 10 (given)
Address of MAT[3][7] given is 1000.
Therefore
(Assumption 1: LBR = LBC = 0)
MAT[3][7]=100 = BA + 4 (10 (3-0) + (7-0))
= BA + 148
BA = 1000 – 148 = 852
Therefore,Base Address = 852
Thus, Address of MAT[10][5] = 852 + 4 (10 (10-0) + (5-0))
= 852+420
= 1272

OR

(Assumption 2: LBR = LBC = 1)
MAT[3][7]=1000 = BA + 4 (10 (3-1) + (7-1))
= BA + 104
BA = 1000 – 104
= 896
Therefore,Base Address = 896
Thus, Address of MAT[10][5]
= 896 + 4 (10 (10-1) + (5-1))
= 896+376
= 1272

14)An array Arr[15][35] is stored in the memory along the row with each of its element occupying 4 bytes . Find out the Base address and the address of element Arr[2][5] , if the location Arr[5][10] is stored at the address 4000. (2005D)
Ans) LOC(Arr[I][J])
=Base(Arr)+W*(I + No.of Rows * J)
LOC(Arr[5][10])
=Base(Arr)+8*(5+15*10)
4000 =Base(Arr)+8*(155)
4000 =Base(Arr)+1240
Base(Arr) =4000-1240
Base(Arr) =2760
LOC(Arr[2][5]) =Base(Arr)+8* (2 + 15*5)
=2760+8*(77)
=2760+616
=3376

OR

LOC(Arr[I][J])
=Base(Arr)+W*((I-1) + No. of Rows * (J-l))
LOC(Arr[5][10])
=Base(Arr)+8*[(5-1)+15* (10-1)]
4000 =Base(Arr)+8*(139)
4000 =Base(Arr)+1112
Base(Arr) =4000-1112
Base(Arr) =2888
LOC(Arr[2][5])
=Base(Arr)+ 8*[(2-1)+15*(5-1)]
=2888+8*(61)
=2888+488
=3376

15)An array Arr[35][15] is stored in the memory along the row with each of its element occupying 4 bytes . Find out the Base address and the address of element Arr[20][5] , if the location Arr[2][2] is stored at the address 3000. (2005OD)
Ans)
LOC(Arr[I][J])
Base(Arr)+W*(No. of Cols*I+J)
LOC(Arr[2][2]) =Base(Arr)+4*(15*2+2)
3000 =Base(Arr)+4*(32)
3000 =Base(Arr)+128
Base(Arr) =3000-128
Base(Arr) =2872
LOC(Arr[20][5])
=Base(Arr)+4*(15*20+5)
=2872+4*(300+5)
=2872+4*305
=2872+1220
=4092

OR

LOC(Arr[I][J])
=Base(Arr)+W*(No. of Cols*(I-1)+(J-1)
LOC(Arr[2][2])
=Base(Arr)+4*(15*(2-1)+(2-1))
3000 =Base(Arr)+4*(16)
3000 =Base(Arr)+64
Base(Arr) =3000-64
Base(Arr) =2936

LOC(Arr[20][5])
=Base(Arr)+4*(15*(20-1)+(5-1))
=2936+4*(289)
=2936+1156
=4092

16)An array S[40][30] is stored in the memory along the row with each of the element occupying 2 bytes, find out the memory location for the element S[20][10], if the Base Address of the array is 5000. 3 (MP109-10)
Ans)
Given,W=2
N=40
M=30
Base(S)=5000

Row Major Formula:
Loc(S[I][J])
=Base(S)+W*(M*I+J)
Loc(S[20][10])
=5000+2*(30*20+10)
=5000+2*(600+10)
=5000+1220
=6220

17) 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. Ans) (MP108-09)4

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

MODEL 3B: Address Calculation of 2-D array. (Column-Major) (3 Marks)

(1) Let us assume P[20][30] is a two-dimensional array, which is tored in the memory along the column with each of its elements occupying 2 bytes. Find the address of the element P[5][5], if the base address of the array is 25000. (2019)

2. An array S[10] [30] is stored in the memory along the column with each of its element occupying 2 bytes. Find out the memory location of S[5][10], if element S[2][15] is stored at the location 8200. 2019SP3
OPTION 1:
ASSUMING LBR=LBC=0
W=2 BYTES, NUMBER OF ROWS(M)=10,
NUMBER OF COLUMNS(N)=30
LOC(S[I][J]) = B +(I + J*M)*W
LOC(S[2][15]) = B +(2+15*10)* 2
8200 = B + (152*2)
B = 8200 - 304
B = 7896
LOC(S[5][10]) = 7896 +(5+10*10)* 2
= 7896 + (105*2)
= 7896 + 210
= 8106
OPTION 2:
ASSUMING LBR=2,LBC=15 AND B = 8200
W=2 BYTES, NUMBER OF ROWS(M)=10,
NUMBER OF COLUMNS(N)=30
LOC(S[I][J]) = B +((I-LBR) + (J-LBC)*M)*W
LOC(S[5][10])= 8200 + ((5-2) + (10-15)*10)*2
= 8200 + (3 + (-5)*10) * 2
= 8200 + (3 + (-50)) * 2
= 8200 + (3 – 50) * 2
= 8200 + (-47) * 2
= 8200 – 94
= 8106

3.An array P[30][20] is stored along the column in the memory witheach element requiring 2 bytes of storage. If the base address of the array P is 26500, find out the location of P[20][10]. (2016)3
Total number of rows= 30
Total size= 2 bytes
Base Address= 26500
LOC (P[I][J]) = BaseAddress+((I-LBR) + (J-LBC) * R)*W
Assuming Lower Bound of Row(LBR)=0
Lower Bound of Column(LBC)=0
Total number of Rows(R)=30
Size of each element(W)=2
LOC(P[20][10])= 26500 +((20-0)+(10-0)*30)*2
LOC(P[20][10])= 26500 +640
LOC(P[20][10])= 27140

4) An array T[20][10] is stored in the memory along the column with each of the elements occupying 2 bytes. Find out the memory location of T[10][5], if the element T[2][9] is stored at the location 7600.(2012)3Ans
Assuming LBR=LBC=0
W=2 bytes
Number of Rows (M) =20
Number of Co1umns(N)=10
LOC(T[I] [J]) = B +(I + J*M)*W
LOC(T[2] [9]) = B +(2+9*20)* 2
7600 = B + (182*2)
B = 7600 - 364
B = 7236
LOC (T[10] [5]) = 7236 +(10+5*20)* 2
= 7236 + (110*2)
= 7236 + 220
= 7456

OR

Assuming LBR=2, LBC=9 and B = 7600
W=2 bytes
Number of Rows (M) = 20
Number of Co1umns (N) = 10
LOC (T[I] [J]) = B + ((I-LBR) + (J-LBC)*M)*W
LOC (S[10] [5]) = 7600 + ((10-2) + (5-9)*20)*2
= 7600 + (8-80) * 2
= 7600 + (-72)) * 2
= 7600 - 144
= 7456

OR

Assuming LBR=LBC=l
W=2 bytes
Number of Rows (M) = 20
Number of Co1umns (N) = 10
LOC (T[I] [J]) = B +((I-LBR) + (J-LBC)*M)*W
LOC (T[2] [9]) = B +((2-1) + (9-1)*20)* 2
7600 = B + (161*2)
B = 7600 - 322
B = 7278
LOC (T[10] [5]) = 7278 +((10-1)+(5-1)*20)* 2
= 7278 + (9+80) *2)
= 7278 + 178
= 7456

5) An array P[50] [60] is stored in the memory along the column with each of the element occupying 2 bytes, find out the memory location for the element P[10][20], if the Base Address of the array is 6800. (2010D)

Ans)
Loc(P[I] [J]) = Base(P)+W(I+J*M)i Loc(P[10][20]) = Base(P)+2(10+20*50)
Loc(P[10] [20]) = 68OO + 2(10+20*50)
= 6800 + 2 (10+1000)
= 6800 + 2*1010
= 6800 + 2020
= 8820

OR

Address of P[i] [j] = BaseAddress + W((i–L1)+(j–L2)*M)
Address of P[10] [20]= 6800 + 2((10-0)+(20-0)x50)
= 6800 + 2 x 1010
= 6800 + 2020
= 8820

OR

Address of P[I] [J] along the column
= BaseAddress + W((I–LBR)+(J–LBC)*M)
(where N is the number of rows, LBR = LBC = 1)
Address of P[10][20]
=6800+2((10-1)+(20-l)x50)
= 6800 + 2 (9 + 19 x 50)
= 6800 + 2 x 959 = 6800 + 1918 = 8718

6) An array T[90][100] is stored in the memory along the **column** with each of the elements occupying 4 bytes. Find out the memory location for the element T[10][40], if the Base Address of the array is 7200. **(2010D)**

Ans.
Loc(T[I][J)) = Base(T)+W(I+J*N)
(where N is the number of rows, LBR = LBC = 0)
= 7200 + 4[10 + 40 x 90]
= 7200 + 4[10+3600]
= 7200 + 4 x 3610
= 7200 + 14440
= 21640

OR

Address of T[I][J] along the column
= BaseAddress + W [(I-LBR)+(J-LBC)* N]
(where N is the number of rows, LBR=LBC = 1)

Address of T[10][40] = BaseAddress + 4[(10 - 1) +(40 - l)x 90]
= 7200+4[9 + 39 x 90]
= 7200+4[9 + 3510]
= 7200+4 x 3519
= 7200+14076
= 21276

7) An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200. (2009 D)

Ans)
Loc(S[I][J]) = Base(S)+W(I+J*N)
Loc(S[15][10]) = Base(S)+4(15+10*40)
Base(S) = 7200-4*415
Base(S) = 7200-1660
Base(S) = 5540
Loc(S[20][15]) = Base(S)+4(20+15*40)
Loc(S[20][15])
= 5540 + 4(20+15*40)
= 5540 + 4(20+600)
= 5540 + 4*620
= 5540 + 2480
= 8020

OR

Address of S[i][j]=BaseAddress + W[(i-L1) + (j - L2) *M]
Address of S[15] [10] = BaseAddress+ 4[(15–0)+(10 - 0)*40]
7200= Base Address + 4 [415]
Base Address = 7200 - 4 * 415
= 7200 - 1660
= 5540
Address of S[20][15]
= 5540 + 4 [(20 - 0) + (15 - 0) x 40]
= 5540 + 4 x 620
= 5540 + 2480
= 8020

OR

Address of Sri] [j] along the column =
Base Address + W [(i - L1) + (j - L2) * M]
Address of S[15)[10] = BaseAddress + 4[(15 - 1)+(10-1) x 40]
7200= Base Address + 4 [374]
Base Address = 7200 - 4 x 374
= 7200 - 1496
= 5704
Address of 5[20)[15]
= 5704 + 4 [(20 - 1) + (15 - 1) x 40]
= 5704 + 4 x 579
= 5704 + 2316
= 8020

8) An array T[50][20] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the base address and address of element T[30][15], if an element T[25][10] is stored at the memory location 9800. (2009 OD)

Ans)
Loc(T[I][J]) = Base(T)+W(I+J*N)
Loc(T[25][10]) = Base(T)+4(25+10*50)
Base(T) = 9800-4*525
Base(T) = 9800-2100
Base(T) = 7700
Loc(T[30][15]) = Base(T)+4(30+15*50)

Loc(T[30][15])
= 7700 + 4(30+15*50)
= 7700 + 4(30+750)
= 7700 + 4*780
= 7700 + 3120
= 10820

OR

Address of T[i][j]
=BaseAddress + W [(i - L1) + (j - L2) * M]
Address of T[25] [10] =
BaseAddress + 4[(25 - 0)+(10 - 0)*50]
9800 = Base Address + 4 [525]
Base Address = 9800 - 4 * 525
= 9800 - 21.00
= 7700
Address of T[30][15]
=7700 + 4 [(30 - 0) + (15 - 0) x 50]
= 7700 + 4 x 780
= 7700 + 3120
= 10820

OR

Address of T[i][j] along the column
=Base Address+ W[(i - L1)+(j - L2)* M]
Address of T[25][10]
=BaseAddress + 4[(25 - 1) +(10 -1)x50]
9800= Base Address + 4 [474]
Base Address
= 9800 - 4 x 474
= 9800 - 1896
= 7904
Address of T[30][15]
= 7904 + 4 [(30 - 1) + (15 - 1) x 50]
= 7904 + 4 x 729
= 7904 + 2916
= 10820

9) An array Arr[40][10] is store in the memory along the column with each element occupying 4 bytes. Find out the base address of the location Arr[3][6] if the location Arr[30][10] is stored at the address 9000. (2008D)

Solution:

Address of Array[i][j] along the column =Base Address + W [(i - L1) + (j - L2) * M]
where,
W = size of each location in bytes = 4
L1 = Lower Bound of rows = 0
L2 = Lower Bound of columns = 0
M = Number of rows per column = 40

Address of Array[30][10]
= Base Address + 4 * (30 + 10 * 40)
9000 = Base Address + 4 * 430

Base Address = 9000 - 4 x 430
= 9000 -1720 = 7280
Address of Array[3][6]
= 7280 + 4 * (3 + 6 * 40)
= 7280 + 4 * 243
= 7280 + 972
= 8252

OR

Address of Array[i][j] along the column = Base Address + W ((i - L1) + (j - L2) * M)
where,W = size of each location in bytes = 4
L1 = Lower Bound of rows = 1
L2 = Lower Bound of columns = 1
M = Number of rows per column = 40
Address of Array[30][10]
= Base Address + 4 * ((30 -1) +(10 -1) * 40)
9000 = Base Address + 4 * (29+9*40)
9000 = Base Address + 4 * (29+360)
9000 = Base Address + 4 * (389)
Base Address
= 9000 - 4 * 389
= 9000 -1556
= 7444
Address of Array[3][6]
= 7444 + 4 * ((3 -1) + (6 -1) * 40)
= 7444 + 4 * (2+5 * 40)
= 7444 + 4 * (2+200),
= 7444 + 4 * 202
= 7444 + 808
= 8252

OR

Address of Array[i][j] along the column =Address of Array[x][y] + W [(i-x) + (j - y) * M]
where,
W = size of each location in bytes = 4
M = Number of rows per column = 40
i , j = Index value of the unknown element
x , y = Index value of the known element
Address of Array[3][6]
= Address of Array[30][10]+ 4 [(3 - 30) +(6 -10) * 40]
= 9000 + 4 [-27 -160]
= 9000 - 4 x 187= 9000 -748= 8252

10) An array Array[20][15] is stored in the memory along the column with each element occupying 8 bytes. Find out the base address of the element Array[2][3] if the element Array[4][5] is stored at the address 1000. (2007D)

Solution:

Given Data: Aray [20][15] W=8 B=? R=20 C=15 $L_{r=}0$ $L_{c=}0$
Address of Array [2][3] =?
Address of Array[4][5] =1000.

Address of an element (I,J) in column major
$=B + W ((I-L_r) + R(J-L_c))$

Therefore
1000=B+8*((4-0)+20(5-0))
1000=B+8*(4+20*5)
1000 =B+8*104
1000=B+832
B =1000-832
B =168
Therefore Address of
Array[2][3]=168+8*((2-0)+20(3-0))
=168+8*(2+20*3)
=168+8*62 =168+496 =664

11) An array MAT[30][10] is stored in the memory along column wise with each element occupying 8 bytes of the memory. Find out the Base address and the address of element MAT[20][5] , if the location MAT[3][7] is stored at the address 1000. (2006D)

Ans) For Column wise allocation
Address of A[I][J]
= BA + W[(J –LBC) x M + (I - LBR)]
Where
BA = Base Address
W = Size of each element in bytes
= 8 bytes (given)
M = No. of rows in the 2D Array = 30

(given)
Address of MAT[5][7] given is 1000.

Assumption 1 : LBR=LBC=0

Therefore

1000 = BA + 8 (7 × 30 + 5)

= BA + 8 × 215 = BA + 1720

BA = 1000 – 1720 = -720

Therefore,Base Address = - 720

Thus, Address of MAT[20][5] = -720 + 8 (5 × 30 + 20)

= -720 + 8 × 170

= -720 + 1360 = 640

Assumption 2 : LBR=LBC=1

Therefore

1000 = BA + 8 [(7-1) × 30 +(5-1)]

= BA + 8[6 × 30 + 4]

= BA + 8 ×184

= BA + 1472

BA = 1000 – 1472 = -472

Therefore,Base Address = - 472

Thus, Address of MAT[20][5]

= -472 + 8 (4 × 30 + 19)

= -472 + 8 × 139 = -472 + 1112 = 640

12) An array P[20][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the Base Address of the array, if an element P[2][20] is stored at the memory location 5000.

Ans) Given, **(MP209-10)3**

W=4 N=20 M=30

Loc(P[2][20]) =5000

Column Major Formula:

Loc(P[I][J]) = Base(P)+W*(N*J+I)

Loc(P[2][20]) = Base(P)+4*(20*20+2)

Base(P) = 5000 -4*(400+2)

=5000-1608

=3392

13) 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. (MP208-09)4

Ans) Given,

W=4 N=20 M=30

Loc(P[2][20])=5000

Column Major Formula:

Loc(P[I][J])=Base(P)+W*(N*J+I)

Loc(P[2][20])=Base(P)+4*(20*20+2)5000

=Base(P)+4*(400+2)

Base(P) = 5000- 1608

Base(P) = 3392

Loc(P[5][15]) =3392+4*(20*15+5)

=3392+4*(300+5)

=3392+1220

=4612

14) An array ARR[5][5] is stored in the memory with each element occupying 3 bytes of space. Assuming the base address of ARR to be 1500, compute the address of ARR[2][4], when the array is stored: (2004)

Solution: Children, Try this answer as an assignment.

15)An array X[30][10] is stored in the memory with each element requiring 4 bytes storage. Find out the Base address of X is 4500, find out memory locations of X[12][8] and X[2][14], if the content is stored along the row. (2003)

Solution: Children, Try this answer as an assignment.

16) The array A[20][10] is stored in the memory with each element requiring one byte of storage if the base address of a is 0, determine the location of A[10][5] when the array A is stored by column major. (2002)

Solution: Children, Try this answer as an assignment.

17) An array X[10][20] is stored in the memory with each element requiring 4 bytes of storage. If the Base address of the array is 1000, calculate location of X[5][15] when the array X is stored using column major order. (2001)

NOTE: X[10][20] means valid row indices are 0 and 9 and valid column indices are 0 and 19

Solution: Children, Try this answer as an assignment.

18) An array VAL[1…15][1…10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored (i) Row wise (ii) Column wise. (2000)

Solution: Given Data:

VAL[1…15][1…10]

Word Length (W) = 4 Bytes

Base Address of VAL(B) = 1500

VAL[12][9] = ?

C = Total No of Columns

R = Total No of Rows

L_r = Least Row=1

L_c = Least Column=1

(i) Row Major:

Address of an element (I,J) in row major

= B + W (C (I-L_r) + (J – L_c))

VAL [12][9] = 1500 + 4 (10 * (12-1) + (9-1))

= 1500 + 4 (10 * 11+8)

= 1500 + 4 (118)

= 1500 + 472

(i) Column Major:

Address of an element (I,J) in column major

= B + W ((I-L_r) + R(J – L_c))

VAL [12][9] = 1500 + 4 ((12-1) +15 * (9-1))

= 1500 + 4 (11 + 15 * 8)

= 1500 + 4 (11+ 120)

= 1500 + 4 * 131

= 1500 + 524

= 2024.

19) An array A[10][20] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array in the memory is 400, determine the location of A[8][13] when the array VAL is stored (i) Row major (ii) Column major.

Solution: Children, Try this answer.

MODEL 4: Sorts & Search

1) Write a function SORTPOINTS( ) in C++ to sort an array of structure Game in descending order of Points using Bubble Sort. (2009 D)

Note: Assume the following definition of structure Game

```
struct Game
{     long PNo; //Player Number
   char PName [20] ;
    long Points;
};
```

Sample content of the array (before sorting)

PNo	PName	Points
103	Ritika Kapur	3001
104	John Philip	2819
101	Razia Abbas	3451
105	Tarun Kumar	2971

Sample content of the array (after sorting)

PNo	PName	Points
101	Razia Abbas	3451
103	Ri tika Kapur	3001
105	Tarun Kumar	2971
104	John Philip	2819

Ans)

```
void SORTPOINTS(Game G[], int N)
{ Game Temp;
 for (int I = 0; I<N-l; I++)
  for (int J = 0; J<N-I-l; J++)
    if(G[J].Points < G[J+l].Points)
    {
        Temp = G[J];
        G[J] = G[J+l];
        G[J+l] = Temp;
    }
}
```

2) Write a function SORTSCORE( ) in C++ to sort an array of structure Examinee in descending order of Score using Bubble Sort. (2009 OD)

Note: Assume the following definition of structure Examinee

```
struct Examinee
{ long RollNo;
  char Name[20] ;
  float Score;
} ;
```

Sample Content of the array (before sorting)

RollNo	Name	Score
1001	Ravyank Kapur	300
1005	Farida Khan	289
1002	Anika Jain	345
1003	George Peter	297

Sample Content of the array (after sorting)

RollNo	Name	Score
1002	Anika Jain	345
1001	Ravyank Kapur	300
1003	George Peter	297
1005	Farida Khan	289

Ans)

```
void SORTSOORE (Examinee E[ ], int N)
{  Examinee Temp;
  for (int I = 0; I<N-l; I++)
    for (int J = 0; J<N-I-l; J++)
     if(E[J].Score < E[J+l].Score)
     { Temp = E[J];
        E[J] = E[J+l];
        E[J+l] = Temp;
     }
}
```

3)Assume a array E containing elements of structure Employee is required to be arranged in descending order of Salary. Write a C++ function to arrange same with the help of bubble sort, the array and its size is required to be passed as parameters to the function. Definition of structrure Employee is as follows: (2003)

```
Struct Employee
{     intEno;
      char name[25];
      float Salary;
};
```

Solution:

```
void bubble(Employee E[ ],int n)
{ inti,j;
  Employee Etemp;
 for(i=0;i<n;++i)
  for(j=0;j<(n-1)-i ;j++)
   if(E[j].salary<E[j+1].salary)
   {  Etemp=E[j];
      E[j]=E[j+1];
      E[j+1]=temp;
    }
cout<<"The details of the employee in ascending order of salary ";
for(i=0;i<n;i++)
   cout<<E[i].Eno<<'\t'<<E[i].name<<'\t<<E[i].Salary<<endl;
}
```

4) Considering the following key set: 42,29,74,11,65,58, use insertion sort to sort the data in ascending order and indicate the sequences of steps required. (2002)

Solution:

In this, Suppose an array A with n elements A[1],A[2],…A[N] is in memory. The insertion sort algorithm scans A from A[1] to A[N], insertion each element A[K] into its proper position in the previously sorted subarray A[1],A[2],…,A[K-1].

This sorting algorithm is frequently used when n is small.

The array contains 6 elements as follows: 42,29,74,11,65,58

Pass	**A[0]**	**A[1]**	**A[2]**	**A[3]**	**A[4]**	**A[5]**	**A[6]**
K=1	-32768	**42**	29	74	11	65	58
K=2	-32768	42	**29**	74	11	65	58
K=3	-32768	29	42	**74**	11	65	58
K=4	-32768	29	42	74	**11**	65	58
K=5	-32768	11	29	42	74	**65**	58
K=6	-32768	11	29	42	65	74	**58**
Sorted	**-32768**	**11**	**29**	**42**	**58**	**65**	**74**

5) Given two arrays of integers X and Y of sizes m and n respectively. Write a function named MERGE() which will third array named Z, such that the following sequence is followed.(2001)

(i) All odd numbers of X from left to right are copied into Z from left to right.
(ii) All even numbers of X from left to right are copied into Z from right to left.
(iii) All odd numbers of Y from left to right are copied into Z from left to right.
(iv) All even numbers of Y from left to right are copied into Z from right to left.

X, Y and Z are passed as arguments to MERGE( ).

Eg. X is {3, 2, 1, 7, 6, 3} and {9, 3, 5, 6, 2, 8, 10}
The resultant array Z is
{3, 1, 7, 3, 9, 3, 5, 10, 8, 2, 6, 6, 2}

Ans)

```
void MERGE(int X[ ], intm,int Y[ ], intn,int Z[ ])
{   intmn,i,,left=0,right=mn-1;
    mn=m+n;
    for(i=0;i<m;i++)
          if (X[i]%2= = 1)
             Z[left++]=X[i];
                  //For copying odd numbers of
                  //X into Z from left to right      else
             Z[right- -]=X[i];
                 //For copying even number of
                 //X into Z from right to left
           for(i=0;i<n;i++)
             if (X[i]%2= = 1)
                Z[left++]=Y[i];
                  //For copying odd numbers of
                  //Y into Z from left to right
             else
                Z[right- -]=Y[i];
                  //For copying even number of
                  // X into Z from right to left
}
```

6) Suppose A, B, C are arrays of integers of size M, N and M+N respectively. The numbers in array A appear in ascending order while numbers in array in descending order. Write user defined function in C++ to produce third array C by merging array A by B in ascending order. Use A, B and C as arguments in the function. **(2000)**

```
void Merge(int A[ ],intM,int B[ ], intN,int C[ ])
{ inta,b,c;
 for(a=0,b=N-1,c=0;a<M&&b>=0;)
 {   if(A[a]<=B[b])
          C[c++]=A[a++];
     else
          C[c++]=B[b--];
  }
  if(a<M)
  {   while(a<M)
          C[c++]=A[a++];
  }
  else
  {  while(b>=0)
          C[c++]=B[b--];
  }
}
```

7) Suppose a 1D array AR containing integers is arranged in ascending order. Write a user defined function in C++ to search for one integer from AR with the help of binary search method, to show presence of the number in the array. The function should have three parameters: (1) an array AR (2) the number to be searched and (3) the number of elements N in the array.

```
void BinSearch(int AR[ ], intSno, int N)
{    int  l=0,u=N-1,m,flag=0;
   while(l<=u)
   {      m=(l+u)/2;
          if (Sno= = AR[m])
          {   flag=1;
              break;
          }
          else if(Sno<AR[m])
              u=m-1;
          else
              l=m+1;
    }
    if( flag = = 0)
   cout<<"\nThe Search Element "
      <<Sno<<" is not available";
else
   cout<<"\nThe Search Element "
     <<Sno<<" is available";
}
```

8) Suppose an array P containing float is arranged in ascending order. Write a user defined function in C++ to search for one float from p with the help of binary search method. The function should return an integer 0 to show absence of the number in the array. The function should have the parameters as (1) an array P (2) the number DATA to be searched (3) number of elements N. (1998)

```
intBinSearch(float P[ ], float DATA, int N)
{   int  l=0,u=N-1,m;
   while(l<=u)
   { m=(l+u)/2;
     if (DATA= = P[m])
              return 1;
     else if(DATA<P[m])
              u=m-1;
     else
              l=m+1;
     }
    return 0;
 }
```

9) Write a function in C++ to merge the contents of two sorted arrays A & B into third array C. Assuming array A and B are sorted in ascending order and the resultant array C is also required to be in ascending order.

Ans) **(MP109-10)3**

```
void AddNSave(int A[ ],int B[ ],int C[ ],
intN,int M, int&K)
{ int I=0,J=0;
  K=0;
  while (I<N && J<M)
     if (A[I]<B[J])
          C[K++]=A[I++];
     else if (A[I]>B[J])
          C[K++]=B[J++];
     else
     {
        C[K++]=A[I++];
        J++;
     }
  for (;I<N;I++)
     C[K++]=A[I];
  for (;J<M;J++)
     C[K++]=B[J];
}
```

10. 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. (MP108-09) 4

Answer:

```
void AddNSave(int A[],int B[],int C[],intN,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];
}
```

MODEL 5:Theory / Mislleneous

1) Define array and pointer. **(2002)**

Solution: An array refer to a named list of a finite number n of similar data elements. Each of the data elements can be referenced respectively by a set of consecutive numbers.

Arrays can be one dimensional, two dimensional or multi dimensional.

An array can be declared as :

Syntax:data_typeArray_name[size];

Eg:int A[10]; //Then location of
//the array are A[0], A[1],…….A[9].
int B[5][4]; //This array can holds 5 X 4 = 20 elements.

10. LINKED LISTS , STACKS AND QUEUES

MODEL 1: Program on Stack

1) Write a complete program in c++ to implement a dynamically allocated Stack containing names of Countries. (D 2010)

Ans)

```
#include<iostream.h>
#include<stdio.h>
struct Node
{ char Country [20] ;
  Node *Link;
};
class Stack
{  Node *Top;
public:
   Stack( )
   {    Top = NULL;
   }
    void Push() ;
    void Pop() ;
    void Display() ;
     ~Stack () ;
};
void Stack::Push( )
{  Node *Temp = new Node;
   gets(Temp -> Country);
   Temp -> Link = Top;
   Top = Temp;
}
void Stack::Pop( )
{  if (Top !=NULL)
   {    Node *Temp = Top;
        Top = Top -> Link;
        delete Temp;
    }
    else
         cout<<"stack Empty";
}
void Stack::Display( )
{   Node *Temp = Top;
    while (Temp! = NULL)
    {   cout<<Temp -> Country <<endl;
        Temp = Temp -> Link;
    }
}
Stack::~Stack ( )
{  while (Top!=NULL)
    {  NODE *Temp=Top;
       Top=Top->Link;
       delete Temp;
    }
}
void main ( )
{  Stack ST;
   char Ch;
   do
   {  cout<<"p/O/D/Q" ;
      cin>>Ch;
      switch (Ch)
      {   case 'P' : ST.Push( ); break;
          case 'O' :ST.Pop(); break;
          case 'D' :ST.Disp();
      }
    } while (Ch!='Q');
}
```

2)Each node of a STACK contains the following information, in addition to pointer field: **(2001)**

(i).Pin code of city

(ii).Name of city

Give the structure of node for the linked STACK in question. TOP is a pointer that points to the topmost node of the STACK. Write the following functions:4

a)PUSH( ) – To push a node into the STACK, which is allocated dynamically.

b)POP( ) – To remove a node from the STACK, and release the memory.

Solution:

```
struct City
{    longCpin ;
charCName[20] ;
     City *Next ;
} ;
class Stack
{    City *Top;
public:
Stack( ) {    Top = NULL; }
void Push( );
void Pop( );
void Display( );
};
void Stack::PUSH( )
{     City *Temp;
      Temp=new City;
if(Temp= =NULL)
       { cout<<"\nNo memory to create the node…";
exit(1);
       }
cout<<"\nEnter the City Pin Code to be inserted: ";
cin>>Temp→Cpin;
cout<<"\nEnter the City Name to be inserted: ";
gets(Temp→CName);
    Temp→Next=Top;
    Top=Temp;
}
void Stack::POP( )
{   City *Temp;
if( Top= = NULL)
           cout<<"Stack Underflow…";
else
{ cout<<"\nThe City Pin Code for the element to delete:
"<<Top→Cpin;
cout<<"\nThe City name of the element
to delete: "<<Top→CName;
     Temp=Top;
     Top=Top→Next;
delete Temp;
    }
}
```

MODEL 1A: Dynamic Stack (Insert – Push)

(1) For the following structure of Books in C++

```
struct Book
{  int Bno;
   char Bname[20];
   Book *Link;
};
```

Given that the following declaration of class BookStack in C++ represents a dynamic stack of Books: (2019)

```
class BookStack
{
Book *Top; //Pointer with address of Topmost Book of Stack
public:
     BookStack( )
    {       Top = NULL;
     }
    void Push( );
         //Function to push a Book into the dynamic stack
    void Pop( );
         //Function to pop a Book from the dynamic stack
    ~BookStack( );
};
```

Write the definition for the member function **void BookStack::Push( )**, that pushes the details of a Book into the dynamic stack of BookStack.

2. Write the definition of a member function PUSHGIFT() for a class STACK in C++, to add a GIFT in a dynamically allocated stack of GIFTs considering the following code is already written as a part of the program: (2017) 4

```
struct GIFT
{  int GCODE;          //Gift Code
   char GDESC[20];     //Gift Description
   GIFT *Link;
};
class STACK
{ Gift *TOP;
public:
    STACK(){TOP=NULL;}
    void PUSHGIFT();
    void POPGIFT();
    ~STACK();
};
```

Ans)

```
void STACK::PUSHGIFT()
{  GIFT *T = new GIFT;
    cin>>T->GCODE;
    gets(T->GDESC);
    T->Link = TOP;
    TOP = T;
}
```

3. Write the definition of a member function push() for a class Library in C++ to insert a book information in a dynamically allocated stack of books considering the following code is already written as a partof the program: (2017MP)4

```
struct book
{ int bookid;
  char bookname[20];
   book *next;
};
class Library
{  book *top;
public:
   Library()
   {  top=NULL;
    }
    void push();
    void pop();
    voiddisp();
    ~Library();
};
```

Ans)

```
void Library::push()
{  book *nptr;
  nptr=new book;
  cout<<"Enter values for bookid and bookname";
  cin>>nptr->bookid;
  gets(nptr->bookname);
  nptr->next=NULL;
  if(top= =NULL)
      top=nptr;
   else
  { nptr->next=top;
    top=nptr;
   }
}
```

4. Write the definition of a member function PUSH() in C++, to add a new book in a dynamic stack of BOOKS considering the following code is already included in the program: (2015) 4

```
struct BOOKS
{ char ISBN[20], TITLE[80];
  BOOKS *Link;
};
class STACK
{  BOOKS *Top;
public:
STACK()
{ Top=NULL;
}
void PUSH();
void POP();
~STACK();
};
```

A)

```
void STACK::PUSH()
{    BOOKS *Temp;
     Temp=new BOOKS;
     gets(Temp>ISBN);
     gets(Temp>TITLE);
     Temp>Link=Top;
     Top=Temp;
}
```

5. Write a function PUSHBOOK( ) in C++ to perform insert operation on a Dynamic Stack, which contains Book_No and Book_Title. Consider the following definition of NODE, while writing your C++ code.(2014)

```
struct NODE
{     int Book_No;
      char Book_Title[20];
      NODE *Next;
};
```

Answer)

```
void POPBook( )
{  NODE *P=new NODE;
   cout<<"Enter Book No, and Book Title";
   cin>>p->Book_No;
   gets(P→Book_Title);
   if(top= = NULL)
  {         p→Next=NULL;
            top=p;
   }
  else
  {  p→Next=top;
     top=p;
   }
}
```

6) Write a function in C++ to perform PUSH operation on a dynamically allocated stack containing real numbers. (D 2006)

```
struct Node
{   float Number ;
    Node *Link ;
};
class STACK
{    Node *Top ;
public :
      STACK( )
      {       Top = NULL;
       }
       void PUSH( ) ;
       void POP( ) ;
       ~STACK( ) ;
} ;
```

Solution:

```
struct Node
{   float Number ;
    Node *Link ;
} ;
class STACK
{     Node *Top ;
public :
      STACK( )
      {      Top = NULL;
       }
       void PUSH( ) ;
       void POP( ) ;
       ~STACK( ) ;
} ;
void STACK::PUSH( )
{   Node *Temp;
    Temp=new Node;
     if(Temp= =NULL)
    { cout<<"\nNo memory to create the  node…";
      exit(1);
    }
    cout<<"\nEnter the Number to be inserted: ";
    cin>>Temp→Number;
    Temp→Link=Top;
    Top=Temp;
}
```

7) Write a function in C++ to perform a **PUSH** operation in a **dynamically allocated stack** considering the following : **(O2005)**

```
struct Node
{            int X,Y ;
             Node *Link ;
} ;
class STACK
{            Node *Top ;
public :
             STACK( )
              {Top = Null ;
               }
             void PUSH( ) ;
              void POP( ) ;
             ~STACK( ) ;
} ;
```

Solution:

```
struct Node
{            int X,Y ;
             Node *Link ;
} ;
```

```
class STACK
{       Node *Top ;
public :
          STACK( )
          {   Top = NULL;
           }
          void PUSH( ) ;
          void POP( ) ;
          ~STACK( ) ;
} ;
void STACK::PUSH( )
{          Node *Temp;
          Temp=new Node;
          if(Temp= =NULL)
          { cout<<"\nNo memory to create the node…";
            exit(1);
          }
          cout<<"Enter the value of X and Y";
          cin>>Temp→X>>Temp→Y;
          Temp→Link=Top;
          Top=Temp;
 }
```

8) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. (MP208-09) (MP209-10)4

Ans)

```
struct NODE
{    float Data;
     NODE *Link;
};
class STACK
{   NODE *Top;
public:
    STACK(  );
    void Push();
    void Pop();
    void Display();
     ~STACK();
};
void STACK::Push()
{   NODE *Temp;
   Temp=new NODE;
   cin>>Temp->Data;
   Temp->Link=Top;
   Top=Temp;
}
```

MODEL 1B: Dynamic Stack (Delete – Pop)

1. Write a function in C++ to delete a node containing Books information ,from a dynamically allocated stack of Books implemented with the help of the following structure: 2019MP4

```
struct Book
{  int BNo;
   char BName[20];
   Book *Next;
};
```

Answer:

```
struct Book
{  int BNo;
  char BName[20];
  Book *Next;
}*temp,*top;
void pop()
{  temp=new Book ;
   temp=top;
   top=top->next;
  delete temp;
}
```

2)Write a function in C++ to delete a node containing Book's information, from a dynamically allocated Stack of Books implemented with the help of the following structure. (D 2007)

```
struct Book
{  int BNo ;
  char BName[20] ;
   Book *Next ;
} ;
```

Solution:

```
struct Book
{    int BNo ;
   char BName[20] ;
   Book *Next ;
} ;
class Stack
{  Book *Top;
public:
  Stack( )
  {      Top = NULL;
  }
  void Push( );
  void Pop( );
   void Display( );
};
void Stack::Pop( )
{ Book *Temp;
  if( Top= = NULL)
     cout<<"Stack Underflow…";
  else
  {cout<<"\nThe Book number of the
      element to delete: "<<Top→BNo;
   cout<<"\nThe Book name of the
     element to delete: "<<Top→BName;
   Temp=Top;
   Top=Top→Next;
   delete Temp;
 }
}
```

3) Give the necessary declaration of a linked implemented stack containing integer type numbers; also write a user defined function in C++ to pop a number from this stack. (1998)

Solution:

```
struct Node
{     float Number;
      Node *Next ;
} ;
class Stack
{     Node *Top;
public:
      Stack( )
    {   Top = NULL;
     }
      void Push( );
      void Pop( );
      void Display( );
};
```

```
void Stack::Pop( )
{    Node *Temp;
     if( Top= = NULL)
       cout<<"Stack Underflow…";
     else
    {cout<<"\nThe Number of the element to delete: "
                 <<Top→Number;
     Temp=Top;
     Top=Top→Next;
    delete Temp;
   }
}
```

MODEL 1D: Stack (Using Arrays)

(1) Write a user-defined function Pop(Book B[ ], int &T), which pops the details of a Book, from the static stack of Book B, at the location T (representing the Top end of the stack), where every Book of the stack is represented by the following structure) : (2019) 4

```
struct Book
{  int Bno;
  char Bname[20];
};
```

2) (2006)

```
class stack
{    int data[10] :
      int top ;
public :
     stack( )
     {       top = - 1;
     }
    void push( ) ; //to push an element into the stack
   void pop( ) ;  //to pop an element from the stack
   void Delete(int ITEM) ;
   //To delete all elements which are equal to ITEM.
 } ;
```

Complete the class with all function definitions. Use another stack to transfer data temporarily.

Solution:

```
void stack::push( )
{   if(top>=9)
          cout<<"Stack Overflow…";
    else
    {  top++;
       cout<<"\nEnter the element to be inserted…";
       cin>>data[top];
    }
}
void stack::pop( )
{ if(top= =-1)
           cout<<"\nStack Underflow";
   else
    {cout<<"\nThe element to be deleted = "<<data[top];
     top--;
    }
}
void stack::Delete(int ITEM)
{  //Dear children, try to complete this function.
}
```

OR

```
void stack::push( )
{ int n;
  cout<<"Enter a value";cin>>n;
  if (top= =10)
         cout<<"Stack Overflow";
else
        data[++top]=n;
}
void stack::pop( )
{   if (top = =-1)
            cout<<"Stack Underflow";
    else
            cout<<data[top--];
}
void stack::Delete(int ITEM);//Ignore this part
```

3) Given the following class, **(2002) 4**

```
char *msg[ ]={"over flow","under flow"};
class Stack
{    int top;          //the stack pointer
     int stk[5];       //the elements
    voiderr_rep(inte_num)
    { cout<<msg[e_enum];          //report error message
     }
public:
     voidinit( )
     {           top=0;
      }                  //initialize the stack pointer
      void push(int); //put new value in stk
      void pop( );      //get the top value.
};
```

Define pop outside the Stack. In your definition take care of under flow condition. Function pop should invoke err_rep to report under flow.

Solution:

```
void Stack::pop( )
{          //Dear children, try to complete this function.
}
```

MODEL 2: Program on Dynamic Queue

1) Write a complete program in C++ to implement a dynamically allocated Queue containing names of Cities.
Ans) (OD2010)4

```
#include <iostream.h>
#include <conio.h>
struct NODE
{  char City[20];
    NODE *Next;
};
class Queue
{   NODE *Rear,*Front;
puplic:
   Queue( )
   {    Rear=NULL;Front=NULL;
   }
   void Qinsert( );
   void Qdelete( );
   void Qdisplay( );
   ~Queue( );
} ;
void Queue::Qinsert( )
{  NODE *Temp;
  Temp=new NODE;
  cout<<"Data:";
  gets (Temp->City);
 Temp->Next=NULL;
  if (Rear==NULL)
  {      Rear=Temp;
         Front=Temp;
  }
else
```

```
  {     Rear–>Next=Temp;
        Rear=Temp;
  }
}
void Queue::Qdelete( )
{ if (Front!=NULL)
   {  NODE *Temp=Front;
      cout<<Front->City<<"Deleted \n";
      Front=Front->Next;
      delete Temp;
      if (Front==NULL)
           Rear=NULL;
    }
   else
     cout<<"Queue Empty..";
}
Queue::Qdisplay( )
{  NODE *Temp=Front;
   while (Temp!=NULL)
   {     cout<<Temp->City<<endl;
         Temp=Temp->Next;
   }
}
Queue:: ~Queue( )   //Destructor Function
{  while (Front!=NULL)
   {    NODE *Temp=Front;
        Front=Front->Next;
        delete Temp;
    }
}
void main( )
{  Queue QU;
   char Ch;
   do
   {
    :
    :
    } while (Ch!='Q');
}
```

2)Define member functions **queins( )** to insert nodes and **quedel ( )** to delete nodes of the **linked list implemented class queue**, where each node has the following structure:

struct node **(2004)**

```
{     char name[20] ;
      int age ;
      node *Link ;
} ;
class queue
{     node *rear, *front ;
public :
     queue( )
     { rear = NULL;
       front = NULL
      };
     void queins( ) ;
     void quedel( ) ;
};
```

Solution:

```
void queue::queins( )
{ node *ptr;
  ptr=new node;
  if(ptr= = NULL)
  { cout<<"\nNo memory to create a new node….";
    exit(1);
  }
cout<<"\nEnter the name….";
gets(ptr→name);
cout<<"\nEnter the age…";
cin>>ptr→age;
ptr→Link=NULL;
if(rear= = NULL)
          front=rear=ptr;
else
   {rear→Link=ptr;
    rear=ptr;
   }
}
void queue::quedel( )
{node *temp;
 if(front= = NULL)
          cout<<"Queue Underflow";
else
   {cout<<"\nThe name of the element to delete: "
                    <<front→name;
cout<<"\nThe age of the element to
delete: "<<front→age;
          temp=front;
          front=front→Link;
          delete temp;
   }
}
```

MODEL 2A: Dynamic Queue (Insert)

1) Write the definition of a member function Q_Insert() for a class Exam_Queue in C++ to insert a new Application information in a dynamically allocated queue whose code is already given below as a part of the program(assume all necessary header files are included in program):

Ans) **(2018 MP) 4**

```
struct Application
{  int App_Id;
   char App_Name[21];
   Application *Link;
};
class Exam_Queue
{  Application *Front, *Rear;
public:
   Exam_Queue( )    //Constructor
   {  Front = Rear = NULL;
    }
   void Q_Insert ( );
   void Q_Delete( );
};
```

Solution:

```
void Exam_Queue::Q_Insert( )
{      Application *Temp;
       Temp = new Application;
       cout<<"Enter the values of App.Id &
                   App.Name\n";
       cin>>Temp→ App_Id;
       gets(Temp→App_Name);
       Temp→Link = NULL;
       if(Front = = NULL)
           Front = Temp;
       else
           Rear→Link = Temp;
        Rear = Temp;
}
```

2) Write a function in C++ to perform Insert operation in a static circular Queue containing Book's information

(represented with the help of any array of structure BOOK) (2012) 4

```
struct BOOK
{longAccno; //Book Accession Number
 char Title [20] //Book Title
};
Ansconstint Max = 10;
void insert(Book B[], int&a, int F)
{if ( (R+l) %Max! =F)
 {  R= (R+l) %Max;
    cin>>B [R] . Accno;
//cin>>B[R].Title OR cin.getline(B[R] .Title,20); OR
   gets(B[R].Title) ;
 }
else
  cout<<"Queue Full";
}
```

OR

```
constintmax =10;
void insert( long newAC, char newTitle[], Book B [],
                        int&F,int&R)
{ if ( (F = 0 && R=max-l) II (F=R+l))
        cout<<"Queue Overflow";
  else
  { if (R -1)
       F=0; R=0;
    else if (R = max-i)
       R = 0;
     else
       R = R + 1;
      B[R].Accno = newAC;//oRcin>>B[R].Accno;
      strcpy(B[R].Title, newTitle);
      // OR gets(B[R].Title); OR cin>>B[R].Title OR
      //cin.getline(B[R].Title,20) ;
   }
}
```

3) Write a function QUEINS( ) in C++ to insert an element in a dynamicallyallocated Queue containing nodes of the following given structure: **(D 2009)**4

```
struct Node
{   intPId ;                //Product Id
    charPname [20] ;
   NODE *Next ;
} ;
```

Ans)

```
class Queue
{  Node *Front, *Rear;
public:
   QUEUE( )//Constructor to initia1ize Front and Rear
   {    Front = NULL;
        Rear = NULL;
    }
    void QUEINS( );  //Function to insert a node
    void QUEDEL( ); //Function to de1ete a node
    void QUEDISP( );//Function to disp1ay nodes
    ~Queue( ); //Destructor to de1ete a11 nodes
} ;
void Queue::QUEINS( )
{ Node *Temp;
  Temp = new Node;
  cin>>Temp->PId;
  gets(Temp->Pname);
              //Or cin>>Temp->Pname;
             //cin.get1ine(Temp->Pname);
  Temp->Next = NULL;
   if (Rear = = NULL)
   { Front = Temp;
     Rear = Temp;
   }
   e1se
   {  Rear->Next = Temp;
      Rear = Temp;
   }
}
```

OR

```
void QUEINS (Node *&Front, Node *&Rear)
{  Node *Temp = new Node;
   cin>>Temp->PId;
   gets (Temp->Pname);
              //or cin>>Temp->Pname;
               //cin.get1ine(Temp->Pname);
   Temp->Next = NULL;
   if(Rear == NULL)
         Front = Temp;
    e1se
         Rear -> Next = Temp;
    Rear = Temp;
}
```

4) Write a function in C++ to **insert** an element into a **dynamically allocated Queue** where each node contains a name (of type string) as data. **(D 2008) (OD2006) (2000)** Assume the following definition of THENODE for the same.

```
struct THENODE
{  char Name[20];
   THENODE *Link;
};
```

Solution:

```
struct THENODE
{   char Name[20];
   THENODE *Link;
};
class Queue
{    THENODE *front,*rear;
public:
     Queue( )
    {front = rear = NULL;
    }
    void Insert( );
    void Delete( );
    void Display( );
};
void Queue::Insert( )
{    THENODE *ptr;
     ptr=new THENODE;
     if(ptr= = NULL)
     { cout<<"\nNo memory to create a new node….";
       exit(1);
      }
     cout<<"\nEnter the name….";
     gets(ptr→Name);
     ptr→Link=NULL;
     if(rear= = NULL)
           front=rear=ptr;
     else
      {    rear→Link=ptr;
           rear=ptr;
      }
}
```

5) Consider the following portion of a program, which implements passengers Queue for a train. Write the definition of function. **Insert** (whose prototype is shown

below); to insert a new node in the queue with required information. **(2003)**

```
struct NODE
{     long Ticketno;
      char  PName[20];//Passengers Name
      NODE * Next;
};
classQueueoftrain
{       NODE * Rear, * Front;
public :
      Queueoftrain( )
     { Rear = NULL;
       Front = NULL:
     }
     void Insert( );
     void Delete( );
    ~Queueoftrain( );
} ;
```

Solution:

```
voidQueueoftrain::Insert( )
{  NODE *ptr;
   ptr=new NODE;
   if(ptr= = NULL)
   {     cout<<"\nNo memory to create a  new node….";
         exit(1);
    }
   cout<<"\nEnter the Ticket Number….";
   cin>>ptr→Ticketno;
  cout<<"\nEnter the Passenger Name..";
  gets(ptr→PName);
  ptr→Next=NULL;
   if(rear= = NULL)
     front=rear=ptr;
  else
   {    rear→Next=ptr;
        rear=ptr;
   }
}
```

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

Ans) **(MP108-09)(MP109-10)4**

```
struct NODE
{   char Name[20];
   NODE *Link;
};
class QUEUE
{    NODE *R,*F;
public:
    QUEUE();
    void Insert();
    void Delete();
};
void QUEUE::Insert()
{  NODE *Temp;
  Temp=new NODE;
  gets(Temp->Name);
  Temp->Link=NULL;
   if (Rear==NULL)
  { Rear=Temp;
    Front=Temp;
   }
   else
  {   Rear->Link=Temp;
      Rear=Temp;
   }
}
```

MODEL 2B: Dynamic Queue (Delete)

1) Write the definition of a member function AddPacket( ) for a class QUEUE in C++, to remove/delete a Packet from a dynamically allocated QUEUE of Packets considering the following code is already written as a part of the program. 2018 (4)

(Note: In the given problem, we should write a function to remove/delete a packet with function name

AddPacket())

```
struct Packet
{    int PID;
     char Address[20];
     Packet *LINK;
};
class QUEUE
{       Packet *Front, *Rear;
public:
       QUEUE( )
       {      Front = NULL;
              Rear = NULL;
        }
       void AddPacket( );
       void DeletePacket( );
       ~QUEUE( );
};
```

Answer:

```
void QUEUE::AddPacket()
{if( Front !=NULL)
  {   Packet *T = Front;
      cout<<Front →  PID<<Front→ Address<<" is
              removed"<<endl;
 //OR cout<<T->PID<<T->Address<<" removed"<<endl;
     Front= Front→LINK;
     delete T;
     if(Front = = NULL)
     {  Rear=NULL;
     }
 }
else
   cout<<"Queue Empty"<<endl;
}
```

2. Write the definition of a member function DELETE() for a class QUEUE in C++, to remove a product from a dynamically allocated Queue of products considering the following structure.

(2016) (2013) (2011 OD) (OD 2009) (OD 2007) 4

```
struct PRODUCT
{   int PID;
    char PNAME[20];
    PRODUCT *Next;
};
```

A)

```
class QUEUE
{  PRODUCT *R,*F;
public:
   QUEUE()
   {R=NULL;
    F=NULL;
   }
   void INSERT();
   void DELETE();
   ~QUEUE();
};
```

```
void QUEUE::DELETE()
{ if( F!=NULL)
  { PRODUCT *T = F;
    cout<<T → PID<<T→ PNAME;
    F= F→ Next;
    delete T;
    if(F==NULL)
    {    R=NULL;
    }
  }
  else
     cout<<"Queue Empty";
}
```

3) Write a function in C++ to perform a DELETE operation in a dynamically allocated queue considering the following description : (OD 2008) (1999) (OD2005)4

```
struct Node
{   float U, V ;
    Node *Link ;
} ;
class QUEUE
{    Node *Rear, *Front ;
public :
    QUEUE( )
    {  Rear = NULL;
       Front = NULL;
    }
    void INSERT( ) ;
    void DELETE( ) ;
   ~ QUEUE( ) ;
} ;
```

Solution:

```
void Queue::DELETE( )
{  NODE *temp;
   if(front= = NULL)
          cout<<"\nQueue Underflow";
   else
  {cout<<"\nThe value of U  of the element to delete: "
                <<Front→U;
    cout<<"\nThe value of V of the element to delete: "
                <<Front→V;
    temp=Front;
   Front=Front→Link;
   delete temp;
 }
}
```

MODEL 2D: Queue (Using Arrays)

1. Write the definition of a member function Ins_Player() for a class CQUEUE in C++, to add a Player in a statically allocated circular queue of PLAYERs considering the following code is already written as a part of the program: 2019MP4

```
struct Player
{ long Pid;
  char Pname[20];
};
const int size=10;
class CQUEUE
{    Player Ar[size];
      int Front, Rear;
public:
    CQUEUE( )
   { Front = -1;
     Rear=-1;
    }
void Ins_Player(); // To add player in a static circular queue
void Del_Player();
                // To remove player from a static circular queue
void Show_Player();        // To display static circular queue
};
```

Answer:

```
void  CQUEUE : : Ins_Player( )
{ if ((Front==0 && Rear==size-1) || (Front==Rear+1))
   {  cout<< "Overflow";
      return;
    }
   else if(Rear = = -1)
   { Front=0;
     Rear=0;
   }
   else if(Rear= =size-1)
   { Rear=0;
   }
   else
   { Rear++;
   }
   cout<< "Enter Player Id=";
   cin>>Ar[Rear].Pid;
   cout<< "Enter Player Name=";
   gets(Ar[Rear].Pname);
}
```

2) (D 2006)

```
class queue
{  int data[10] ;
   int front, rear;
public :
   queue( )
   {   front = - 1;
       rear = - 1 ;
    }
   void add( );    //to add an element into the queue
   void remove( );  //to remove an element from the queue
   void Delete(int ITEM( );
                //to delete all elements which are equal to ITEM
};
```

Complete the class with all function definitions for a circular array Queue. Use another queue to transfer data temporarily.

Solution:

```
void queue::add( )
{if ((front= = 0 && rear = = 9) | | (front= =rear+1))
      cout<<"\nQueue Overflow";
 else if (rear= = -1)
 {   front=rear=0;
     cout<<"\nEnter the element to be inserted";
     cin>>data[rear];
  }
  else if(rear= =9)
  {   rear=0;
     cout<<"\nEnter the element to be inserted";
     cin>>data[rear];
   }
   else
  {   rear++;
      cout<<"\nEnter the element to be inserted";
      cin>>data[rear];
  }
 }
```

```
void queue::remove( )
{    if(front= = -1)
            cout<<"\nQueue Underflow…";
     else
    {cout<<"\nThe element to be deleted" <<data[front];
     if(front= =rear)
            front=rear=-1;
     else if (front= =9)
            front=0;
     else
            front++;
     }
}
void queue::Delete(int ITEM )
{//Children, try to complete this function.
}                OR
void queue::add( )
{ if ( (rear + 1) % 10 != front )
  { if (rear == -1 )
      front = rear = 0 ;
    else
      rear = (rear + 1) %10;
   cin>>data[rear];
  }
 else
    cout<<"Queue full !! Overflow Error !!\n";
}
void queue::remove( )
{  if (front != -1)
  { cout<<data[front]<<" deleted ";
     if(front==rear)
        front=rear=-1;
     else
        front = (front+1)%10;
  }
  else
    cout<<"Queue empty ! Underflow Error!!\n";
}
                                OR
void queue::add( )
{if ( (rear + 1) % 10 != front )  //Ignoring –1 initial values
  {rear = (rear + 1) %10;
   cin>>data[rear];
  }
  else
      cout<<"Queue full !! Overflow Error !!\n";
}
void queue::remove()
{if (front != rear)                    //Ignoring –1 initial values
 {front = (front+1)%10;
  cout<<data[front]<<" deleted…";
 }
else
   cout<<"Queue empty ! Underflow Error!!\n";
}                                OR
void queue::add( )
{int item;
 if ((front==0 && rear==9) || front==rear+1))
       cout<<"\nQueue overflow error";
 else
 {   cout<<"\nEnter an item to add : ";
     cin>>item;
      if(front==-1)
      {         front=0;rear=0;
       }
   else
        rear=rear+1;
   if(rear==10)
        rear=0;
  data[rear]=item;
 }
}                        OR
void queue::remove( )
{   if((front = =-1 )
       cout<<"\nQueue Underflow Error";
    else
    {   int item=data[front];
        if(front==rear)
             front=rear=-1;
       else if(front==9)
            front=0;
       else
            front=front+1;
       cout<<"\nDeleted item is : "<<item;
    }
}
```

MODEL 3: Evaluate the Postfix Notation using Stack

1) Evaluate the following Postfix expression, showing the stack contents. (2019)

250, 45, 9, /, 5, +, 20, *, -

2.Evaluate the following Postfix expression :

4,10,5,+,*,15,3,/,- 2019SP2

Answer: 55

3. Evaluate the following POSTFIX expression. Show the status of Stack after execution of each operation separately:

TRUE, FALSE, OR, NOT, TRUE, FALSE, AND, OR (2018 MP)

S. No.	Element Scanned	Operation	Stack Status
1	True	Push (True)	True
2	False	Push (False)	True, False
3	OR	Pop(False) Pop(True) OR(True, False)=True Push (True)	True
4	NOT	Pop(True) NOT(True)=False	False
5	True	Push (True)	False, True
6	False	Push (False)	False, True, False
7	AND	Pop(False) Pop(True) AND(False, True)=False Push False	False, False
8	OR	Pop(False) Pop(False) OR(False, False)=False	False

The result is **False**

4. Evaluate the following POSTFIX expression. Show the status of Stack after execution of each operation separately: 45, 45, +, 32, 20, 10, /, -,* (2017MP) 2

Ans) 2700

Element Scanned	Stack Status
45	45
45	45, 45
+	90
32	90, 32
20	90,32,20
10	90,32,20,10
/	90,32,2
-	90,30
*	2700

5. Evaluate the following postfix expression. Show the status of stack after execution of each operation separately. (2014) 2

T,F,NOT,AND,T,OR,F,AND

Symbol	Operation	Stack
T	PUSH	T
F	PUSH	T,F
NOT	Pop One Element Apply NOT	T,T
AND	Pop Two Elements. Apply AND	T
T	PUSH	T,T
OR	Pop Two elements. Apply OR	T
F	PUSH	T,F
AND	Pop two elements. Apply AND	F

6. Evaluate the following postfix expression. Show the status of stack after execution of each operations: 5,2,*,50,5,/,5,-,+ (2013)

Element Scanned	STACK
5	5
2	5,2
*	10
50	10,50
5	10,50,5
-	10,45
+	55

7) Evaluate the following POSTFIX notation. Show status of Stack after every step of evaluation (i.e. after each operator): (2012) 2

True, False, NOT, AND, False, True, OR, AND

Element Scanned	Stack Status
True	True
False	True, False
NOT	True, True
AND	True
False	True, False
True	True, False, True
OR	True, True
AND	True

Final Answer: True

8. Evaluate the following postfix notation of expression: (2011 OD) 2

True, False, NOT, AND, True, True, AND,OR

Element Scanned	STACK Status
True	TRUE
False	TRUE, FALSE
NOT	TRUE, TRUE
AND	TRUE
True	TRUE, TRUE
True	TRUE, TRUE, TRUE
AND	TRUE, TRUE
OR	TRUE

Final Result: TRUE

9. Evaluate the following postfix notation of expression: (Show status of Stack after each operation) (D 2010)2

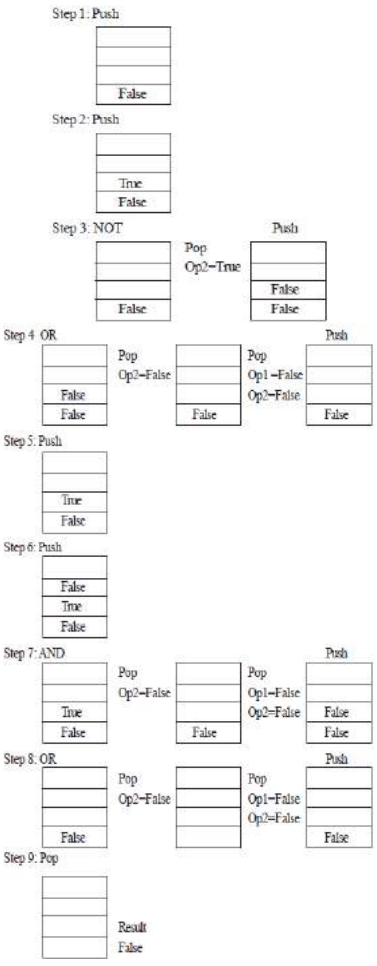
False, True, NOT, OR, True, False, AND, OR

Ans.

Element Scanned	Stack
False	False
True	False, True
NOT	False, False
OR	False
True	False, True
False	False, True, False
and	False, False
OR	False

RESULT = False

OR



10) Evaluate the following postfix notation of expression: (Show status of Stack after each operation) **(OD 2010)**2
True, False, NOT, OR, False, True, OR, AND

Element Scanned	Stack Content
True	True
False	True, False
NOT	True, True
OR	True
False	True, False
True	True, False, True
OR	True, True
AND	True

11) Evaluate the following postfix notation of expression (Show status of stack after execution of each operation):
4, 10, 5, +, *, 15, 3, /, - (D2008)2
Result : 55

12)Evaluate the following **postfix** notation of expression (Show status of stack after execution of each operations):
5, 20, 15, -, *,25, 2, *, + (OD2008)2
Ans)

Operator Scanned	Stack Content
5	5
20	5, 20
15	5, 20,15
-	5, 5
*	25
25	25, 25, 2
2	25, 25, 2
*	25, 50,
+	75

13)Evaluate the following **postfix** notation of expression:2
25 8 3 - / 6 * 10 + (D 2007)

Operator Scanned	Stack Content
25	25
8	25, 8
3	25, 8, 3
-	25, 5
/	5
6	5, 6
*	30
10	30, 10
+	40

14)Evaluate the following **postfix** notation of expression :
15 3 2 + / 7 + 2 *
Ans) (OD2007)2

Operator Scanned	Stack Content
15	15
3	15, 3
2	15, 3, 2
+	15, 5
/	3
7	3, 7
+	10
2	10, 2
*	20

15) Evaluate the following postfix notation of expression :
10 20 + 25 15 - * 30 / (O2005)

Operand/Operator	Stack Status
10	10
20	10,20
+	30
25	30,25
15	30,25,15
-	30,10
*	300
30	300,30
/	10

Ans) Result : 10

16) Evaluate the following **postfix** notation of expression :
20 10 + 5 2 * - 10 / (OD2005)
Ans)

20	20
10	20,10
+	30
5	30,5
2	30,5,2
*	30,10
-	20
10	20,10
/	2

Result : 2

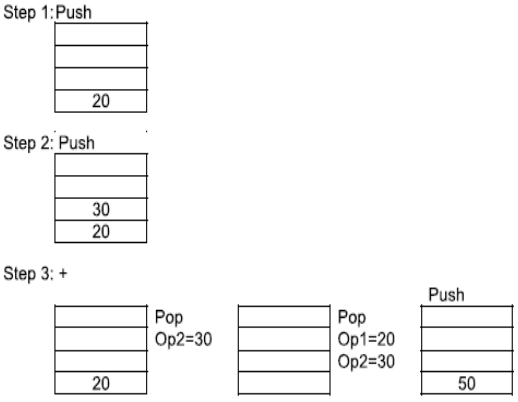
17)Evaluate the following **postfix** expression using a stack and show the contents of stack after execution of each operation: 20, 45, +, 20, 10, -, 15, +, * **(2003)**
Ans) Children, Try this answer as an assignment.

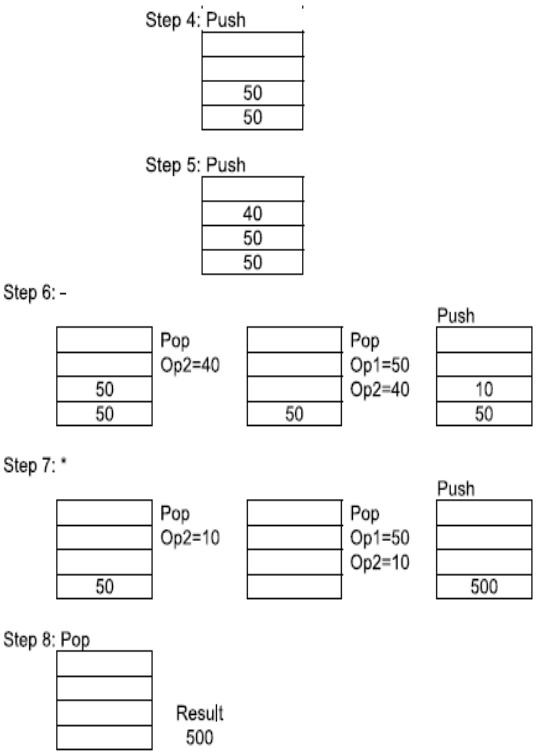
18)Evaluate the following **postfix** expression using a stack. Show the contents of stack after execution of each operation: 20, 8, 4, /, 2, 3, +, *, - **(2000)**
Ans) Children, Try this answer as an assignment.

19) Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation. **5,11,-,6,8,+,12,*,/ (1999)**
Ans) Children, Try this answer as an assignment.

20) Evaluate the following **postfix** expression using a stack and show the contents of stack after execution of each operation: **50, 40, +, 18, 14, -, 4, *, + (1998)**
Ans) Children, Try this answer as an assignment.

21) Evaluate the following postfix notation of expression:2
20, 30, +, 50, 40, - ,* (MP109-10)





22) Evaluate the following postfix notation of expression:
True, False, AND, True, True, NOT, OR, AND
Ans) False (MP208-09) (MP209-10)2

23) Evaluate the following postfix notation of expression:
20,30,+,50,40,-,* **(MP108-09)** 2
Ans) 500

MODEL 4: Convert infix expression to postfix expression

1) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion: (2019)

A + B * C ^ D - E

2. Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. 2019MP2

A/B+C*(D-E)

Element	Stack	Postfix
A		A
/	/	A
B	/	AB
+	+	AB/
C	+	AB/C
*	+*	AB/C
(	+*(	AB/C
D	+*(	AB/CD
-	+*(-	AB/CD
E	+*(-	AB/CDE
)	+*	AB/CDE-
	+	AB/CDE-*
		AB/CDE-*+

3. Convert the following infix expression to the equivalent Postfix expression, showing the stack contents for each step of conversion:
U * V + (W – Z) / X (2018)

((U * V) + ((W - Z) / X))

INFIX	STACK	POSTFIX
U		U
*	*	U
V	*	UV
)		UV*
+	+	UV*
W		UV*W
-	+ -	UV*W
Z	+ -	UV*WZ
)	+	UV*WZ-
/	+ /	UV*WZ-
X	+ /	UV*WZ-X
)	+	UV*WZ-X/
)		UV*WZ-X/+

OR

U * V + (W - Z) / X

INFIX	STACK	POSTFIX
U		U
*	*	U
V	*	UV
+	+	UV*
(	+(	UV*
W	+(	UV*W
-	+(-	UV*W
Z	+(-	UV*WZ
)	+	UV*WZ-
/	+/	UV*WZ-
X	+/	UV*WZ-X
		UV*WZ-X/+

4. Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion: (2017)2
X - (Y + Z) / U * V

ELEMENT	Stack	POSTFIX
X		X
-	-	X
(	-(	X
Y	-(	XY
+	-(+	XY
Z	-(+	XYZ
)	-	XYZ+
/	-/	XYZ+
U	-/	XYZ+U
*	-*	XYZ+U/
V	-*	XYZ+U/V
		XYZ+U/V*-

OR

X-(Y+Z)/U*V = (X-(((Y+Z)/U)*V))

ELEMENT	Stack	POSTFIX
(		
X		X
-	-	
(		
(		
(		
Y		XY
+	- +	
Z		XYZ
)	-	XYZ+
/	-/	
U		XYZ+U
)	-	XYZ+U/
*	-*	
V		XYZ+U/V
)		XYZ+U/V*
)		XYZ+U/V*-

Postfix= XYZ+U/V*-

5. Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. (2016) 2

P/(QR)*S+T

P/(Q-R)*S+T = (P / (Q-R) * S + T)

Element	Stack of Operators	Postfix Expression
(	(	
P	(	P
/	(/	P
(	(/(	P
Q	(/(	PQ
-	(/(-	PQ
R	(/(-	PQR
)	(/	PQR-
*	(*	PQR-/
S	(*	PQR-/S
+	(+	PQR-/S*
T	(+	PQR-/S*T
)		PQR-/S*T+

= PQR-/S*T+

OR

P/(Q-R)*S+T = (((P / (Q-R)) * S) + T)

Element	Stack of Operators	Postfix Expression
(		
(		
(		
P		P
/	/	
(		
Q		PQ
-	/-	
R		PQR
)	/	PQR-
)		PQR-/
*	*	
S		PQR-/S
)		PQR-/S*
+	+	
T		PQR-/S*T
)		PQR-/S*T+

= PQR-/S*T+

6.Convert the following infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. (2015)

Ans) **U * V + R/ (ST)**

U * V + R/ (S-T)
= ((U * V)+(R/(S-T)))

Element	Stack	Postfix
(		
(		
U		U
*	*	
V		UV
)		UV*
+	+	
(		
R		UV*R
/	+/	
(		
S		UV*RS
-	+/-	
T		UV*RST
)		UV*RST-
)		UV*RST-/
)		UV*RST-/+

OR

Element	Stack	Postfix
U		U
*	*	U
V	*	UV
+	+	UV*
R	+	UV*R
/	+/	UV*R
(	+/(	UV*R
S	+/(	UV*RS
-	+/(-	UV*RS
T	+/(-	UV*RST
)	+/	UV*RST-
	+	UV*RST-/
		UV*RST-/+

7) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: X–Y /(Z + U) * V (D2009)2

Ans) X - Y / (Z + U) * v = (X - ((Y / (Z + U)) * v))

Element Scanned	Stack	Postfix
(		
X		X
-	-	
(		
(		
Y		XY
/	-/	
(		
Z		XYZ
+	-/+	
U		XYZU
)	-/	XYZU+
)	-	XYZU+/
*	-*	
V		XYZU+/V
)	-	XYZU+/V*
)		XYZU+/V*-

OR

Element Scanned	Stack	Postfix
(	(	
X	(	X
-	(-	X
Y	(-	XY
/	(-/	XY
(	(-/(	XY
Z	(-/(	XYZ
+	(-/(+	XYZ
U	(-/(+	XYZU
)	(-/	XYZU+
*	(-*	XYZU+/
V	(-*	XYZU+/V
)		XYZU+/V*-

8) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: A + B * (C – D) / E (OD2009)2

Ans) A + B * (C - D) / E = (A+ ((B* (C-D)) / E))

Element Scanned	Stack	Postfix
(		
A		A
+	+	
(		
(		
B		AB
*	+*	
(		
C		ABC
-	+*-	
D		ABCD
)	+*	ABCD-
)	+	ABCD-*
/	+/	
E		ABCD-*E
)	+	ABCD-*E/
)		ABCD-*E/+

OR

Element Scanned	Stack	Postfix
(	(	
A	(	A
+	(+	A
B	(+	AB
*	(+*	AB
(	(+*(	AB
C	(+*(	ABC
-	(+*(-	ABC
D	(+*(-	ABCD
)	(+*	ABCD-
/	(+/	ABCD-*
E	(+/	ABCD-*E
)		ABCD-*E/+

9) Obtain the postfix notation for the following infix notation of expression showing the contents of the stack and postfix expression formed after each step of conversion : (P—Q)/(R*(S—T)+U)(2004)

Ans) ((P-Q)/((R*(S-T))+U))

S No	Symbol Scanned	Stack	Expression Y
1	(	(	
2	(	((	
3	P	((	P
4	-	((-	P
5	Q	((-	P Q
6	)	(	P Q -
7	/	(/	P Q -
8	(	(/ (	P Q -
9	(	(/ ((	P Q -
10	R	(/ ((	P Q - R
11	*	(/ ((*	P Q - R
12	(	(/ ((* (	P Q - R
13	S	(/ ((* (	P Q - R S
14	-	(/ ((* (-	P Q - R S
15	T	(/ ((* (-	P Q - R S T
16	)	(/ ((*	P Q - R S T -
17	)	(/ (	P Q - R S T - *
18	+	(/ (+	P Q - R S T - *
19	U	(/ (+	P Q - R S T - * U
20	)	(/	P Q - R S T - * U +
21	)		P Q - R S T - * U + /

Postfix Form: **PQ-RST-*U+/**

9)Write an algorithm to convert an infix expression to postfix expression. (2001)

Ans) The following algorithm transforms the infix expression X into its equivalent postfix expression Y. The algorithm uses a stack to temporarily hold operators and left parentheses. The postfix expression Y will be constructed from left to right using the operands from X and the operators which are removed from STACK. We begin by pushing a left parenthesis onto STACK and adding a right parenthesis at the end of X. The algorithm is completed when STACK is empty.

Algorithm:

Suppose X is an arithmetic expression written in infix notation. This algorithm finds the equivalent postfix expression Y.

1. Push "(" onto STACK, and add ")" to the end of X.
2. Scan X from left to right and REPEAT Steps 3 to 6 for each element of X UNTIL the STACK is empty.
3. If an operand is encountered, add it to Y.
4. If a left parenthesis is encountered, push it onto STACK.
5. If an operator is encountered, then:
   (a) Repeatedly pop from STACK and add to Y each operator(on the top of STACK) which has the same precedence as or higher precedence than operator.
   (b) Add operator to STACK.
   /* End of If structure */
6. If a right parenthesis is encountered, then:
   (a) Repeatedly pop from STACK and add to Y each operator (on the top of STACK) until a left Parenthesis is encountered.
   (b) Remove the left parenthesis. (Do not add the left parenthesis to Y).
   /* End of If structure */
7. End.

MODEL 5: Write the equivalent infix expression

1) Write the equivalent infix expression for
a, b, AND, a, c, AND, OR. (D 2006)

Ans) a, b, AND, a, c, AND, OR
(a AND b), (a AND c), OR
(a AND b) OR (a AND c)

S.No.	Element scanned	Operation	Infix Expression
1	A	Push a	a
2	B	Push b	a, b
3	AND	Pop, Pop, Push (a AND b)	a AND b
4	A	Push a	a AND b, a
5	C	Push c	a AND b, a, c
6	AND	Pop, Pop, Push(aANDc)	a AND b, a AND c
7	OR	Pop, Pop, a AND b OR a AND c	Push (a AND b OR a AND c

2) Write the **equivalent infix** expression for
10, 3, *, 7, 1, --,*, 23, + (OD2006)

Solution: 10, 3, *, 7, 1, - , *, 23, +
This is in Postfix form
(ie Operator will come after the operand(s));.
Infix form means Operator must come in between the operands. 10, 3, *, 7, 1, - , *, 23, +

Prefix: 10 * 3, 7 – 1,*,23,+
(10 * 3) * (7 – 1),23,+
(10 * 3) * (7 – 1) + 23
(Infix form)
OR
10*3*(7-1)+23

3) Change the following **infix expression into postfix** expression. (A+B)*C+D/E-F **(2002)** 3
Ans) Children, Try this answer as an assignment.

11.DATA BASE CONCEPTS (2M)

Model 1:For a given table, key/cardinality/ etc

1. Observe the following table and answer the parts(i) and(ii) accordingly . 2019SP2

Table:Product

Pno	Name	Qty	PurchaseDate
101	Pen	102	12-12-2011
102	Pencil	201	21-02-2013
103	Eraser	90	09-08-2010
109	Sharpener	90	31-08-2012
113	Clips	900	12-12-2011

Answer: (i) Write the names of most appropriate columns, which can be considered as candidate keys.

Ans) Candidate Key: Pno, Name

(ii) What is the degree and cardinality of the above table?

Ans) Degree:4 Cardinality:5

2) Observe the following tables VIDEO and MEMBER carefully and write the name of the RDBMS operation out of (i) SELECTION (ii) PROJECTION (iii) UNION (iv) CARTESIAN PRODUCT, which has been used to produce the output as shown below. Also, find the Degree and Cardinality of the final result. 2018

TABLE: VIDEO

VNO	VNAME	TYPE
F101	The Last Battle	Fiction
C101	Angels and Devils	Comedy
A102	Daredevils	Adventure

TABLE : MEMBER

MNO	MNAME
M101	Namish Gupta
M102	Sana Sheikh
M103	Lara James

TABLE : FINAL RESULT

VNO	VNAME	TYPE	MNO	MNAME
F101	The Last Battle	Fiction	M101	Namish Gupta
F101	The Last Battle	Fiction	M102	Sana Sheikh
F101	The Last Battle	Fiction	M103	Lara James
C101	Angels and Devils	Comedy	M101	Namish Gupta
C101	Angels and Devils	Comedy	M102	Sana Sheikh
C101	Angels and Devils	Comedy	M103	Lara James
A102	Daredevils	Adventure	M101	Namish Gupta
A102	Daredevils	Adventure	M102	Sana Sheikh
A102	Daredevils	Adventure	M103	Lara James

Ans) Cartesian Product

Degree = 5 Cardinality = 9

3. Observe the following table MEMBER carefully and write the name of the RDBMS operation out of (i) SELECTION (ii) PROJECTION (iii) UNION (iv) CARTESIANPRODUCT, which has been used to produce the output as shown in RESULT. Also, find the Degree and Cardinality of the RESULT. (2017)

MEMBER

No	MNAME	STREAM
M001	JAYA	SCIENCE
M002	ADITYA	HUMANITIES
M003	HANSRAJ	SCIENCE
M004	SHIVAK	COMMERCE

TABLE : RESULT

NO	MNAME	STREAM
M002	ADITYA	HUMANITIES

Ans) (i) SELECTION

Degree=3 Cardinality=1

4. Observe the table 'Club' given below: (2017MP)

CLUB

Member_id	Member_Name	Address	Age	Fee
M001	Sumit	New Delhi	20	2000
M002	Nisha	Gurgaon	19	3500
M003	Niharika	New Delhi	21	2100
M004	Sachin	Faridabad	18	3500

i. What is the cardinality and degree of the above given table?

ii. If a new column contact_no has been added and three more members have joined the club then how these changes will affect the degree and cardinality of the above given table.

A) i. Cadinality: 4 Degree: 5

ii. Cardinality: 7 Degree: 6

5.The following STUDENTS and EVENTS tables carefully and write the name of the RDBMS operation which will be used to produce the output as shown in LIST ? Also, find the Degree and Cardinality of the LIST. (2016 D)

STUDENTS

NO	NAME
1	Tara Mani
2	Jaya Sarkar
3	Tarini Trikha

EVENTS

EVENTCODE	EVENTNAME
1001	Programming
1002	IT Quiz

LIST

NO	NAME	EVENTCODE	EVENTNAME
1	Tara Mani	1001	Programming
1	Tara Mani	1002	IT Quiz
2	Jaya Sarkar	1001	Programming
2	Jaya Sarkar	1002	IT Quiz
3	Tarini Trikha	1001	Programming
3	Tarini Trikha	1002	IT Quiz

A) **Cartesian Product**

Degree = 4 Cardinality = 6

6) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key. (2015)

Code	Item	Qty	Price	Transaction Date
1001	Plastic Folder 14"	100	3400	2014-12-14
1004	Pen Stand Standard	200	4500	2015-01-31
1005	Stapler Mini	250	1200	2015-02-28
1009	Punching Machine Small	200	1400	2015-03-12
1003	Stapler Big	100	1500	2015-02-02

Ans) Candidate keys : Code, Item

Primary keys : Code

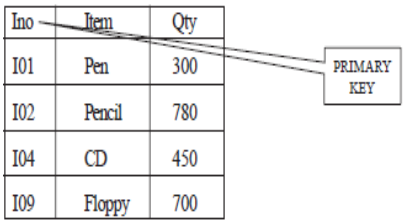
MODEL 2: THEORY QUESTION

KEYS

1) What do you understand by Primary Key? Give a suitable example of Primary Key from a table containing some meaningful data. (OD 2010) 2

Ans. An attribute or set of attributes which are used to identify a tuple uniquely is known as Primary Key.

Table: Item



2) What is the importance of a primary key in a table? Explain with suitable example. (OD 2007)

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:

a)AdmnNo

b)FirstName,LastName,SirName

c)FirstName,LastName,FName, etc.

We can set any one of the above candidate keys as primary key, others are called as alternate keys.

3) Give a suitable example of a table with sample data and illustrate Primary and Candidate Keys in it. (2012 D)

Ans A table may have more than one such attribute/group of attribute that identifies a row/tuple uniquely, all such attribute(s) are known as Candidate Keys. Out of the Candidate keys, one is selected as Primary Key.

Ex: Table: Stock

Ino	Item	Qty
101	Pen	560
102	Pencil	780
104	CD	450
109	Floppy	700
105	Eraser	300
103	Duster	200

Here: Ino – Primary Key
Ino, Item – Candidate Keys,

4) Give a suitable example of a table with sample data and illustrate Primary and Alternate Keys in it. (2012OD)

Ans A table may have more than one such attribute/group of attribute that Identifies a row/tuple uniquely, all such attribute(s} are known as Candidate Keys. Out of the Candidate keys, one is selected as Primary Key. while the rest are the Alternate Keys.

Ex: Table: Stock

Ino	Item	Qty
101	Pen	560
102	Pencil	780
104	CD	450
109	Floppy	700
105	Eraser	300
103	Duster	200

Here: Ino, Item – Candidate Keys,
Ino – Primary Key
Item – Alternate Key

Explain the concept of candidate key with the help of an appropriate example. (2013)(2010D)(D2009)

5) What is the purpose of a key in a table? Give an example of a key in a table. (OD 2009)

Ans) An attribute/group of attributes in a table that identifies each tuple uniquely is known as a Key.

OR

Any correct definition of Key / Primary Key / Candidate Key / Alternate Key

Table:Item

Ino	Item	Qty
I01	Pen	560
I02	Pencil	780
I04	CD	450
I09	Floppy	700
I05	Eraser	300
I03 Duster	200	

Key

6) Differentiate between Candidate key and Primary key in context of RDBMS. (D2008)
Differentiate between Candidate Key and alternate Key in context of RDBMS. (OD 2008)
Differentiate between primary key and alternate key. (D2007)
What is an alternate key? (D2006)
What do you understand by the terms primary key and degree of a relation in relational data base? (D2005)
What do you understand by the candidate key and cardinality of a relation in relational data base? (OD 2005)
What is primary key in a table? (2003)

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.

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.)

Table: Stock

Ino	Item	Qty
101	Pen	560
102	Pencil	780
104	CD	450
109	Floppy	700
105	Eraser	300
103	Duster	200

Here: Ino, Item – Candidate Keys,
Ino – Primary Key
Item – Alternate Key

7) What is a relation? What is the difference between a tuple and an attribute? (1998)

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.

8) What do you understand by Degree and Cardinality of a table? (MP109-10) (MP108-09)2

Ans) Degree: Number of Columns in a table
Cardinality: Number of rows in a table

Ex: TABLE : MEMBER

MNO	MNAME
M101	Namish Gupta
M102	Sana Sheikh
M103	Lara James

Here, Cardinality = 3, Degree = 2

What do you understand by the candidate key and cardinality of a relation in relational data base? (OD 2005)

OPERATIONS

9. Explain the concept of Cartesian Product between tables, with the help of appropriate example. (2014)(2001)

Answer) Cartesian Product (binary operator): It operates on two relations and is denoted by X.

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.

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.

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

Resultant Relation = Relation1 X Relation2

The resulting relation contains all possible combinations of tuples of the two relations.

10) What do you understand by Union & Cartesian Product operations in relational algebra?(2011D)2

Ans) Union (binary operator): It operates on two relations and is indicated by U.
For example, R= R1 U R2 represents union operation between two relations R1 and R2. The degree of R is equal to degree of R1. The cardinality of R is sum of cardinality of R1 and cardinality of R2.
Following have to be considered for the operation R1 U R2.

Degree of R1 = Degree of R2
jth attribute of R1 and jth attribute of R2 must have a common domain.

Example : Relation R1

Student_ID	Name
S120	Raju
S121	Nani

Relation R2

Student_Code	Student_Name
K550	Chinna
K551	Munna

Resultant Relation : R = R1 U R2

Student_ID	Name
S120	Raju
S121	Nani
K550	Chinna
K551	Munna

11) What do you understand by Selection & Projection operations in relational algebra?
(2011 OD)

Ans Selection for selecting the rows of table
Projection for selecting the columns of table

Ex: Table MEMBER

No	MNAME	STREAM
M001	JAYA	SCIENCE
M002	ADITYA	HUMANITIES
M003	HANSRAJ	SCIENCE
M004	SHIVAK	COMMERCE

TABLE : TABSEL

NO	MNAME	STREAM
M002	ADITYA	HUMANITIES

TABLE : TABPROJ

No	STREAM
M001	SCIENCE
M002	HUMANITIES
M003	SCIENCE
M004	COMMERCE

Here,
Table **TABSEL** is result of **Selection** operation
Table **TABPROJ** is result of **projection** operation

DDL & DML

1) Differentiate between DDL & DMLcommands. Identify DDL & DML commands from the following:- **2018MP**
(UPDATE, SELECT, ALTER, DROP)

Ans) DDL stands for Data Definition language and comprises of commands which will change the structure of database object.

DML stands for Data Manipulation Language and comprises of commands which are used to insert, edit, view & delete the data stored in a database object.

DDL Commands: ALTER, DROP
DML Commands: UPDATE, SELECT

2) What are DDL and DML? (OD 2006)
(Differentiate between data definition language and data manipulation language.(2002))

Ans: DDL means Data Definition Language. SQL DDL provides commands for defining relation schemas, deleting relations, creating indexes and modifying relation schemas. (Provides statements for the creation and deletion of tables and indexes.)

DML Means Data Manipulation Language. SQL DML provides statements to enter, update,delete data and perform complex queries on these tables.
(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.

12.STRUCTURED QUERY LANGUAGE (6 MARKS)

STUDENT MARKS TABLE

In the following section many of the commands is explained through the example "Student marks table".

S.no	Attribute	Type
1	AdmnNo	Integer
2	SName	Character
3	Sub1	Real Number
4	Sub2	Real Number
5	Sub3	Real Number
6	Total	Real Number
7	Avg	Real Number
8	Divison	Character

1. Create Table:

CREATE TABLE <table-name> (<column name><data type>[(size>)],<column name><data type>[(size>)],…);

Example: To create a table consisting the Admnno, SName, Sub1, Sub2, Sub3, Total,Avg,Divison attributes.

CREATE TABLE Student (AdmnNo integer,SName char(20), Sub1 number(5,2), sub2 number(5,2), sub3 number(5,2), Total number(5,2),Avg number(5,2), Div Char(10));

2.Constraints:

(i) **NOT NULL :** The attribute that contains this constraints should not be vacant.

(ii) **Unique constraints:** This constraint ensures that no two rows have the same value in the specified column(s).

(iii) **Primary key constraints:** This constraint declares a column as the primary key of the table.(Primary keys cannot allow NULL values)

(iv) **Default constraints:** A default value can be specified for a column using DEFAULT clause. When a user does not enter a value for the column, automatically the defined default value is inserted in the field.

(v) **Check constraints:** this constraint limits values that can be inserted into a column of a table.

Above table can be created using the constraints as follows:

CREATE TABLE Student (AdmnNo number(4) NOT NULL PRIMARY KEY, SName char(20), Sub1 number(5,2) CHECK(Sub1<=100.0), Sub2 number(5,2) CHECK(Sub2<=100.0), Sub3 number(5,2) CHECK (Sub3<=100.0), Total number(5,2),Avg number(5,2),Div char(10));

3.INSERT Command:

INSERT INTO <tablename>[<column list>] VALUES(<value>,<value>…);

Eg:

i) To insert our desired attributes only:

INSERT INTO Student (Admnno,SName,Sub1,Sub2,Sub3) Values (1000,'pradeep',75.5,90.5,57.0);

ii) To insert all the attributes:

INSERT INTO Student Values (1001, 'sudeep',77.50,95.0,68.50, 41.0,80.33,'First');

(for inserting number of rows in a easy way…)

INSERT INTO STUDENT(Admnno,SName,Sub1,Sub2, Sub3) VALUES (&Admnno, &SName, &Sub1, &Sub2, &Sub3);

Then it will ask first student data….Enter the data…then press / at command prompt. It will ask you next student data, etc.)

Sample Data Inserted

Admn No	SName	Sub 1	Sub 2	Sub 3	Total	Avg	Div
1000	Pradeep	75.5	95.0	57.0			
1001	Sudeep	77.5	95.0	68.5	241.0	80.33	First
1002	Philip	32.5	60.0	59.5			
1003	Pradeep	45.5	65.5	70.0			
1004	Naidu	77.5	25.5	65.5			
1005	Sudeep	80.5	72.5	67.0			

4.Select command: Select command of SQL lets you make queries on the database. A query is a command that is given to produce certain specified information from the database table(s).

Simple Form:

SELECT<column name>[,<column name>…] FROM <table name>;

Eg: Select AdmnNo,SName from Student.

(Will display only AdmnNo and SName attributes of the table student.)

Select * from Student.

(Will display all the attributes of the table Student.)

5.DISTINCT Keyword: This keyword eliminates duplicate rows from the results of a SELECT statement.

Eg: Select **DISTINCT** SName from Student

Sname
Pradeep
Sudeep
Philip
Naidu

6.ALL Keyword: This keyword will not eliminate duplicate rows from the results of a SELECT statement.

Eg: Select **ALL** SName from student

SName
Pradeep
Sudeep
Philip
Pradeep
Naidu
Sudeep

7. Selecting specific rows using WHERE clause with SELECT:

Syntax: SELECT <column name>[< column name>,…] FROM <table name> WHERE <condition>;

Eg:

SELECT Admnno,SName FROM Student WHERE Sub1>=40 AND Sub2>=40 AND Sub3>=40;

SELECT SName FROM Student WHERE SName='Sudeep' OR SName='Philip;

SName
Sudeep
Philip
Sudeep

SELECT SName FROM Student WHERE SName<>'Naidu'

OR

SELECT SName FROM Student WHERE (NOT SName='Naidu')

SName
Pradeep
Sudeep
Philip
Pradeep
Sudeep

SELECT Sname from student WHERE SName in('Pradeep','Sudeep');

SName
Pradeep
Sudeep
Pradeep
Sudeep

SELECT SName FROM Student WHERE SName NOT IN('Sudeep','Pradeep');

SName
Philip
Naidu

SELECT SName FROM Student WHERE SName LIKE '%eep'

SName
Pradeep
Sudeep
Pradeep
Sudeep

8. Condition based on a Range using BETWEEN:

Eg: SELECT AdmnNo, SName FROM Student WHERE AdmnNo BETWEEN 1003 AND 1005;

AdmnNo	SName
1003	Pradeep
1004	Naidu
1005	Sudeep

9.ORDER BY:

SELECT AdmnNo, SName from student ORDER BY SName ASC;

Admn No	SName
1004	Naidu
1002	Philip
1000	Pradeep
1003	Pradeep
1001	Sudeep
1005	Sudeep

SELECT AdmnNo, SName from student ORDER BY AdmnNo DESC;

Admn No	SName
1005	Sudeep
1004	Naidu
1003	Pradeep
1002	Philip
1001	Sudeep
1000	Pradeep

10. UPDATE COMMAND:

UPDATE Student SET Total= Sub1+Sub2+Sub3;
UPDATE Student SET Avg=Total/3;
UPDATE Student SET Div='First' WHERE (Avg>=60.0);
UPDATE Student SET Div='Second' WHERE (Avg>=50.0 AND Avg<60.0);
UPDATE Student SET Div='Third' WHERE (Avg>=35.0 AND Avg<50.0);
UPDATE Student SET Div='Fail' WHERE (Sub1<35.0 OR Sub2<35.0 OR Sub3<35.0);

After the execution of the above commands, the sample data will be as follows:

Admn No	SName	Sub1	Sub2	Sub3	Total	Avg	Div
1000	Pradeep	75.5	95.0	57.0	227.5	75.85	First
1001	Sudeep	77.5	95.0	68.5	241.0	80.33	First
1002	Philip	32.5	60.0	59.5	152.0	50.66	Fail
1003	Pradeep	45.5	65.5	70.0	181	60.3	First
1004	Naidu	77.5	25.5	65.5	168.5	56.16	Fail
1005	Sudeep	80.5	72.5	67.0	220	73.3	First

11. ALTER TABLE:

ALTER TABLE student MODIFY (Div Char(6));
ALTER TABLE student ADD(CNo NUMBER(10));

12. Functions:

SELECT Min(Sub1) FROM Student;
(Will give the Minimum marks of Subject1)

Min(SUB1)

32.5

SELECT Max(Sub2) FROM Student;
(Will give the Maximum marks of Subject2)

MAX(SUB2)

95

SELECT Sum(Sub3) FROM Student;
(Will give the Sum of marks of Subject3)

SUM(SUB3)

387.5

SELECT Avg(Sub1) FROM Student;
(Will give the Average of Subject1)

AVG(SUB1)

64.83

SELECT Count(DISTINCT SName) FROM Student;
(Will display 4)

COUNT(DISTINCT SNAME)

4

SELECT Count(SName) FROM Student;
(Will display 6)

COUNT(SNAME)

6

Count – To count non-null values in a column
Count(*) – To count total number of rows in a table.

13. Creating table from Existing Table:

CREATE TABLE PassStudent as (SELECT AdmnNo, SName FROM Student WHERE (Sub1>=40.0 AND Sub2>=40.0 AND Sub3>=40.0));

14. Inserting the Results of a Query:

INSERT INTO PassStudent(admnno,sname)
SELECT AdmnNO, SName FROM Student
WHERE (Sub1>=40.0 AND Sub2>=40.0 AND Sub3>=40.0);

15. CREATE VIEW:

CREATE VIEW FailStudent AS SELECT * FROM Student WHERE Div='Fail';

16. DELETE:

DELETE FROM Student WHERE AdmnNo=1004;
(To delete a record, whose AdmnNo=1004)
DELETE FROM Student;
(To delete all records of student)

17.DROP TABLE:

DROP TABLE Student;

18. DROP VIEW:

DROP VIEW Failstudent;

19.Commit (To save the changes)

20.Rollback (for Undo)

MODEL 1(VERY IMP) : TWO TABLES

1. Write SQL queries for (i) to (iv) and write outputs for SQL queries (v) to (viii) which are based on the table given below: (2019) 8

Table: Trains

TNo	TNAME	START	END
11096	Ahimsa Express	Pune Junction	Ahmedabad Junction
12015	Ajmer Shatabdi	New Delhi	Ajmer Junction
1651	Pune Hbj Special	Pune Junction	Habibganj
13005	Amritsar Mail	Howrah Junction	Amritsar Junction
12002	Bhopal Shatabdi	New Delhi	Habibganj
12417	Prayag Raj Express	Allahabad Junction	New Delhi
14673	Shaheed Express	Jaynagar	Amritsar Junction
12314	Sealdah Rajdhani	New Delhi	Sealdah
12498	Shane Punjab	Amritsar Junction	New Delhi
12451	Shram Shakti Express	Kanpur Central	New Delhi
12030	Swarna Shatabdi	Amritsar Junction	New Delhi

Table: Passenger

PNR	TNO	PNAME	GENDER	AGE	TRAVELDATE
P001	13005	R N AGRAWAL	MALE	45	2018-12-25
P002	12015	P TIWARY	MALE	28	2018-11-10
P003	12015	S TIWARY	FEMALE	22	2018-11-10
P004	12030	S K SAXENA	MALE	42	2018-10-12
P005	12030	S SAXENA	FEMALE	35	2018-10-12
P006	12030	P SAXENA	FEMALE	12	2018-10-12
P007	13005	N S SINGH	MALE	52	2018-05-09
P008	12030	J K SHARMA	MALE	65	2018-05-09
P009	12030	R SHARMA	FEMALE	58	2018-05-09

Note: All dates are given in 'YYY-MM-DD' format

(i) To display details of all Trains which Start from New Delhi.

(ii) To display the PNR, PNAME, GENDER and AGE of all Passengers whose AGE is below 50.

(iii) To display total number of MALE and FEMALE Passengers.

(iv) To display details of all Passengers travelling in Trains whose TNO is 12015.

(v) SELECT MAX(TRAVELDATE), MIN(TRAVELDATE) FROM PASSENGERS WHERE GENDER = 'FEMALE';

(vi) SELECT END, COUNT(*) FROM TRAINS GROUP BY END HAVING COUNT(*)>1;

(vii) SELECT DISTINCT TRAVELDATE FROM PASSENGERS;

(viii) SELECT TNAME, PNAME FROM TRAINS T, PASSENGERS P WHERE T.TNO = P.TNO AND AGE BETWEEN 50 AND 60;

2.Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. (2019SP & Others)

TRAINER

TID	TNAME	CITY	HIREDATE	SALARY
101	SUNAINA	MUMBAI	1998-10-15	90000
102	ANAMIKA	DELHI	1994-12-24	80000
103	DEEPTI	CHANDIGARG	2001-12-21	82000
104	MEENAKSHI	DELHI	2002-12-25	78000
105	RICHA	MUMBAI	1996-01-12	95000
106	MANIPRABHA	CHENNAI	2001-12-12	69000

COURSE

CID	CNAME	FEES	STARTDATE	TID
C201	AGDCA	12000	2018-07-02	101
C202	ADCA	15000	2018-07-15	103
C203	DCA	10000	2018-10-01	102
C204	DDTP	9000	2018-09-15	104
C205	DHN	20000	2018-08-01	101
C206	O LEVEL	18000	2018-07-25	105

WRITE SQL QUERIES

i) To Display the Trainer name, City from table Trainer.
A) SELECT TNAME, CITY from TRAINER;

ii) Display all details of table COURSE
A) SELECT * FROM COURSE;

iii) Display the Trainer Name, City & Salary in descending order of their Hiredate.
Ans:
SELECT TNAME, CITY, SALARY FROM TRAINER ORDER BY HIREDATE DESC;

iv) To display all the details of those trainers whose name ends with 'A'
A) select * from Trainer where Tname like '%A'

v) Display all details from the table COURSE in ascending order of their STARTDATE
Ans:
SELECT * FROM COURSE ORDER BY STARTDATE ASC;

vi) To display CName and Fees of those Courses Whose Fees range in between 10000-15000.
A) select CName, Fees from Course where Fees between 10000 and 15000;

vii) To display total salary of trainers from city name ends with "I".
A) SELECT SUM(SALARY) FROM TRAINER WHERE CNAME LIKE '%I';

viii) To display all Trainer Details from city "Mumbai"
Ans: SELECT * FROM TRAINER WHERE CITY = ' Mumbai ' ;

ix) To display CName, Fees and StartDate of all Courses which are started before 15th July 2018
Ans)
SELECT CNAME,FEES,STARTDATE FROM COURSE WHERE STARTDATE< ' 2018-07-15;

x) To display the last date (recent most) HIREDATE from the table TRAINER
Ans: SELECT MAX(HIREDATE) FROM TRAINER;

xi) To display the TNAME and CITY of Trainer who joined the Institute in the month of December 2001.
Ans:
SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE BETWEEN '2001-12-01' AND '2001-12-31';

OR

SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE >= '2001-12-01' AND HIREDATE<='2001-12-31';

OR

SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE LIKE '2001-12%';

xii) To display TNAME, HIREDATE, CNAME, STARTDATE from tables TRAINER and COURSE of all those courses whose FEES is less than or equal to 10000.
Ans:
SELECT TNAME,HIREDATE,CNAME, STARTDATE FROM TRAINER, COURSE WHERE TRAINER.TID=COURSE.TID AND FEES<=10000;

xiii) To display CNAME, Fees, TName,City from tbales Trainer and Course of all those persons whose Hiredate Before Year 2000.
Ans) SELECT CNAME, FEES, TNAME, CITY from TRAINER, COURSE WHERE TRAINER.TID=COURSE.TID AND HIREDATE<'2000-01-01';

(XiV) To display number of Trainers from each city.
Ans)SELECT CITY,COUNT(*) FROM TRAINER;

WRITE SQL OUTPUTS

(a) SELECT TID, TNAME, FROM TRAINER WHERE CITY NOT IN('DELHI','MUMBAI');
Ans:

TID	TNAME
103	DEEPTI
106	MANIPRABHA

(b) SELECT DISTINCT TID FROM COURSE;
Ans:

DISTINCT TID
101
103
102
104
105

c) SELECT TID, COUNT(*), MIN(FEES) FROM COURSE GROUP BY TID HAVING COUNT(*)>1;

Ans:

TID	COUNT(*)	MIN(FEES)
101	2	12000

d) SELECT COUNT(*), SUM(FEES) FROM COURSE WHERE STARTDATE< '2018-09-15';

Ans:

COUNT(*)	SUM(FEES)
4	65000

(e) SELECT MIN(STARTDATE) FROM COURSE;

Ans)

MIN(STARTDATE)
2018-07-02

(f). SELECT MAX(STARTDATE), MIN(FEES) FROM COURSE;

A)

max(StartDate)	min(Fees)
2018-10-01	9000

(g) SELECT CITY, SUM(SALARY) FROM TRAINER GROUP BY CITY HAVING COUNT(*)>1 ;

A)

CITY	SUM(SALARY)
MUMBAI	18,5000
DELHI	15,8000

(h) select TNAME, CITY, SALARY from TRAINER T, COURSE C where T.TID!=C.TID;

A)

TNAME	CITY	SALARY
ManiPrabha	Chennai	69000

Note: 3 to 4 recent questions models are merged in the above question.

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3) Consider the following relations MobileMaster & MobileStock:- 2018MP

MobileMaster

M_Id	M_Company	M_Name	M_Price	M_Mf_Date
MB001	Samsung	Galaxy	4500	2013-02-12
MB003	Nokia	N1100	2250	2011-04-15
MB004	Micromax	Unite3	4500	2016-10-17
MB005	Sony	XperiaM	7500	2017-11-20
MB006	Oppo	SelfieEx	8500	2010-08-21

MobileStock

S_Id	M_Id	M_Qty	M_Supplier
S001	MB004	450	New Vision
S002	MB003	250	Praveen Gallery
S003	MB001	300	Classic Mobile Store
S004	MB006	150	A-one Mobiles
S005	MB003	150	The Mobile
S006	MB006	50	Mobile Centre

Write the SQL query for questions from (i) to (iv) & write the output of SQL command for questions from (v) to (viii) given below:-

(i) Display the Mobile company, Mobile name & price in descending order of their manufacturing date.

Ans) **SELECT M_Compnay, M_Name, M_Price FROM MobileMaster ORDER BY M_Mf_Date DESC;**

(ii) List the details of mobile whose name starts with „S".

Ans) SELECT * FROM MobileMaster WHERE M_Name LIKE „S%";

(iii) Display the Mobile supplier & quantity of all mobiles except „MB003".

Ans) SELECT M_Supplier, M_Qty FROM MobileStock WHERE M_Id <> „MB003";

(iv) To display the name of mobile company having price between 3000 & 5000.

Ans) SELECT M_Company FROM MobileMaster WHERE M_Price BETWEEN 3000 AND 5000;

(v) SELECT M_Id, SUM(M_Qty) FROM MobileStock GROUP BY M_Id;

M_Id	SUM(M_Qty)
MB004	450
MB003	400
MB001	300
MB006	200

(vi) SELECT MAX(M_Mf_Date), MIN(M_Mf_Date) FROM MobileMaster;

MAX(M_Mf_Date)	MIN(M_Mf_Date)
2017-11-20	2010-08-21

(vii) SELECT M1.M_Id, M1.M_Name, M2.M_Qty, M2.M_Supplier FROM MobileMaster M1, MobileStock M2 WHERE M1.M_Id=M2.M_Id AND M2.M_Qty>=300;

M_Id	M_Name	M_Qty	M_Supplier
MB004	Unite3	450	New_Vision
MB001	Galaxy	300	Classic Mobile Store

(viii) SELECT AVG(M_Price) FROM MobileMaster;

Ans) 5450

4.Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables (2016)

Table: VEHICLE

VCODE	VEHICLETYPE	PERKM
V01	VOLVO BUS	150
V02	AC DELUXE BUS	125
V03	ORDINARY BUS	80
V05	SUV	30
V04	CAR	18

Note: PERKM is Freight Charges per kilometer

Table: TRAVEL

CNO	CNAME	TRAVELDATE	KM	VCODE	NOP
101	K.Niwal	2015-12-13	200	V01	32
103	Fredrick Sym	2016-03-21	120	V03	45
105	Hitesh Jain	2016-04-23	450	V02	42
102	Ravi Anish	2016-01-13	80	V02	40
107	John Malina	2015-02-10	65	V04	2
104	Sahanubhuti	2016-01-28	90	V05	4
106	Ramesh Jaya	2016-04-06	100	V01	25

Note:
- Km is Kilometers travelled
- NOP is number of passengers travelled in vehicle

(i) To display CNO, CNAME, TRAVELDATE from the table TRAVEL in descending order of CNO.

Ans SELECT CNO, CNAME, TRAVELDATE FROM TRAVEL ORDER BY CNO DESC;

(ii) To display the CNAME of all the customers from the table TRAVEL who are traveling by vehicle with code V01 or V02.

Ans SELECT CNAME FROM TRAVEL WHERE VCODE='V01' OR VCODE='V02';

OR

SELECT CNAME FROM TRAVEL WHERE VCODE IN ('V01', 'V02');

(iii) To display the CNO and CNAME of those customers from the table TRAVEL who travelled between '2015-12-31' and '2015-05-01'.

Ans SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE >='2015-05-01' AND TRAVELDATE <= '2015-12-31';

OR

SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE BETWEEN '2015-05-01' AND '2015-12-31' ;

OR

SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE <= '2015-12-31' AND TRAVELDATE >= '2015-05-01' ;

OR

SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE BETWEEN '2015-12-31' AND '2015-05-01';

(iv) To display all the details from table TRAVEL for the customers, who have travel distance more than 120 KM in ascending order of NOP.

Ans SELECT * FROM TRAVEL WHERE KM > 120 ORDER BY NOP;

(v) SELECT COUNT(*),VCODE FROM TRAVEL GROUP BY VCODE HAVING COUNT(*)>1;

Ans COUNT(*) VCODE
2 V01
2 V02

(vi) SELECT DISTINCT VCODE FROM TRAVEL;

Ans DISTINCT VCODE
V01
V02
V03
V04
V05

vii) SELECT A.VCODE,CNAME, VEHICLETYPE FROM TRAVEL A,VEHICLE B WHERE A.VCODE=B.VCODE AND KM<90;

Ans VCODE C NAME VEHICLETYPE
V02 Ravi Anish AC DELUXE BUS
V04 John Malina CAR

(viii) SELECT CNAME,KM*PERKM FROM TRAVEL A,VEHICLE B WHERE A.VCODE=B.VCODE AND A.VCODE='V05';

Ans CNAME KM*PERKM
Sahanubhuti 2700

---

5. Consider the following DEPT and EMPLOYEE tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii). (2015)

Table: DEPT

DCODE	DEPARTMENT	LOCATION
D01	INFRASTRUCTURE	DELHI
D02	MARKETING	DELHI
D03	MEDIA	MUMBAI
D05	FINANCE	KOLKATA
D04	HUMAN RESOURCE	MUMBAI

Table: EMPLOYEE

ENO	NAME	DOJ	DOB	GENDER	DCODE
1001	George K	2013-09-02	1991-09-01	MALE	D01
1002	Ryma Sen	2012-12-11	1990-12-15	FEMALE	D03
1003	Mohitesh	2013-02-03	1987-09-04	MALE	D05
1007	Anil Jha	2014-01-17	1984-10-19	MALE	D04
1004	Manila Sahai	2012-12-09	1986-11-14	FEMALE	D01
1005	R SAHAY	2013-11-18	1987-03-31	MALE	D02
1006	Jaya Priya	2014-06-09	1985-06-23	FEMALE	D05

Note: DOJ refers to date of joining and DOB refers to date of Birth of employees.

(i) To display Eno, Name, Gender from the table EMPLOYEE in ascending order of Eno.

Ans **SELECT Eno,Name,Gender FROM Employee ORDER BY Eno;**

(ii) To display the Name of all the MALE employees from the table EMPLOYEE.

Ans **SELECT Name FROM Employee WHERE Gender='MALE';**

(iii) To display the Eno and Name of those employees from the table EMPLOYEE w ho are born between '1987-01-01' and '1991-12-01'.

Ans **SELECT Eno,Name FROM Employee**
WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01'

OR

SELECT Eno,Name FROM Employee
WHERE DOB >='1987-01-01' AND DOB <='1991-12-01' ;

OR

SELECT Eno,Name FROM Employee
WHERE DOB >'1987-01-01' AND DOB <'1991-12-01';

(iv) To count and display FEMALE employees who have joined after '1986-01-01'.

Ans **SELECT count(*) FROM Employee**
WHERE GENDER='FEMALE' AND DOJ > '1986-01-01';

OR

SELECT * FROM Employee
WHERE GENDER='FEMALE' AND DOJ > '1986-01-01';

(v) SELECT COUNT(*),DCODE FROM EMPLOYEE

GROUP BY DCODE HAVING COUNT(*)>1;

Ans

COUNT	DCODE
2	D01
2	D05

(vi) SELECT DISTINCT DEPARTMENT FROM DEPT;

Ans

Department
INFRASTRUCTURE
MARKETING
MEDIA
FINANCE
HUMAN RESOURCE

(vii) SELECT NAME, DEPARTMENT FROM EMPLOYEE E, DEPT D WHERE E.DCODE=D.DCODE AND EN0<1003;

Ans

NAME	DEPARTMENT
George K	INFRASTRUCTURE
Ryma Sen	MEDIA

(viii) SELECT MAX(DOJ), MIN(DOB) FROM EMPLOYEE;

Ans

MAX(DOJ)	MIN(DOB)
2014-06-09	1984-10-19

---

6. Answer the question (b) and (c) on the basis of the following tables SHOPPE and ACCESSORIES.

Table: SHOPPE (2014)

ID	SName	Area
S01	ABC Computronics	CP
S02	All Infotech Media	GK II
S03	Tech Shopee	CP
S04	Geeks Techno Soft	Nehru Place
S05	Hitech Store	Nehru Place

Table: ACCESSORIES

ID	Iname	Price	Sno
A01	Mother Board	12000	S01
A02	Hard Disk	5000	S01
A03	Keyboard	500	S02
A04	Mouse	300	S01
A05	Mother Board	13000	S02
A06	Keyboard	400	S03
A07	LCD	6000	S04
A08	LCD	5500	S05
A09	Mouse	350	S05
A10	Harddisk	4500	S03

Write a SQL query (1 to 4) 4

1. To display Name and Price of all the Accessories in ascending order of their Price.

A) Select Name, Price from ACCESSORIES order by Price.

2. To display Id and Sname of all Shopee located in Nehru Place;

A) Select Id, Sname from SHOPPE where Area = 'Nehru Place;

3. To display Minimum and Maximum price of each Name of Accessories.

A) Select Min(Price), Max(Price) from ACCESSORIES group by Name;

4. To display Name, Price of all the Accessories and their respective SName where they are available.

A) Select Name, Price, SName from SHOPPE, ACCESSORIES where SHOPPE.Id= ACCESSORIES.ID;

Write the output of the following SQL command (1 to 4) (2014) 2

1. SELECT DISTINCT NAME FROM ACCESSORIES WHERE PRICE>=5000;

INAME
Mother Board
Hard Disk
LCD

2.SELECT AREA, COUNT(*),FROM SHOPPE GROUP BY AREA;

AREA	Count(*)
CP	2
GK II	1
Nehru Place	2

3. SELECT COUNT(DISTINCT AREA) FROM SHOPPE;

COUNT(DISTINCT AREA)
3

4. SELECT NAME, PRICE*0.05 DISCOUNT FROM ACCESSORIES WHERE SNO IN('S02','S03');

INAME	DISCOUNT
Keyboard	25
Motherboard	650
Keyboard	20
Hard Disk	225

---

7. Write SQL queries for (b) to (g) and write the outputs for the SQL queries mentioned shown in (h1) to (h4) on basis of tables PRODUCTS and SUPPLIERS. (2013)

Table: PRODUCTS

PID	PNAME	QTY	PRICE	COMPANY	UPCODE
101	DIGITIAL CAMERA 14X	120	12000	RENIX	S01
102	DIGITAL PAD 11i	100	22000	DIGI POP	S02
104	PEN DRIVE 16 GB	500	1100	STOREKING	S01
106	LED SCREEN 32	70	28000	DISPEX PERTS	S02
105	CAR GPS SYSTEM	60	12000	MOVEON	S03

Table: SUPPLIERS

SUPCODE	SNAME	CITY
S01	GET ALL INC	KOLKATA
S03	EASY MARKET CORP	DELHI
S02	DIGI BUSY GROUP	CHENNAI

(b) To display the details of all the products in ascending order of product names (ie PNAME)

A) SELECT * FROM PRODUCTS ORDER BY PNAME;

(c) To display product name and price of all those products whose price is in range of 10000 and 15000 (both values inclusive).

A) SELECT PNAME, PRICE FROM PRODUCTS WHERE PRICE >=10000 AND PRICE >=15000;

(d) To display the number of products, which are supplied supplier. Ie, the expected output should be

S01 2
S02 2
S03 1

A) SELECT SUPCODE, COUNT(SUPCODE) FROM PRODUCTS GROUP BY SUPCODE;

(E) To display the price, product name and quantity (ie qty) of those products which have quantity more than 100

A) SELECT PRICE,PNAME, QTY FROM PRODUCTS WHERE QTY>100;

(f) To display the names of those suppliers, who are either from DELHI or from CHENNAI.

A) SELECT SNAME FROM SUPPLIERS WHERE CITY="DELHI" OR CITY="KOLKATA";

(g) To display the name of the companies and the name of the products in descending order of company names.

A) SELECT COMPANY, PNAME FROM PRODUCTS ORDER BY COMPANY DESC.

(h) Obtain the outputs of the following SQL queries based on the data given in tables PRODUCTS and SUPPLIERS above.

(h1) SELECT DISTINCT SUPCODE FROM PRODUCTS;

A)

SUPCODE
S01
S02
S03

(h2) SELECT MAX(PRICE), MIN(PRICE) FROM PRODUCTS;

A)

MAX (PRICE)	MIN(PRICE)
28000	1100

(h3) SELECT PRICE*QTY AMOUNT FROM PRODUCTS WHERE PID=104;

A)

AMOUNT
55000

(h4) SELECT PNAME, SNAME FROM PRODUCTS P, SUPPLIERS S WHERE P.SUPCODE=S.SUPCODE AND QTY>100;

PNAME	SNAME
DIGITAL CAMERA 14X	GET ALL INC
PEN DRIVE 16GB	GET ALL INC

---

8) Constider the following tables CARDEN and CUSTOMER and answer (b) and (c) parts of this question: (2012)

Table: CARDEN

Ccode	CarName	Make	Color	Capacity	Charge
501	A-Star	Suzuki	RED	3	14
503	Indigo	Tata	SILVER	3	12
502	Innova	Tovota	WHITE	7	15
509	SX4	Suzuki	SILVER	4	14
510	C Class	Mercedes	RED	4	35

Table: CUSTOMER

CCode	Cname	Ccode
1001	Hemant Sahu	501
1002	Raj Lal	509
1003	Feroza Shah	503
1004	Ketan Dhal	502

(b) Write SQL commands for the following statements: 4

(i) To display the names of all silver colored Cars.

Ans **SELECT CarName FROM CARDEN WHER Color = 'SILVER';**

(ii) To display name of car, make and capacity of cars in descending order of their sitting capacity.

Ans **SELECT CarName, Make, Capacity FROM CARDEN ORDER BY Capacity DESC;**

(iii) To display the highest charges at which a vehicle can be hired from CARDEN.

Ans **SELECT MAX(Charges) FROM CARDEN ;**

OR

SELECT CarName, MAX(Charges)FROM CARDEN GROUP BY CarName;

(iv) To display the customer name and the corresponding name of the cars hired by them.

Ans SELECT **CName, CarName FROM CUSTOMER, CARDEN WHERE CUSTOMER.Ccode = CARDEN.Ccode;** **OR**

SELECT CUSTOMER. CName, CARDEN. CarName FROM CUSTOMER, CARDEN WHERE CUSTOMER.Ccode = CARDEN.Ccode;

OR

SELECT CName, CarName FROM CUSTOMER A, CARDEN B WHERE A.Ccode = B.Ccode;

OR

SELECT A. CName, B. CarName FROM CUSTOMER A, CARDEN B WHERE A.Ccode = B.Ccode;

(c) Give the output of the following SOL queries:

(i) SELECT COUNT (DISTINCT Make) FROM CARDEN;

Ans **COUNT (DISTINCT Make)**
4

(ii) SELECT MAX (Charges), MIN (Charges) FROM CARDEN;

Ans **MAX (Charges) MIN (Charges)**
35 12

(iii) SELECT COUNT (*), Make FROM CARDEN;

Ans (Ignoring Make for display)

COUNT (*)
5

OR

(assuming the presence of GROUP By Make)

COUNT(*)	Make
2	SUZUKJ:
1	TATA
1	TOYOTA
1	MERCEDES

(iv) SELECT CarName FROM CARDEN WHE~ Capacity = 4;

Ans **CarName**
Sx4
C Class

---

9) Consider the following tables EMPLOYEE and SALGRADE and answer (b) and (c) parts of this questions. (2011)

Table: EMPLOYEE

ECODE	NAME	DESIG	SGRADE	DOJ	DOB
101	Abdul Ahmad	EXECUTIVE	S03	23-Mar-2003	13-Jan-1980
102	Ravi Chander	HEAD-IT	S02	12-Feb-2010	22-Jul-1987
103	John Ken	RECEPTIONIST	S03	24-June-2009	24-Feb-1983
105	Nazar Ameen	GM	S02	11-Aug-2006	03-Mar-1984
108	Priyam Sen	CEO	S01	29-Dec-2004	19-Jan-1982

Table: SALGRADE

SGRADE	SALARY	HRA
S01	56000	18000
S02	32000	12000
S03	24000	8000

(b) Write SQL commands for the following statements:
(i) To display the details of all EMPLOYEEs, in descending order of DOJ
Ans **SELECT * FROM EMPLOYEE ORDER BY DOJ DESC;**
(ii) To display NAME and DE51G of those EMPLOYEEs, whose 5ALGRADE is either 502 or 503
Ans **SELECT NAME, DESIG FROM EMPLOYEE WHERE SGRADE = 'S02' OR SGRADE= 'S03';**
OR
SELECT NAME, DESIG FROM EMPLOYEE WHERE SALGRADE ='S02' OR SALGRADE='S03';
(iii) To display the content of all the EMPLOYEEs table, whose DOJ is in between'09-Feb-2006' and '08-Aug-2009'.
Ans **SELECT * FROM EMPLOYEE WHERE DOJ BETWEEN '09-Feb-2006'and '08-Aug-2009';**
OR
SELECT * FROM EMPLOYEE WHERE DOJ > = '09-Fab-2006' and DOJ <='08-Aug-2009';
OR
SELECT * FROM EMPLOYEE WHERE DOJ > '09-Feb-2006' and DOJ <' 08-Aug-2009" ;
(iv) To add a new row with the following:
109, 'Harish Roy', 'HEAD-IT', 'S02', '09-Sep-2007, '21-Apr-1983'
Ans **INSERT INTO EMPLOYEE VALUES(109,'Harish Roy' ,'HEAD-IT' ,'S02' ,'09-Sep-2007' ,'21-Apr-1983') ;**

(c) Give :the output of the following SQL queries: 2
(i) SELECT COUNT (SGRADE),SGRADE FROM EMPLOYEE GROUP BY SGRADE;
Ans **COUNT (SGRADE) SGRADE**
1 S01
2 S02
2 S03

(ii) SELECT MIN(DOB), MAX (DOJ) FROM EMPLOYEE;
Ans **MIN (DOB) MAX (DOJ)**
13-Jan-1980 12-Feb-2010

(iii) SELECT NAME , SALARYFROM EMPLOYEE E, SALGRADE S WHERE E.SGRADE= S.SGRADE AND E.ECODE<103;
Ans **Name Salary**
Abdul Ahmad 24000
Ravi Chander 32000

(iv) SELECT SGRADE, SALARY+HRA ET:)M SALGRADE WHERE SGRADE= 'S02';
Ans) SGRADE SALARY+HRA
S02 44000

---

10) Consider the following tables STORE and SUPPLIERS and answer (bl) and (b2) parts of this question: (D 2010)

Table: STORE

ItemNo	Item	Scode	Qty	Rate	LastBuy
2005	Sharpener Classic	23	60	8	31-Jun-09
2003	Ball Pen 0.25	22	50	25	01-Feb-10
2002	Gel Pen Premium	21	150	12	24-Feb-10
2006	Gel Pen Classic	21	250	20	11-Mar-09
2001	Eraser Small	22	220	6	19-Jan-09
2004	Eraser Big	22	110	8	02-Dec-09
2009	Ball Pen 0.5	21	180	18	03-Nov-09

Table: SUPPLIERS

Scode	Sname
21	Premium Stationers
23	Soft Plastics
22	Tetra Supply

b1)Write SQL commands for the following statements:4 (i) To display details of all the items in the Store table in ascending order of LastBuy.
Ans. SELECT * FROM STORE ORDER BY LastBuy;
(ii) To display ItemNo and Item name of those items from Store table whose Rate is more than 15 Rupees.
Ans. SELECT ItemNo, Item..In FROM STORE WHERE Rate >15;
(iii) To display the details of those items whose Supplier code (Scode) is 22 or Quantity in Store (Qty) is more than 110 from the table Store.
Ans. SELECT * FROM STORE WHERE Scode = 22 OR Qty >110;
(iv) To display Minimum Rate of items for each Supplier individually as per Scode from the table Store.
Ans. SELECT Scode, MIN(Rate) FROM STORE GROUP BY Scode;
b2)Give the output of the following SQL queries:2
Note: In all output Questions ignore Column Headings
(i) SELECT COUNT(DISTINCT Scode) FROM Store;
Ans. COUNT(DISTINCT Scode)
3
(ii) SELECT Rate*Qty FROM Store WHERE ItemNo=2004;
Ans. RATE*QTY
880

(iii) SELECT Item,Sname FROM Store S, Suppliers P WHERE S.Scode=P.Scode AND ItemNo=2006;

Ans. ITEM SNAME Gel Pen Classic Premium Stationers

(iv) SELECT MAX(LastBuy) FROM Store;

Ans. **MAX (LASTBUY)**
24-Feb-10

---

11) Consider the following tables GARMENT and FABRIC. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) (D2009)6

Table: GARMENT

GCODE	DESCRIPTION	PRICE	FCODE	READYDATE
10023	PENCIL SKIRT	1150	F03	19-DEC-08
10001	FORMAL SHIRT	1250	F01	12-JAN-08
10012	INFORMAL SHIRT	1550	F02	06-JUN-08
10024	BABY TOP	750	F03	07-APR-07
10090	TULIP SKIRT	850	F02	31-MAR-07
10019	EVENING GOWN	850	F03	06-JUN-08
10009	INFORMAL PANT	1500	F02	20-OCT-08
10007	FORMAL PANT	1350	F01	09-MAR-08
10020	FROCK	850	F04	09-SEP-07
10089	SLACKS	750	F03	20-OCT-08

Table : FABRIC

FCODE	TYPE
F04	POLYSTER
F02	COTTON
F03	SILK
F01	TERELENE

(i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE

Ans SELECT GeODE, DESCRIPTION FROM GARMENT ORDER BY GCODE DESC;

(ii) To display the details of all the GARMENTs, which have READYDA TE in between 08-DEC-07 and 16-JUN-08(inclusive of both the dates).

Ans) SELECT * FROM GARMENT WHERE READYDATE BETWEEN' 08-DEC-07'AND , 16-JUN-08' ;

OR

SELECT * FROM DRESS WHERE LAUNCHDATE >= '08-DEC-07' AND LAUNCHDATE<='16-JUN-08';

(iii) To display the average PRICE of all the GARMENTs, which are made up of FABRIC with FCODE as F03.

Ans) SELECT AVG (PRICE) FROM GARMENT WHERE FCODE = 'F03';

(iv) To display FABRIC wise highest and lowest price of GARMENTs from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price)

Ans SELECT FCODE, MAX (PRICE), MIN(PRICE) FROM GARMENT GROUP BY FCODE;

(v) SELECT SUM (PRICE) FROM GARMENT WHERE FCODE = 'F01' ;

Ans SUM (PRICE)
2600

(vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE GARMENT.FCODE = FABRIC.FCODE AND GARMENT. PRICE > = 1260 ;

Ans) DESCRIPTION TYPE
INFORMAL SHIRT COTTON
INFORMAL PANT COTTON
FORMAL PANT TERELENE

(vii) SELECT MAX (FCODE) FROM FABRIC;

Ans MAX (FCODE)
F04

(viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT ;

Ans COUNT(DISTINCT PRICE)
7

---

(12) Consider the following tables DRESS and MATERIAL. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii). (2009 OD)6

Table: DRESS

DCODE	DESCRIPTION	PRICE	MCODE	LAUNCHDATE
10001	FORMAL SHIRT	1250	M001	12-JAN-08
10020	FROCK	750	M004	09-SEP-07
10012	INFORMAL SHIRT	1450	M002	06-JUN-08
10019	EVENING GOWN	850	M003	06-JUN-08
10090	TULIP SKIRT	850	M002	31-MAR-07
10023	PENCIL SKIRT	1250	M003	19-DEC-08
10089	SLACKS	850	M003	20-OCT-08
10007	FORMAL PANT	1450	M001	09-MAR-08
10009	INFORMAL PANT	1400	M002	20-OCT-08
10024	BABY TOP	650	M003	07-APR-07

Table: **MATERIAL**

MCODE	TYPE
MOO1	TERELENE
MOO2	COTTON
MOO4	POLYESTER
MOO3	SILK

(i) To display DCODE and DESCRIPTION of each dress in ascending order of DCODE.

Ans SELECT DCODE. DESCRIPTION FROM DRESS ORDER BY DCODE ;

(ii) To display the details of all the dresses which have LAUNCHDATE in between 05-DEC'-07 and 20-JUN-08 (inclusive of both the dates).

Ans SELECT * FROM DRESS WHERE LAUNCHDATE BETWEEN '05-DEC-07' AND '20-JUN-08' OR
SELECT * FROM DRESS WHERE LAUNCHDATE >= '05-DEC-07' AND LAUNCHDATE<= '20-JUN-08'

(iii) To display the average PRICE of all the dresses which are made up of material with MCODE as M003.

Ans SELECT AVG(PRICE) FROM GARMENT WHERE MCODE = 'M003'

(iv) To display materialwise highest and lowest price of dresses from DRESS table. (Display MCODE of each dress along with highest and lowest price)

Ans SELECT MCODE, MAX(PRICE), MIN (PRICE) FROM DRESS GROUP BY MCODE

(v) SELECT SUM(PRICE) FROM DRESS WHERE MCODE='M001';

Ans **SUM(PRICE)**

2700

(vi) SELECT DESCRIPTION, TYPE FROM DRESS, MATERIAL WHERE DRESS.DCODE = MATERIAL.MCODE AND DRESS.PRICE>=l250;

Ans **DESCRIPTION** **TYPE**

(NO OUTPUT)

(vii) SELECT MAX(MCODE) FROM MATERIAL;

Ans **MAX (MCODE)**

MOO4

(viii) SELECT COUNT(DISTINCT PRICE) FROM DRESS;

Ans **COUNT(DISTINCT PRICE)**

6

---

13) 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) (D 2008)

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

---

14) 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) (OD 2008)

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

---

15) 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). (OD2007)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,Blockd,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
R singhal
Amit Kumar

CneeName
Rahul Kishore
S mittal

(vii)SELECT CneeName,CneeAddress FROM Consignee WHERE CneeCity Not IN ('Mumbai', 'Kolkata');

Ans:

CneeName	CneeAddress
P Dhingra	16/J,Moore Enclave
B P Jain	13,Block D,A Vihar

(viii) SELECT CneeID, CneeName FROM Consignee WHERE CnorID = 'MU15' OR CnorID = 'ND01';

Ans:

CneeID	CneeName
MU05	Rahul Kishore
KO19	A P Roy

---

16) Consider the following tables. Write SQL command for the statements (i)to(iv)and give outputs for the SQL quries (v) to (viii). (D2006) 6

TABLE : **SENDER**

SenderID	SenderName	Sender Address	Sender City
ND01	R jain	2,ABC Appts	New Delhi
MU02	H sinha	12, Newton	Mumbai
MU15	S haj	27/ A,Park Street	New Delhi
ND50	T Prasad	122-K,SDA	Mumbai

TABLE :**RECIPIENT**

RecID	SenderID	ReCName	RecAddress	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:

DISTINCT(SENDERCITY)
NewDelhi
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

---

17) 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). (OD 2006)

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:**FARES**

FL_NO	AIRLINES	FARE	TAX%
IC701	INDIAN AIRLINES	6500	10
MU499	SAHARA	9400	5
AM501	JET AIRWAYS	13450	8
IC899	INDIAN AIRLINES	8300	4
IC302	INDIAN AIRLINES	4300	10
IC799	INDIAN AIRLINES	1050	10
MC101	DECCAN AIRLINES	3500	4

(i) Display FL_NO and NO_FLIGHTS from "KANPUR" TO "BANGALORE" from the table FLIGHTS.

Ans: **SELECT FL_NO, NO_FLIGHTS FROM FLIGHTS WHERE STARTING="KANPUR" AND ENDING="BANGALORE"**

(ii) Arrange the contents of the table FLIGHTS in the ascending order of FL_NO.

Ans: SELECT * FROM FLIGHTS ORDER BY FL_NO;

(iii) Display the FL_NO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid = FARE+FARE+TAX%/100.

Ans: SELECT FL_NO, FARE+FARE+(TAX%/100) FROM FLIGHTS, FARES WHERE STARTING="DELHI" AND ENDING="MUMBAI"

(iv) Display the minimum fare "Indian Airlines" is offering from the tables FARES.

Ans: SELECT MIN(FARE) FROM FARES WHERE AIRLINES="INDIAN AIRLINES"

v)Select FL_NO,NO_FLIGHTS, AIRLINES from FLIGHTS, FARES Where STARTING = "DELHI" AND FLIGHTS.FL_NO = FARES.FL_NO

Ans:

FL_NO	NO_FLIGHTS	AIRLINES
IC302	8	Indian Airlines
AM501	1	Jet Airways
IC701	4	Indian Airlines

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

Ans: 7

18) 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) (D2006):

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

---

19) 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). (D2005)

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

EMP ID	SALARY	BENEFITS	DESIGNATION
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	Salesman

(i) To display Firstname, Lastname, Address and City of all employees living in Paris from the table EMPLOYEES.

Ans: SELECT FIRSTNAME, LASTNAME, ADDRESS,CITY FROM EMPLOYEES WHERE CITY="PARIS"

(ii) To display the content of EMPLOYEES table in descending order of FIRSTNAME.

Ans: SELECT * FROM EMPLOYEES ORDER BY FIRSTNAME DESC

(iii) To display the Firstname, Lastname, and Total Salary of all managers from the tables, where Total Salary is calculated as Salary+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

---

20) 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).

(OD 2005)

WORKERS

W_ID	FIRST NAME	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:

SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION IN ('MANAGER'.'CLERK') GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION= 'MANAGER' OR DESIGNATION='CLERK' GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION='MANAGER' OR DESIGNATION='CLERK';

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION IN ('MANAGER','CLERK');

(v) SELECT FIRSTNAME, SALARY FROM WORKERS, DESIG WHERE 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

---

21. Give the following table for database a LIBRARY. (2004)

TABLE : BOOKS

BOOK_ID	BOOK_NAME	AUTHORNAME	PUBLISHER	PRICE	TYPE	QUANTITY
F0001	The Tears	William Hopkins	First Publ.	750	Fiction	10
F0002	Thunder bolts	Anna Roberts	First Publ.	700	Fiction	5
T0001	My first C++	Brains & Brooke	EPB	250	Text	10
T0002	C++ Brain works	A.W.Rossaine	TDH	325	Text	5
C001	Fast Cook	Lata 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

---

22. Write SQL commands for (b) to (g) and write the outputs for (h) on the basis of tables TNTERIORS and NEWONES. (2003)

TABLE: INTERIORS

NO	ITEMNAME	TYPE	DATEOFSTOCK	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	ITEM NAME	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

---

23)Consider the following tables ACTIVITY and COACH and answer (b) and (c) parts of this question: (MP109-10)

Table: ACTIVITY

A Code	ActivityName	Stadium	Participants Num	Prize Money	Schedule Date
1001	Relay 100x4	Star Annex	16	10000	23-Jan-2004
1002	High jump	Star Annex	10	12000	12-Dec-2003
1003	Shot Put	Super Power	12	8000	14-Feb-2004
1005	Long Jump	Star Annex	12	9000	01-Jan-2004
1008	Discuss Throw	Super Power	10	15000	19-Mar-2004

Table: COACH

PCode	Name	Acode	
1	Ahmad Hussain	1001	
2	Ravinder	1008	
3	Janila	1001	
4	Naaz	1003	

b)Write SQL commands for the flowing statements:4

(i) To display the names of all activities with their Acodes in descending order.

Ans) SELECT Acodes, ActivityName FROM ACTIVITY ORDER BY Acode DESC;

(ii) To display sum of PrizeMoney for the Activities played in each of the Stadium separately.

Ans) SELECT SUM(PrizeMoney), Stadium FROM ACTIVITY GROUP BY Stadium;

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

Ans) SELECT Name, Acode FROM COACH ORDER BY Acode;

(iv) To display the content of the Activity table whose ScheduleDate earlier than 01/01/2004 in ascending order of ParticipantsNum.

Ans) SELECT * FROM ACTIVITY WHERE SchduleDate<'01-Jan-2004' ORDER BY ParticipantsNum;

c) Give the output of the following SQL queries:2

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

Ans) 3

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

Ans) 19-Mar-2004 12-Dec-2003

(iii) SELECT Name,ActivityName FROM ACTIVITY A,COACH C WHERE A.Acode= C.Acode AND A.ParticipantsNum = 10;

Ans) Ravinder Discuss Throw

(iv) SELECT DISTINCT Acode FROM COACH;

Ans) 1001
1003
1008

---

24) Consider the following tables GAMES and PLAYER and answer (b) and (c) parts of this question (MP209-10)

Table: GAMES

GCode	GameName	Type	Number	Prize Money	Schedule Date
101	Carom Board	Indoor	2	5000	23-Jan-2004
102	Badminton	Outdoor	2	12000	12-Dec-2003
103	Table Tennis	Indoor	4	8000	14-Feb-2004
105	Chess	Indoor	2	9000	01-Jan-2004
108	Lawn Tennis	Outdoor	4	25000	19-Mar-2004

Table: PLAYER

PCode	Name	Gcode
1	Nabi Ahmad	101
2	Ravi Sahai	108
3	Jatin	101
4	Nazneen	103

b)Write SQL commands for the flowing statements:4

(i) To display the name of all GAMES with their GCodes

Ans) SELECT GameName,Gcode FROM GAMES;

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

Ans) SELECT * FROM Games WHERE Prizemoney>7000;

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

Ans) SELECT * FROM Games ORDER BY ScheduleDate;

(iv) To display sum of PrizeMoney for each Type of GAMES

Ans) SELECT SUM(Prizemoney),Type FROM Games GROUP BY Type;

c) Give the output of the following SQL queries: 2

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

Ans) 2

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

Ans) 19-Mar-2004 12-Dec-2003

(iii) SELECT Name, GameName FROM GAMES G, PLAYER P WHERE G.Gcode=P.Gcode AND G.PrizeMoney>10000;

Ans) Ravi Sahai Lawn Tennis

(iv) SELECT DISTINCT Gcode FROM PLAYER;

Ans) 3

25)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)
(MP108-09) 6

Table: ACTIVITY

ACode	ActivityName	ParticipantsNum	PrizeMoney	ScheduleDate
1001	Relay 100x4	16	10000	23-Jan-2004
1002	High jump	10	12000	12-Dec-2003
1003	Shot Put	12	8000	14-Feb-2004
1005	Long Jump	12	9000	01-Jan-2004
1008	Discuss Throw	10	15000	19-Mar-2004

Table: COACH

PCode	Name	ACode
1	Ahmad Hussain	1001
2	Ravinder	1008
3	Janila	1001
4	Naaz	1003

i)To display the name of all activities with their Acodes in descending order.
Answer: SELECT ActivityName, ACode FROM ACTIVITY ORDER BY Acode DESC;
(ii) To display sum of PrizeMoney for each of the Number of participants groupings (as shown in column ParticipantsNum 10,12,16)
Answer: SELECT SUM(PrizeMoney), ParticipantsNum FROM ACTIVITY GROUP BY ParticipantsNum;
(iii) To display the coach's name and ACodes in ascending order of ACode from the table COACH
Answer: SELECT Name, ACode FROM COACH ORDER BY ACode;
(iv) To display the content of the ACTIVITY table whose ScheduleDate earlier than 01/01/2004 in ascending order of ParticipantsNum.
Answer: SELECT * FROM ACTIVITY WHERE ScheduleDate<'01-Jan-2004' ORDER BY ParticipantsNum;

v)SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;
Answer: 3
(vi)SELECT MAX(ScheduleDate), MIN(ScheduleDate) FROM ACTIVITY;
Answer:

19-Mar-2004	**12-Dec-2003**

(vii) SELECT SUM(PrizeMoney)
FROM ACTIVITY;
Answer: 54000
(viii) SELECT DISTINCT
ParticipantsNum FROM ACTIVITY;
Answer: 16
10
12

---

26) Consider the following tables SCHOOL and ADMIN. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

TABLE: SCHOOL

CODE	TEACHERNAME	SUBJECT	DOJ	PERIODS	EXPERIENCE
1001	RAVI SHANKAR	ENGLISH	12/03/2000	24	10
1009	PRIYA RAI	PHYSICS	03/09/1998	26	12
1203	LISA ANAND	ENGLISH	09/04/2000	27	5
1045	YASHRAJ	MATHS	24/08/2000	24	15
1123	GAMAM	PHYSICS	16/07/1999	28	3
1167	HARISH B	CHEMISTRY	19/10/1999	27	5
1215	UMESH	PHYSICS	11/05/1998	22	16

TABLE: ADMIN

CODE	GENDER	DESIGNATION
1001	MALE	VICE PRINCIPAL
1009	FEMALE	COORDINATOR
1203	FEMALE	COORDINATOR
1045	MALE	HOD
1123	MALE	SENIOR TEACHER
1167	MALE	SENIOR TEACHER
1215	MALE	HOD

(i) To decrease period by 10% of the teachers of English subject.
UPDATE SCHOOL SET PERIOD = PERIOD*0.90;

(ii) To display TEACHERNAME, CODE and DESIGNATION from tables SCHOOL and ADMIN whose gender is male.
SELECT S.TEACHERNAME,S.CODE, A.DESIGNATION FROM SCHOOL, ADMIN A WHERE GENDER='MALE' AND S.CODE=A.CODE;
(iii) To display number of teachers in each subject.
SELECT SUBJECT, COUNT(*) FROM SCHOOL GROUP BY SUBJECT;
(iv) To display details of all teachers who have joined the school after 01/01/1999 in descending order of experience.
SELECT S.CODE,S.TEACHERNAME, S.SUBJECT, S.DOJ,S.PERIODS, S.EXPERIENCE,A.GENDER,A.DESIGNATION FROM SCHOOL S, ADMIN A WHERE DOB>'01/01/1999' AND S.CODE=A.CODE ORDER BY EXPERIENCE DESC;
(v) SELECT SUM(PERIODS), SUBJECT FROM SCHOOL GROUP BY SUBJECT;

SUM(PERIODS)	SUBJECT
51	ENGLISH
76	PHYSICS
24	MATHS
27	CHEMISTRY

(vi) SELECT TEACHERNAME, GENDER FROM SCHOOL, ADMIN WHERE DESIGNATION ='COORDINATOR' AND SCHOOL.CODE=ADMIN.CODE;

TEACHERNAME	GENDER
PRIYA RAI	FEMALE
LISA ANAND	FEMALE

(vii) SELECT DESIGNATION, COUNT(*) FROM ADMIN GROUP BY DESIGNATION HAVING COUNT(*)>1;

DESIGNATION	COUNT(*)
COORDINATOR	2
HOD	2
SENIOR TEACHER	2

(viii) SELECT COUNT(DISTINCT SUBJECT) FROM SCHOOL;

COUNT(*)
4

MODEL 2 : SINGLE TABLE

27. Given the following Teacher Relation. (2002)
Write SQL Commands fro (b) to (g)

No	Name	Department	DateofJoining	Salary	Sex
1	Raja	Computer	21/5/98	8000	M
2	Sangita	History	21/5/97	9000	F
3	Ritu	Sociology	29/8/98	8000	F
4	Kumar	Linguistics	13/6/96	10000	M
5	Venkatraman	History	31/10/99	8000	M
6	Sindhu	Computer	21/5/86	14000	M
7	Aishwarya	Sociology	11/1/1998	12000	F

(b) To select all the information of teacher in computer department
Ans: Select * from Teacher where Department="Computer"

(c) To list the name of female teachers in History Department.
Ans: Select Name from Teacher Where Sex="F" And Department="History"

(d) To list all names of teachers with date of admission in ascending order.
Ans: Select Name from Teacher Order By Dateofjoining Asc

(e) To display Teacher's Name, Department, and Salary of female teachers
Ans: Select Name,Department,Salary from Teacher Where Sex="F"

(f) To count the number of items whose salary is less than 10000
Ans: Select Count(*) from Teacher Where Salary<10000

(g) To insert a new record in the Teacher table with the following data:
8,"Mersha","Computer",(1/1/2000),12000,"M".
Ans: Insert into Teacher values ,"Mersha", "Computer",{1/1/2000),12000,"M");

28) Write the SQL commands for (i) to (vii) on the basis of the table SPORTS (2001)

TABLE: SPORTS

Stud no	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

29. Write SQL commands for the (b) to (e) and write the outputs for (g) on thse basis of table CLUB. (2000)

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	BASKETBALL	19/02/98	1700	M

(b) To show all information about the swimming coaches in the club.
Ans: Select * from Club where SPORTS= "SWIMMING"
(c) To list names of all coaches with their date of appointment (DATOFAPP) in descending order.
Ans: Select COACHNAME,DATEOFAPP from Club order by DATEOFAPP 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

30) Given the following Teacher relation: Write SQL commands for questions (b) to (g). (1999)

TEACHER

NO	NAME	Age	DEPARTMENT	DATEOF JOING	SALARY	SEX
1	RAJA	45	COMPUTER	21/5/98	8000	M
2	SANGITA	32	History	21/5/97	9000	F
3	RITU	22	MATHS	29/8/98	8000	F
4	KUMAR	41	HISTORY	13/6/96	10000	M
5	VENKAT	44	MATHS	31/10/99	8000	M
6	SINDU	51	HISTORY	21/5/86	14000	F
7	ASHWARYA	37	MATHS	11/1/98	12000	F

(b) To show all information about the teachers of history department.

Ans:select * from teacher where department='history';

(c) To list names of female teacher who are in math department.

Ans: select name from teacher where sex='female' and department='maths';

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

Ans:Select Name From Teacher order by dateofjoing;

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

Ans: Select count(name) from teacher where age>23;

(g) To insert a new row in the teacher table with the following data:
9, "raja', 26, "computer", {13/5/95 }, 2300, "M".

Ans: Insert into Teacher values(9,"raja",26, "computer", {13/05/95},2300,"M");

31. Write SQL commands for (b) to (g) and write the outputs for (h) on the basis of table : HOSPITAL (1998)

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

13. BOOLEAN ALGEBRA

Laws:

(1)Properties of 0 and 1:

0 + X = X, 1 + X = 1,

0.X = 0, 1.X = X

(2) Idempotence Law:

(a)X +X = X (b)X.X = X

(3) Involution Law: $\overline{\overline{A}} = A$

(4)ComplementaryLaw:

(a)X + $\overline{X}$ =1 (b)X. $\overline{X}$ =0

(5)Commutative Law:

(a) X+Y =Y+X (b)X.Y=Y.X

(6) Associative Law:

(a)X + (Y+Z)=(X+Y)+Z

(b)X.(Y.Z)=(X.Y).Z

(7) Distributive Law:

(a) X(Y+Z)=XY+XZ (b) X+YZ=(X+Y)(X+Z)

(8) Absorption Law:

(a) X+XY=X (b)X(X+Y)+X

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

X+X'Y = X+Y is also known as third distributive law.

(9) Demorgan's Theorems

(a) $\overline{X + Y} = \overline{X}.\overline{Y}$ (b) $\overline{X.Y} = \overline{X} + \overline{Y}$

Model 1: Boolean Laws (2 Marks)

Model 1A: Boolean Laws (Truth Table) (2M)

1.State any one Distributive Law of Boolean Algebra and Verify it using truth table.
(2019)(2019MP) (2007D) (D2006) (2002)(1999) 2

Ans) Distributive Law:
(i)A (B+C) = AB + AC (ii) A+BC=(A+B)(A+C)
Verification of first distributive law using Truth Table: A (B+C) = AB + AC

A	B	C	B+C	A(B+C)	AB	AC	AB+AC
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

Comparing Column 5 and 8, Distributive law is verified

OR

Verification of second distributive law using Truth Table:

A	B	C	BC	A+BC	(A+B)	(A+C)	(A+B)(A+C)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

Comparing Column 5 and 8, Distributive law is verified

2) Verify the following using Truth Table: 2

X+Y. Z=(X+Y).(X+Z)

Ans

X	Y	Z	YZ	X+YZ	X+Y	X+Z	(X+Y).(X+Z)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

VERIFIED

3) State any one Absorption Law of Boolean Algebra and verify it using truth table (2018)(OD2009)(OD2008)(OD2005)(2002) 2

Ans) Absorption Laws:

(a) X+XY=X (b)X(X+Y)=X

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

X+X. Y=X

X	Y	X.Y	X+X.Y	X
0	0	0	0	0
0	1	0	0	0
1	0	0	1	1
1	1	1	1	1

OR

X. (X+Y) = X

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

OR

X+X'. Y=X+Y

X	Y	X'	X'.Y	X+X'. Y	X+Y
0	0	1	0	0	0
0	1	1	1	0	0
1	0	0	0	1	1
1	1	0	0	1	1

OR

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

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

4. Name the law shown below and verity it using a truth table. (2014)

X+X'.Y=X+Y

Answer :

X	Y	X'O	X'Y	X+X'Y	X+Y
0	0	1	0	0	0
0	1	1	1	1	1
1	0	0	0	1	1
1	1	0	0	1	1

Hence Proved

X+X'.Y=X+Y

This is absorption law (In some books it is written as as third distributive law.)

5. State DeMorgan's Laws of Boolean Algebra and verify them using truth table.
(2018MP)(2017) (OD2007) (2003)(1998)

Ans)(i) (X+Y)' = X'.Y' (ii) (X.Y)' = X'+Y'

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

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

State and verify De Morgan's law in Boolean Algebra. (D2008) (MP108-09 2

6)State and verify AssociativeLaw. (OD2006) 2

Ans) (D2005)

(i) X+(Y+Z)=(X+Y)+Z

X	Y	Z	Y+Z	X+Y	X+(Y+Z)	(X+Y)+Z
0	0	0	0	0	0	0
0	0	1	1	0	1	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

(ii) X.(Y.Z)=(X.Y).Z

X	Y	Z	Y.Z	X.Y	X.(Y.Z)	(X.Y).Z
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	1	0	0
1	1	1	1	1	1	1

7) Verify the following using truth table: (2012)2

(i) X,X' = 0

Ans

X	X'	X . X'	0
0	1	0	0
1	0	0	0

Verified

(ii) X+1=1

X	1	X +1
0	1	1
1	1	2

Verified

8) Verify X'Y + X.Y' + X'Y' = (X' + Y') using truth table. (D2009) 2

Ans)

X	Y	X'	Y'	X'Y	XY'	X'Y'	X'Y+XY'+X'Y'	X'+Y'
0	0	1	1	0	0	1	1	1
0	1	1	0	1	0	0	1	1
1	0	0	1	0	1	0	1	1
1	1	0	0	0	0	0	0	0

VERIFIED

Model 1B: Boolean Laws – Algebraic Method (2Marks)

1) State and verify De Morgan's law in Boolean Algebra. (MP109-10) **(D2008) 2**

Ans) (i) (X+Y)'= X'.Y' (ii) (X.Y)'= X'+Y'

Verification

(X+Y)'.(X+Y) = X'.Y'.(X+Y)
0 = X'.Y'.X + X'.Y'.Y
0 = X'.X .Y'+ X'.0
0 = 0 .Y'+ 0
0 = 0 + 0
0 = 0
L.H.S = R.H.S

2) State and verify Absorption Law in Boolean algebra.(OD2008) (OD2005)(2004) (MP208-09)2

Ans)(a) X+XY = X (b)X(X+Y) = X
(c)X+X'Y = X+Y (d) X.(X'+Y) = X.Y

Algebraic Verification:

(a) X+XY = X

LHS X+X.Y = X.1+X.Y
= X.(1+Y)
=X.1
=X RHS
Verified **OR**

(b)X(X+Y) = X

LHS X.(X+Y) = XX+X.Y
= X.1+X.Y
= X.(1+Y)
= X.1
=X RHS
Verified **OR**

(c)X+X'Y = X+Y

LHS X+X'. Y = (X+X')(X+Y)
= 1.(X+Y)
= X+Y RHS
Verified

OR

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

LHS X(X'+Y) = XX'+X.Y
= 0+X.Y
= X.Y RHS
Verified

3. Verify the following using Boolean Laws. (2016)2

X'+ Y'Z = X'.Y'.Z'+ X'.Y.Z'+ X'Y.Z+ X'.Y'.Z+ X.Y'.Z

Ans LHS =X' + Y'.Z
= X'.(Y + Y').(Z + Z') + (X + X').Y'.Z
= X'.Y.Z + X'.Y.Z' + X'.Y'.Z + X'.Y'.Z' + X.Y'.Z
+ X'.Y'.Z
= X'.Y.Z + X'.Y.Z' + X'.Y'.Z + X'.Y'.Z' + X.Y'.Z
= X'.Y'.Z' + X'.Y.Z' + X'.Y.Z + X'.Y'.Z + X.Y'.Z
= RHS

OR

RHS = X'.Y'.Z' + X'.Y.Z' + X'.Y.Z + X'.Y'.Z + X.Y'.Z
= X'.Y'.Z + X'.Y'.Z' + X'.Y.Z + X'.Y.Z' + X.Y'.Z
= X'.Y'.(Z+Z') + X'.Y.(Z+Z') + X.Y'.Z
= X'.Y' + X'.Y + X.Y'.Z
= X'.(Y'+Y) +X.Y'.Z
= X' + X.Y'.Z
= (X' + X).(X' + Y'.Z)
= X' + Y'.Z
= **LHS**

4.Verify the following using Boolean Laws.
U'+ V= U'V'+U'.V +U.V (2015)

L.H.S =U'+ V
=U'.(V+V')+ V.(U'+ U)
=U'.V + U'.V' + U'.V + U.V
=U'.V+U'.V'+U.V
=R.H.S

OR

R.H.S =U'V'+U'.V +U.V
=U'.(V'+ V)+ U.V
=U'.1 + U.V
=U'+ U.V
=U'+ V =L.H.S

5) Verify the following using Boolean Laws
X+Z = X + X'.Z + Y.Z (2013) 2

Ans: RHS X + X'.Z + Y.Z
= X + Z + YZ (X + X'Y = X+Y)
= X + Z.1 + Z.Y
= X + Z (1 + Y)
= X + Z.1
= X + Z LHS

6)Verify the following algebraically 2
(A'+B').(A +B)=A'.B+A.B' (2011)

Ans. LHS
(A' +B') . (A+B)
= A'.A + A'.B + A.B' + B'.B
= 0 + A'.B + A.B'+ 0
= A'.B + A.B'
= RHS (Verified)

7)Verify the following algebraically:(OD 2010)2
X'.Y + X.Y' = (X'+Y').(X+Y)

Ans. R. H . S
(X'+y').(x+y)
= x'.(x+y)+y'.(x+y)
= x.x'+X'.y+y'.x+y'.y
= x'.y+y'.X
= x'.y+x.y'

So L.H.S=R.H.S **OR**
L.H.S. = X'.Y + X.Y'
= (X'.Y+X) (X'.Y+Y')
= (X'+X).(Y+X).(X'+Y').(Y+Y')
= 1.(X+Y).(X' +Y').1 = (X+Y).(X'+Y') = R.H.S.

8) Verify X.Y'Z+X.Y'Z'+X'.Y'Z = X.Y' + Y'.Z algebraically. (2003)

9) Prove XY + YZ + Y'Z =XY + Z, algebraically. (2002)2

10) Prove algebraically:
x'y'z'+x'y'z+x'yz'+x.y'z=x'+y' (2001)

11) Prove X'.Y+Y'.Z= X'.Y.Z+X'.Y'.Z'+ X.Y'.Z+X'.Y'.Z algebraically. (2000)

12) Prove x+x'y=x+y algebraically. (1999)

13) Prove X+Y'Z=(X+Y'+Z')(X+Y'+Z)(X+Y+Z) algebraically. (1998)

Model 1C: Correct the Boolean Laws/Statements (2Marks)

Correct the following boolean statements:
1. X+1 = X 2. (A')'=A'
3. A+A'=0 4. (A+B)' = A.B (2017 MP)

A) 1. X+1 =1 or X+0=X 2. ((A')') = A
3. A + A'= 1 or A . A'=0 4. (A+B)' = A' . B'

Model 2A: Write SOP Form (1 Mark)

(Consider Only 1's combinations from the Result Column. Here Variable Value is 1)

1.Derive a Canonical SOP expression for a Boolean function F(X,Y,Z) represented by the following truth table: 2019MP1

X	Y	Z	F(X,Y,Z)
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans: F(X,Y,Z)= X'Y'Z'+X'Y'Z+XY'Z'+XYZ
OR
F(X,Y,Z)=Σ(0,1,4,7)

2) Write the SOP form for the Boolean Function F(X,Y,Z) represented by the given truth table:-

X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Ans) SOP Form is :
X'.Y'.Z + X'.Y.Z' + X.Y.Z' + X.Y.Z

3) Write the SOP form of a Boolean Function F, Which is represented by the following truth table: (D2005)1

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Ans) A'.B'.C' + A'.B.C + A.B.C' + A.B.C

4) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: (MP208-09)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

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

5) Try following:

A	B	C	F(A,B,C)
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

U	V	W	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Model 2B: Write POS Form (1 Mark)

(Consider Only 0's combinations from the Result Column. Here Variable Value is 0)

1. Derive a canonical POS expression for a Boolean function FN, represented by the following truth table. (2019)

X	Y	Z	F(X,Y,Z)
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

2) Derive a canonical POS expression for a Boolean function FN, represented by the following truth table. (2018)

X	Y	Z	FN(X,Y,Z)
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans: FN(X,Y,Z)=
(X+Y'+Z).(X+Y'+Z').(X'+Y+Z').(X'+Y'+Z)
OR
FN(X,Y,Z)= Π (2,3,5,6)

3. Write the POS form of a Boolean Function F, which is represented in a truth table as follows: (2017 MP)

P	Q	R	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

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

4) Write the POS form of a Boolean function H, which is represented in a truth table as follows:

A	B	C	H
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans) H(A,B,C) = (A+B+C).(A'+B+C').(A'+B'+C)
OR
H(A,B,C) = Π (0, 5, 6) **(D2009)**

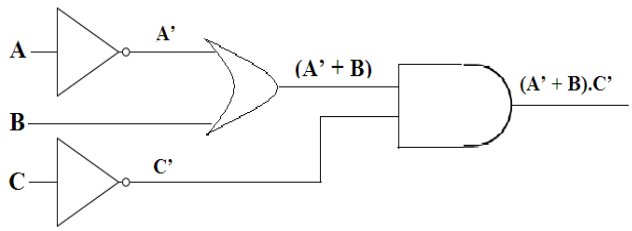
5) Try following:

X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

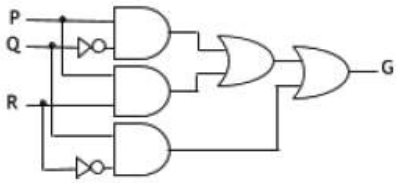
x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Model 3A: Write the Equivalent Boolean Expression (2 Marks)

1) Draw the equivalent logic circuit diagram of the following Boolean expression:- 2018 MP
(A' + B).C'

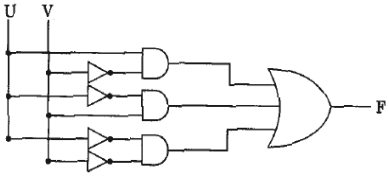


2.Write the Boolean Expression for the result of the Logic Circuit as shown below: (2016)



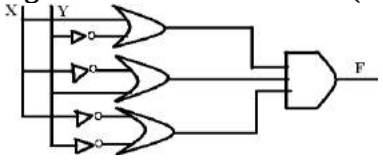
P.Q' + P.R + Q.R'

3) Write the equivalent expression for the following Logic Circuit : (OD2005)



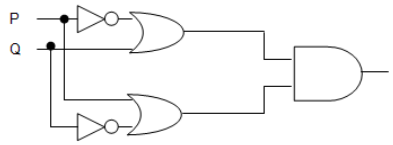
Ans) U.V'+U'.V+U'.V

4) Write the equivalent Boolean expression for the following Logic Circuit: (D2005)

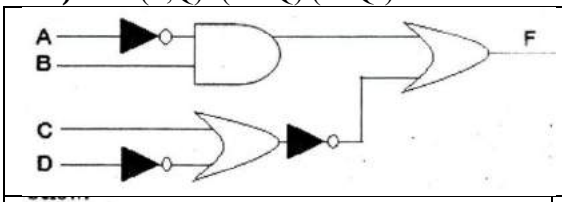
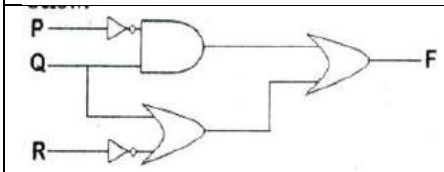
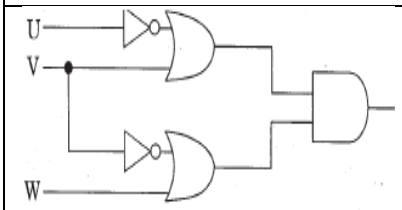
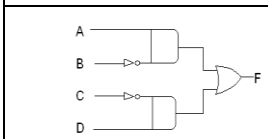
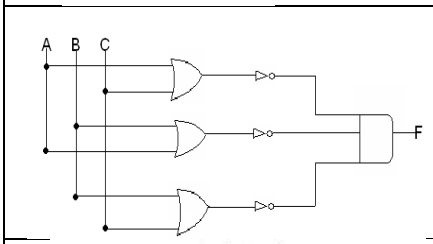
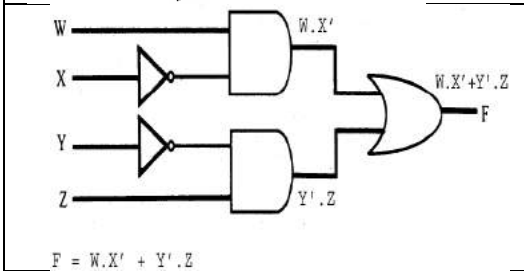
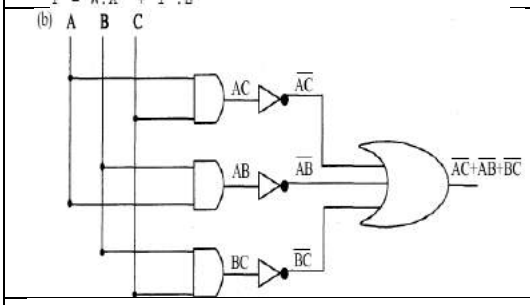
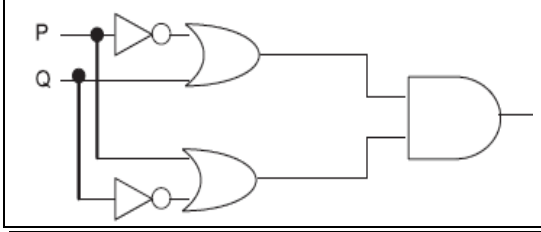


Ans) (X+Y')(X'+Y)(X'+Y')

5)Write the equivalent Boolean Expression for the following Logic Circuit (MP108-09) 2



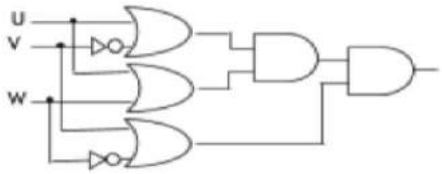
Ans) F(P,Q)=(P'+Q).(P+Q')

	**2014**
	**2013**
	**OD2010**
	**OD2007**
	**D2007**
	
	**OD2006**
	**MP109-10**

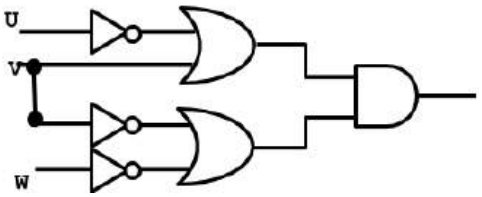
Model 3B: Draw the Logic Circuit (2 Marks)

1. Draw the Logic Circuit of the following Boolean Expression: A'B' + A.C 2019

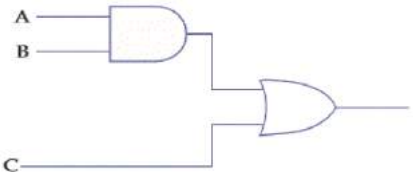
2.Draw the Logic Circuit of the following Boolean Expression:
((U + V').(U + W)). (V + W') 2019MP



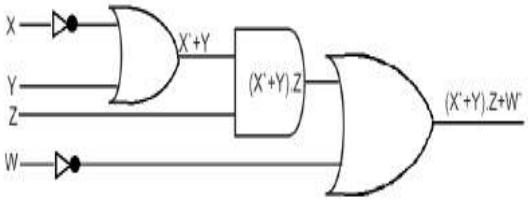
3) Draw the Logic Circuit of the following Boolean Expression: (U'+V).(V'+W') (2018)



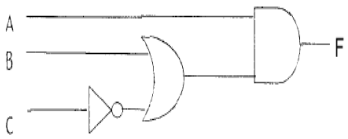
4.Draw the equivalent logic circuit for the following Boolean expression: (A.B)+C (2017MP)



5. Draw the Logic Circuit for the following Boolean Expression : (X'+Y).Z+W' **(2015)**

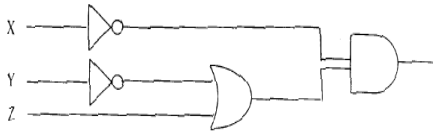


6) Draw a logical circuit diagram for the following Boolean Expression: (OD2008)1
A.(B+C')



Ans)

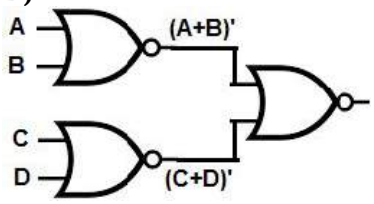
7) Draw a Logical Circuit Diagram for the following Boolean Expression. (D2008)1
X'.(Y'+Z)



7) Draw a logical circuit diagram for the following Boolean expression: A'.(B+C) 1

Model 3B: Draw the Logic Circuit Using NAND or NOR gates (2 Marks)

1. Draw the Logic Circuit of the following Boolean Expression using only NOR Gates:
(A+B).(C+D) (2017)



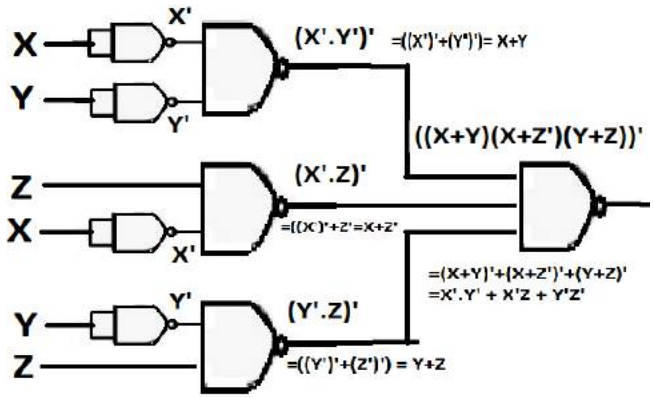
2) Represent the Boolean expression X'Y+Y'Z with the help of **NAND** gates only. (2000)

3) Represent the Boolean expression (X+Y)(Y+Z)(X+Z) with help of **NOR** gates only. (2002)1

4) Represent the Boolean expression (x+y)(y+z)(z+x) with the help of **NOR** gates only. (1999)

5) Represent the Boolean expression X+Y.Z' with the help of **NOR** gates only. (1998)

REPRESENT X'Y' + X'Z + Y'Z' using NAND gates only



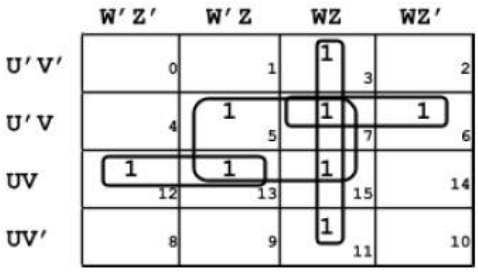
Model 4A: Reduce the Boolean Expression using K-Map Σ (3 Marks)

1. Reduce the following Boolean Expression to its simplest form using K-Map: 2019
F(P,Q,R,S) = Σ (0,1,2,3,5,6,7,10,14,15)

2.Reduce the following Boolean Expression to its simplest form using K-Map: 2019SP3
F(X,Y,Z,W)= Σ (0,1,2,3,4,5,8,10,11,14)

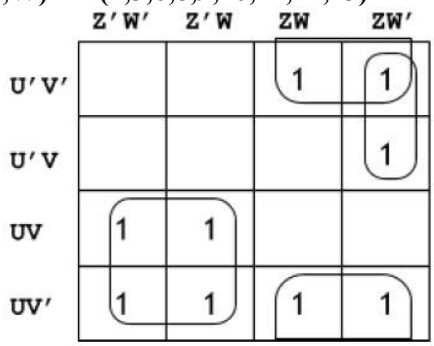
Answer: X'Z'+Y'W'+Y'Z+XZW'

3) Reduce the following Boolean Expression to its simplest form using K-Map:2018 (3)
G(U,V,W,Z) = ∑ (3,5,6,7,11,12,13,15)



F(U,V,W,Z)= VZ + WZ + UVW'+ U'VW

4. Reduce the following Boolean expression to its simplest form using K-Map: (2017)
E(U,V,Z,W)= Σ (2,3,6,8,9,10,11,12,13)

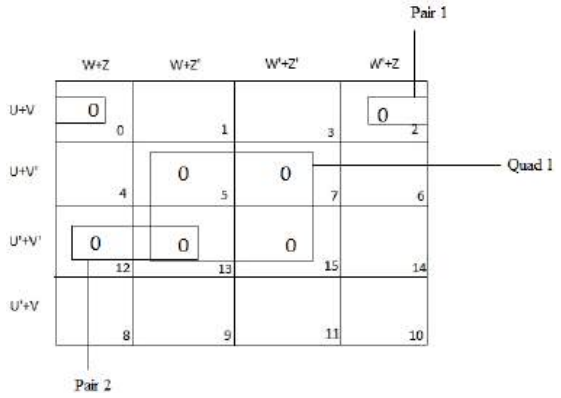


E(U,V,Z,W) = UZ' + V'Z + U'ZW'

K-MAP (SOP)	Year
F(A,B,C,D) = Σ (0,1,3,5,6,7,9,11,13,14,15)	2017
F(P,Q,R,S) = ∑ (0,4,5,8,9,10,11,12,13,15)	2016
F(X,Y,Z,W) = Σ(0,1,4,5,6,7,8,9,11,15)	2015
F(A,B,C,D) = Σ(1,3,4,5,6,7,12,13)	2014
F(U,V,W,Z) = Σ (0,1,2,3,6,7,8,9,10,13,15)	2013
F(A, B, C, D) = Σ (2, 3, 4, 5, 6, 7, 8, 10, 11)	2012, D2010
F(A, B,C, D) =∑(0,1, 2, 4, 5, 6, 7, 8, 10)	2011
F(U, V, W, Z) = Σ (3, 5, 7, 10, 11, 13, 15)	D2010
F (A,B,C,D) = Σ (3,4,5,6, 7,13,15)	OD2010
F(P,Q,R,S) = ∑ (1,2,3,5,6,7,9,11,12,13,15)	D2009
H(U,V,W,Z) = ∑(0,1,4,5,6,7,11,12,13,14,15)	OD2009
F(A,B,C,D) = ∑(0,1,2,,4,5,8,9,10,11)	OD2008
F(A,B,C,D) = ∑(0,2,3,4,6,7,8,10,12)	D2008
F(U, V, W, Z) = ∑(0,1,2,3,4,10,11)	D2007
F(P, Q, R, S,) = ∑(0,3,5,6,7,11,12,15)	D2006
F(A, B, C, D,) = ∑(0,1,2,3,4,5,10,11,15)	OD2005
F(a,b,c,d) = ∑(0,1,2,4,5,7,8,9,10,11,14)	2004
F(U,V,W,Z,)=∑(0,2,3,4,7,9,10,13,14,15)	2003
F(w,x,y,z)=∑(2,3,6,10,11,14)	2002
F(x,y,z,w)= ∑ (1,3,4,5,7,9,11,12,13,15)	2000
F (w,x,y,z) = ∑ (0,4,8,12	1999
F(U, V, W,Z) = ∑(0,1,3,5,7,9,10,11,12,13,14,15)	1998
F(A,B,C,D)= Σ (0,1,2,4,5,6,8,10)	MP108-09
F(A,B,C,D)=Σ(0,1,2,4,5,6,8,10)	MP109-10

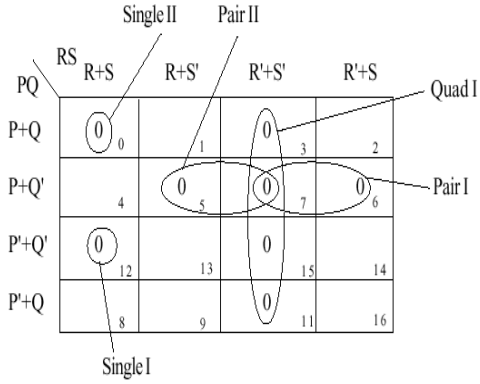
Model 4B: Reduce the Boolean Expression using K-Map Π (3 Marks)

1) Reduce the following Boolean expression using K-Map: F(U,V,W,Z)= π(0,2,5,7,12,13,15)
Ans) 2018MP
POS form using K-Map is given as:-



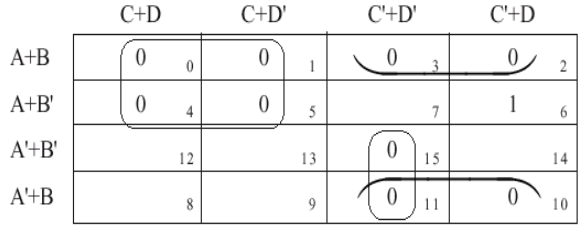
Quad 1: (V'+Z')
Pair 1: (U+V+Z)
Pair 2: (U'+V'+W)
POS Form: (V'+Z').(U+V+Z).(U'+V'+W)

2) Reduce the following Boolean expression using K – Map : (OD2006)3
F(P, Q, R, S,) = Π (0,3,5,6,7,11,12,15)



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

3) Reduce the following Boolean expression using K – Map : (D2005)3
F(A, B, C, D,) = Π (0,1,2,3,4,5,10,11,15)
Ans) F(A, B, C, D,) = Π (0,1,2,3,4,5,10,11,15)



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

$F\ (A,\ B,\ C,\ D) = \sum(6,\ 7,\ 8,\ 9,\ 12,\ 13,\ 14)$

K-MAP (POS)	Year
F(A, B, C, D,) = Π (5, 6, 7, 8, 9, 12, 13, 14, 15)	OD2007
F(a,b,c,d) = Π (0,1,3,4,5,7,8,9,11,12,13,15)	2001
F(U,V,W,Z)= Π (0,1,2,4,5,6,8,10)	MP208-09
F(A,B,C,D)= Π (1,3,4,5,7,9,11,12,13,14)	
F(U,V,W,Z)= Π (0,1,2,4,5,6,8,10)	MP209-10

Model 5A: Convert the expression into SOP (1Mark)

1) Convert the following Boolean expression into its equivalent Canonical Sum of Product Form (SOP): (D2008)2
(X'+Y+Z').(X'+Y+Z).(X'+Y'+Z).(X'+Y'+Z')

Ans) F(X,Y,Z) = Π (4,5,6,7) = ∑ (0,1,2,3)
=X'Y'Z' + X'Y'Z + X'YZ' + X'YZ

Write equivalent Canonical SOP for following	Year
F(X, Y,Z) = Π (1,3,6,7)	D2007
(U'+V'+W').(U+V'+W').(U+V+W).	

Model 5B: Convert the expression into POS (1Mark)

1) Convert the following Boolean expression into its equivalent Canonical Product of sum form (POS): A.B'C + A'.B.C + A'.B.C'. (OD200)2
Ans) A.B'C + A'.B.C + A'.B.C'
= m5 + m3 + m2
= ∑(2,3,5)
= Π (0,1,4,6,7)
= (A+B+C)((A+B+C')(A'+B+C)(A'+B'+C)(A"+B'+C')

2) Write the equivalent canonical product of sum expression for the following sum of product expression: (OD2007)2
F(X, Y,Z) = ∑ (0, 2,4,5)
Ans)F(X, Y, Z) = **Π** (1, 3, 6, 7)
OR
F=(X+Y+Z')(X+Y'+Z')(X'+Y'+Z)(X'+Y'+Z')

Model 6A: Express the following in SOP (1 Mark)

1) Express P +Q'R in canonical SOP form. (D2006)1
(P + Q'R) = P.1.1 + 1.Q'.R
= P (Q+Q')(R+R') + (P+P')Q'R
= (PQ +PQ') (R + R') + PQ'R + P'Q'R
= PQR + PQ'R + PQR' + PQ'R' + PQ'R+ P'Q'R
= PQR + PQ'R + PQR' + PQ'R' + P'Q'R

Model 6B: Express the following in POS (1 Mark)

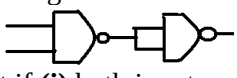
1) Express P +Q'R in POS form. (OD 2006)1
P +Q'R = (P+Q').(P+R)
= (P+Q'+0).(P+0+R)
= (P+Q'+RR').(P+QQ'+R)
= (P+Q'+R) (P+Q'+R') (P+Q+R)(P+Q'+R)
= (P+Q'+R).(P+Q'+R').(P+Q+R)

Model 7: Mislleneous Models

Write the dual of the followins Boolean Expression

(B'+C).A	2003
(x+y).(x'+y')	1999
(U+W)(V'U+W)	1998

2) Seven inverters are cascaded one after another. What is the output if the input is 1? **(2001)**
3) Given the following circuit:



What if the output if **(i)** both inputs are FALSE(0)
(ii) one is FALSE and the other is TRUE.
4) State and verify Duality Principle. **(2001)**

14.COMMUNICATION AND NETWORK CONCEPTS

Full Forms :

It is very very important model. Will be asked for one or two marks. I have given previously asked full forms in bold. For an example, 2 or 3 old questions I have given below:

1)Write the expanded names for the following abbreviated terms used in Networking and communications: 2019

(i) MBPS (ii) WAN (iii) CDMA (iv) WLL

2) Expand the following:- 2018 MP1

1. GSM 2. TDMA

NETWORKS FULL FORMS

ARPANET - Advanced Research Projects Agency Network
CDMA – Code Division Multiple Access
TDMA - Time Division Multiple Access
FTP - FILE TRANSFER PROTOCOL
FSF - FREE SOFTWARE FOUNDATION
GPRS – General Packet Radio Service
GNU - GNU's not Unix
GSM – Global System for Mobile (communication)
HTML - Hyper Text Markup Language
HTTP – Hyper Text Transfer Protocol
MAN - Metropolitan Area Network
MODEM - Modulator - Demodulator
MBPS - Mega Bytes Per Second
PPP - Point To Point Protocol
SMS - Short Message/Messaging Service
SMTP – Simple Mail Transfer Protocol
TCP/IP - Transfer Control Protocol/Internet Protocol
URL – Uniform Resource Locator
VoIP - Voice Over Internet Protocol
WAN - Wide Area Network
WLL(WiLL) – Wireless in Local Loop
WWW - World Wide Web
XML – eXtensible Markup Language

THE ABOVE FULL FORMS ARE PREVIOUSLY ASKED QUESTIONS

NSFNET - National Science Foundation Network
LAN - Local Area Network
PAN - Personal Area Network
NIU - Network Interface Unit
NIC - Network Interface Card
TAP - Terminal Access Point(NIU = NIC = TAP)
bps - Bits Per Second
Bps - Bytes Per Second
Kbps – Kilo bits Per Second
KBps – Kilo Bytes Per Second
Mbps - Mega Bits Per Second
Gbps - Giga Bits Per Second
GBps – Giga Bytes Per Second
KHz – Kilo Hertz
MHz – Mega Hertz
GHz – Giga Hertz
THz – Tera Hertz

NFS – Network File System
VGM – Voice Grade Medium
DGM – Data Grade Medium
STP – Shielded Twisted Pair
UTP – Unshielded Twisted Pair
LED – Light Emitting Diode
LD – Laser Diode
OFC – Optic Fiber Cable, Fiber Optic Cable
PDA – Personal Digital Assistants

AM – Amplitude Modulation
FM - Frequency Modulation
PM – Phase Modulation
A/F – Audio Frequency
(Txd – Transmit, Rxd – Receive,
RTS – Request to Send, CD –Carrier Detect,
DSR – Data Set Ready, CTS – Clear to Send
DTR – Data Terminal Ready)
RJ45 – Registered Jack – 45
BNC – Bayone – Neill – Concelman
AUI – Attachment Unit Interface

SNA – Systems Network Architecture
VFIR – Very Fast Infrared
URI – Uniform Resource Identifier
URN – Uniform Resource Name
P-P - Point to Point
MIME – Mail and Multipurpose Internet Mail Extensions
POP – Post Office Protocol
NNTP – Network News Transfer Protocol
HTTP – Hyper Text Transfer Protocol
NTP – Network Time Protocol
IMAP – Internet Mail Transfer Protocol
SLIP – Serial Line Internet Protocol
SIP – Session Initiation Protocol
PPP - Point to Point Protocol
IPCP – IP Control Protocol
NCP – Network Control Protocol
LCP – Link Control Protocol
ITU – International Telecommunications Union
PC – Personal Computer
ISP – Internet Service Provider
SIM – Subscriber Identity Module
TDM – Time Division Multiplexing
IDEN – Integrated Digital Enhanced Network
WCDMA –Wideband CDMA
PSTN – Public Switched Telephone Network
1G, 2G, 3G, 4G, 5G – Fifth Generation
UMTS – Universal Mobile Telecommunications System / Universal Mobile Telephone System
EDGE – Enhanced Data rates for Global Evolution
SMSC – Short Message Service Center
HLR – Home Location Register
Email – Electronic Mail
Fax – Fascimile
VSNL – Videsh Sanchar Nigam Limited
DNS – Domain Name Server
DHTML– Dynamic Hyper Text Markup Language
DECnet – Digital's family of communication protocols
IE – Internet Explorer
WiFi - Wireless Fidelity
LTE – Long Term Evolution
HDTV – High Definition Television
WiMAX -Worldwide Interoperability for Microwave Access
ISD - International Subscriber Dialing
ISDN - Integrated Services Digital Network
IRC - Internet Relay Chat
BWA – Broadband Wireless Access
PHP - Hypertext Preprocessor (earlier called Personal Home Page)
UNCITRAL – United Nation's Commission for International Trade related laws.
IT Act – The Information Technology Amendment Act
IP – Intellectual Property
FAT – File Allocation Table

Theory Question: Fundamental Concepts

1) Mention one advantage of networking(2001). 1

Ans: Advantages/Need for networking or Network Goals:

(i) Resource Sharing: Hardware Resources like printers, Softwares can be shared between all computers in the network.

(ii) Reliability: A file can have copies in two or more computers.

(iii) Cost Factor

(iv) Communication Medium: Using a network, it is possible for managers, working far apart, to prepare financial report of the company, etc

2) What was the role of ARPANET in the Computer Network? (D2010)1m

OR

What is the significance of ARPANET in the network? (MP108-10) 1

Ans) The first evolution of network was jointly designed by The Advanced Research Projects Agency (ARPA) and Department of Defence (DoD) of united states 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. This ARPANET was handed over to Defence Communication Agency (DCA) for further development.

3) What is NFS? (2001) 1

4) Differentiate between Internet and Intranet. (D2006) 1

Ans)Internet is a network of computer networks which operates world-wide using a common set of communications protocols.

Intranet is an inter-connected network within one organization that uses Web technologies for the sharing of information internally.

5) What do you understand by a backbone network? (1998)1

Ans: A backbone is central interconnecting structure that connects one or more networks just like the trunk of a tree or the spine of a human being.

LAN,MAN,WAN,PAN

1.Assume that 50 employees are working in an organization. Each employee has been allotted a separate workstation to work. In this way, all computers are connected through the server and all these workstations are distributed over two floors. In each floor, all the computers are connected to a switch. Identify the type of network? 2019MP1

Ans: LAN(Local Area Network)

2) Daniel has to share the data among various computers of his two offices branches situated in the same city. Name the network (out of LAN, WAN, PAN and MAN) which is being formed in this process. (2017MP)1

Ans : MAN

3. Differentiate between PAN and LAN types of networks. (2016)1

PAN (Personal Area Network)	LAN (Local Area Network)
A personal area network PAN is a computer network organized around an individual person.	LAN interconnects a high number of access or node points or stations within a confined physical area upto a kilometer

4. Which type of network (out of LAN, PAN and MAN) is formed, when you connect two mobiles using Bluetooth to transfer a Video. 2013

Ans: PAN (Personal Area Network)

5 In networking, what-is WAN? How is it different from LAN? (2011)1

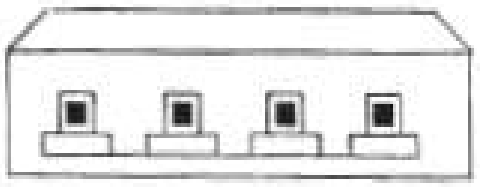
Ans A WAN (wide area network), is not restricted to a geographical location, although it might be confined within the bounds of a state or country. A WAN connects several LANs, and may be limited to an enterprise (a corporation or an organization) or accessible to the public. The technology is high speed and relatively expensive. The Internet is an example of a worldwide public WAN.

A LAN (local area network) is a group of computers and network devices connected together, usually within the same building or campus.

6) What is the difference between LAN and WAN?

Ans LAN (Local Area Network): (OD2009)1

Interconnects a high number of access or node points or stations within a confined physical area. An example is the territory covered in a single office building that houses various departments/offices. All these areas are interconnected using a LAN.



WAN (Wide Area Network)

It is used to connect systems with no limitation of geographical area. It is used to serve many locations distributed over a large geographical area. A system of overnight teller machines used by a banking organisation covering the North of India is an example of a WAN. Internet is also an example of the same.

7) What is the difference between MAN and WAN? (2003)(1999) 1m

8) What is the difference between LAN and WAN? (2000) 1m

LAN	WAN
Diameter of not more than a few kilometers.	Span entire countries
A total data rate of atleast several Mbps	Data rate less than 1 Mbps(Megabits per Second)
Complete ownership by a single organization	Owned by multiple organization
Very low error rates	Comparatively higher error rates

9) What is the difference between LAN and MAN? (1998) 1

SWITCHING TECHNIQUES

1) Name two switching techniques used to transfer data between two terminals(computers). (D2009)1

Ans Circuit Switching , Message Switching and Packet Switching

2) What is the difference between Message Switching technique and Packet Switching technique? (2015) (D2005)(2002) 1m

Ans:

Message Switching	Packet Switching
The source computer sends data (**message**) to the switching office, which stores data in a **buffer**. It then looks for a free link to another switching office and sends data to that office. This process continues until data is delivered to the destination computer	The source computer sends data (message) in a fixed size of **Packet** to the switching office, which stores data in **main memory**. It then looks for a free link to another switching office and sends data to that office. This process continues until data is delivered to the destination computer
Message Switching follows store and forward principle for complete message.	Packet Switching follows store and forward principle for fixed packets
No limit on block size.	Fixes an upper limit for packet size

3) Define Packet switching? (2004) 1m

4) Compare any two Switching techniques. MP109-10)1

GUIDED & UNGUIDED MEDIA

1. Your friend wishes to install a wireless network in his office. Explain him the difference between guided and unguided media. (2019MP)1

Answer: Guided media uses cables to connect computers, whereas unguided media uses waves.

2.Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies. (2017)2

Ans)

Optical Fibre	Ethernet Cable
Very Fast	Slower as compared to Optical Fiber
Expensive	Less Expensive as compared to Optical Fiber
Immune to electromagnetic interference	Prone to electromagnetic interference

3. Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication? (2015)1

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber

Ans (i) Wired - Optical Fiber

(ii) Wireless - Infrared OR Microwave

4. Write two advantages of using an optical fibre cable over an Ethernet cable to connect two service stations, which are 200m away from each other. (2014) 1

Ans: Two advantages of using an optical fibre cable over an Ethernet cable:

Provides high speed

Electrical and magnetic interference does not affect the transmission.

5. How is Coaxial cable different from Optical Fibre? (D2008)(OD2005)1

Ans) Coaxial Cable: Comparatively Slow, Economic, convenient to lay down, used in Bus topology of networks

Optical Fibre: Very fast, expensive, reliable, no interference

6) Write one difference between Coaxial and optical cable? (2004)1

7) Write an advantage and a disadvantage of using optical fibre cables? (2003)1

8) Name two transmission media for networking. (OD2006) 1m

Ans) Optical Fiber,Ethernet Cable or twisted pair cable or UTP or STP,Co-axial Cable,,Infrared, Radio Link OR Radiowave, Microwave link OR Microwave, Satellite Link

9) Name two communication channels used in networking and explain any one. (2001)2

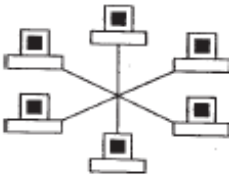
TOPOLOGIES:

1) Differentiate between Bus Topology and Star Topology of Networks. What are the advantages and disadvantages of Star Topology over Bus Topology? (2018)(D2009)(D2006)

Ans: Bus Topology: It is characterised by common transmission medium shared by all the connected hosts, managed by dedicated nodes. It offers simultaneous flow of data and control.

Bus

Star Topology: It is characterised by central switching node (communication controller) and unique path (point to point link) for each host. It is easy to add and remove additional hosts by upgrading the centralised node.



Star

Advantages of Star Topology over Bus Topology: ● Faster communication as compared to Bus topology ● Independent line of connection allows freedom of removing or adding nodes from the network
*Fault detection is easy.
*Fault isolation is easy.

Disadvantages of Star Topology over Bus Topology: ● Expensive as compared to Bus topology ● Long cable length

2) Write two advantages and two disadvantages for STAR topology? (2004)1

3) Write one advantage and one disadvantage of the following topologies in network: (2003)2
i)STAR Topology ii)BUS Topology

4) Mention one difference between Linear and Star topologies in networking. (2001)1

5) Write the two advantages and two disadvantages of BUS Topology in network? (2000)2

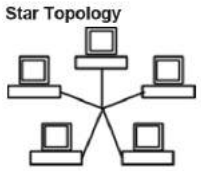
6) Write two advantages and disadvantages of the following topologies in a Network. (2002)1
i) BUS ii)RING

7) Give two advantages and disadvantages of following network topologies: (1999)2
i)BUS ii) Tree

8) Identify the type of topology on the basis of the following: (2017MP)
a. Since every node is directly connected to the server, a large amount of cable is needed which increases the installation cost of the network.
b. It has a single common data path connecting all the nodes. 2

Ans: a. Star Topology b. Bus Topology

9. Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks. (2015)2

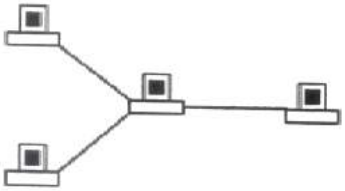


OR any valid illustration of Bus and Star Topology.

10) Write one advantage of Bus Topology of network. Also, illustrate how 4 computers can be connected with each other using star topology of network. (2012)2

Ans Cable length required for this topology is the least compared to other networks.

Illustration of 4 computers connected with each other using star topology of network.



Theory Question : Communication Devices

1)What is the purpose of using a repeater in the context of networking? (2003)1

2) What are repeaters? (1998)1

A) A repeater is a network device that amplifies and restores signals for long distance transmission.

It is used in long network lines, which exceed the maximum rated distance for a single run.

Repeaters are of two types:

(i)Amplifier : amplifies all incoming signals over the network. (it amplifies both the signal and any concurrent noise)

(ii) Repeater : collected inbound packet and then retransmits the packet as if it were starting form the source station.

3) What is a Hub? (D2008)1

Ans)A Hub is used for a central connection between two or more computers on a network.

OR

A Hub is a network device used to connect two or more computers. **OR**

A Hub is an unintelligent network device to connect computers.

Hubs are of two types:

(i) Active hubs: electrically amplify the signal as it moves from one connected device to another.

(ii) Passive hubs: allow the signal to pass from one computer to another without any change.

4) What is a Modem? (OD2008)1

Ans) Modem is a Modulation Demodulation device that converts analog signal to digital signal and vice versa.

5) What is the purpose of using a MODEM?(2000)1

6) What is a Modem? (2002)1

7) What is a bridge? (1999)1

A) A bridge is a device that lets you link two networks together. Bridges are smart enough to know which computers are on which side of the bridge, so they only allow those messages that need to get to the other side to cross the bridge. This improves performance on both sides of the bridge.

As a packet arrives at the bridge, the bridge examines the physical destination address of the packet. The bridge then decides whether or not to let the packet cross.

OR

A bridge is a network device that establishes an intelligent connection between two local networks with the same standard but with different types of cables.

8) What are Routers? (2000)1

A) A router is a network device that is used to separate different segements in a network to improve performance and reliability. A router works like a bridge but can handle different protocols.

Compared to hubs and switches, routers are smarter still. Routers use a more complete packet address to determine which router or workstation should receive each packet next. Based on a network road map called arouting table routers can help ensure that packets are travelling the most efficient paths to their destination. If a link between routers fails, the sending router can determine an alternate route to keep traffic moving.

DATA TRANSFER UNITS

1) Define the term Bandwidth. Give any one unit of Bandwidth. (MP208-10)(MP209-10)1

Ans) The amount of data that can be transmitted in a fixed amount of time is known as bandwidth.

For digital devices, the bandwidth is usually expressed in bits per second(bps) or bytes per second. For analog devices, the bandwidth is expressed in cycles per second, or Hertz (Hz) **OR**

Bandwidth is referred to the volume of information per unit of time that a transmission medium (like an Internet connection) can handle.

2) Which of the following is not an unit for data transfer rate? (D2010)1

(i) bps (ii) abps (iii) gbps (iv) kbps

Ans. (ii)abps

3) Which of the following is not a unit for data transfer rate? (OD2010)1

(i) mbps (ii) kbps (iii) sbps (iv) gbps

Ans. (iii) sbps

4) Which of the following unit measures the speed with which data can be transmitted from one node to another node of a network? Also, give the expansion of the suggested unit. (D2007)1

i) Mbps ii) KMps iii) MGps

Ans) Mbps (Mega Bits Per Second)

Theory Question : Protocols (1 Mark)

1) Tarani Wadhwa is in India and she is interested in communicating with her uncle in Australia. She wants to show one of her own designed gadgets to him and also wants to demonstrate its working without physically going to Australia. Which protocol out of the following will be ideal for the same? 2019

(i) POP3 (ii) SMTP (iii)VoIP (iv)HTTP

Ans)

2)Which protocol helps us to transfer files to and from a remote computer? (2016)

Ans) FTP OR Telnet OR TCP

3) What out of the following, will you use to have an audio-visual chat with an expert sitting in a far-away place to fix-up a technical issue? 2012

(i) VolP(ii) Email(iii) FTP

Ans (ii) VolP

4) What is protocol? Which protocol is used to search information from internet using an internet browser? (D2009)

Ans) A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules. Protocol used to search information from internet using an internet browser is :TCP/IP OR HTTP

5) What is protocol? Which protocol is used to copy a file from/to a remotely located server?

Ans A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules. Protocol used to copy a file from/to a remotely located server is FTP (File Transfer Protocol) **(OD2009)**

6. What is the difference between HTTP and FTP?

Ans: (2013)1

HTTP	FTP
1. HTTP, is a protocol used to transfer files from a web server onto a browser in order to view a Web page that is on the Internet.	1. FTP, is a protocol used to upload files from a workstation to a FTP server or download files frofn a FTP server to a workstation.
2. It is used to define the format and Transfer the web page.	2. It is used to transfer the file from one system to another.

7) What is the purpose of using FTP? (1999)1

SECURITY

1) Damodar Mohan has been informed that there had been a backdoor entry to his computer, which has provided access to his system through a malicious user/programs, allowing confidential and personal information to be subjected to theft. It happened because he clicked a link provided in one of the pop-ups from a website announcing him to be winner of prizes worth 1 Million Dollars. Which of the following has caused this out of the following?

(i) Virus (ii) Worm (iii) Trojan Horse

Also, mention, what he should do to prevent this infection. (**2019)2**

Ans)

2) Kabir wants to purchase a Book online and placed the order for that book using an e-commerce website. Now, he is going to pay the amount for that book online using his Mobile, he needs which of the following to complete the online transaction:- 2018 MP 1

1. A bank account,
2. A Mobile connection/phone which is attached to above bank account,
3. The mobile banking app of the above bank installed on that mobile
4. Login credentials(UserId & Password) provided by the bank,
5. All of above.

Ans) Option No 5

3) What do you mean by data encryption? For what purpose it is used for? 2018 MP 1

Ans) Data encryption is a technique used for data security in which original message is converted or encoded using an algorithm into a form not understood by anyone except the person who has the key to decode it.

4) Arun opened his e-mail and found that his inbox was full of hundreds of unwanted mails. It took him around two hours to delete these unwanted mails and find the relevant ones in his inbox. What may be the cause of his receiving so many unsolicited mails? What can Arun do to prevent this happening in future? 2019MP2

Ans: Arun's email has been attacked with spam. These may be promotional mails from different advertisement groups. Arun must have checked some promotional offers while surfing the Internet. He should create filters in his email to stop receiving these unwanted mails.

5) Which out of the following does not come under Cyber Crime? 2018 MP 1

(i) Copying data from the social networking account of a person without his/her information & consent.
(ii) Deleting some files, images, videos, etc. from a friend‟s computer with his consent.
(iii) Viewing & transferring funds digitally from a person‟s bank account without his/her knowledge.
(iv) Intentionally making a false account on the name of a celebrity on a social networking site.

Ans) (ii)

6)Janish Khanna used a pen drive to copy files from his friend's laptop to his office computer. Soon his office computer started abnormal functioning. Sometimes it would restart by itself and sometimes it would stop different applications running on it. Which of the following options out of (i) to (iv), would have caused the malfunctioning of the computer? Justify the reason for your chosen option:

(i) Computer Virus (ii) Spam Mail
(iii) Computer Bacteria (iv) Trojan Horse (2017)

Ans) (i) Computer Virus **OR** (iv) Trojan Horse

Justification:

● Pen drive containing Computer Virus / Trojan Horse was used before the abnormal functioning started, which might have corrupted the system files.
● Computer Virus/ Trojan Horse affects the system files and start abnormal functioning in the computer

7) Ms. Raveena Sen is an IT expert and a freelancer. She recently used her skills to access the Admin password for the network server of Super Dooper Technology Ltd. and provided confidential data of the organization to its CEO, informing him about the vulnerability of their network security. Out of the following options (i)to (iv), which one most appropriately defines Ms.Sen?

Justify the reason for your chosen option:
(i) Hacker (ii) Cracker
(iii) Operator (iv) Network Admin **(2017)2**

Ans) (i) Hacker : A Hacker is a person who breaks into the network of an organization without any malicious intent.

8) Who is a hacker? (2017MP)1

Ans: A computer enthusiast, who uses his computer programming skills to intentionally access a computer without authorization is known as hacker. A hacker accesses the computer without the intention of destroying data or maliciously harming the computer.

9)How is a Hacker different from a Cracker?

Ans) Hackers are the ones who get into someone's code or computer without any malicious intentions, where as Crackers are the one's who get into someone's code or computer with malicious intentions. **(OD2008)1**

9) Difference between Hackers and Crackers? (OD2006)1

Ans)Hackers: Computer enthusiasts who enjoy learning about computer systems and get into other system/network for gaining more knowledge or may find flaws in the system for rectification purposes.

Crackers: Malicious programmers who break into secure systems for stealing and corrupting/spoiling data.

10) What is the basic difference between Computer Worm and Trojan Horse? (2016)1

Trojan Horse	Computer Worm
It is a 'Malware' computer program presented as useful or harmless in order to induce the user to install and run them.	It is a self replicating computer program which uses a network to send copies of itself to other computers on the network and it may do so without any user intervention.

11) What is Trojan Horse? (2015) 1

Ans A Trojan Horse is a code hidden in a program, that looks safe but has hidden side effects typically causing loss or theft of data, and possible system harm.

12) What is the difference between Trojan Horse and Virus in terms of computers? (D2010)1

Ans. TROJAN HORSE: "Malware" computer programs presented as useful or harmless in order to induce the user to install and run them.
VIRUS: Virus is a malicious program that damages data and files and causes harm to computer system.

13) What is the difference between Virus and Worms in the computers? (OD2010)1
Ans.Virus: Virus is a malicious program that damages data and files and causes harm to computer system.
Worms: Worms disrupt services and create system management problems. In some cases worms can install viruses that cause damage to system.

14) How Trojan Horses are different from Worms? Mention any one difference. (MP209-10)1
Ans)A Trojan horse is a term used to describe malware that appears, to the user, to per form a desirable function but, in fact, facilitates unauthorized access to the user's computer system.
A computer worm is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computers on the network) and it may do so without any user intervention.

15) What term we use for a software/hardware device, which is used to block, unauthorized access while permitting authorized communications. This term is also used for a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria. (D2010)1
Ans. Firewall
Firewall: Any of a number of security schemes (hardware/software) that
prevent unauthorized users from gaining access to **a** computer network or that monitor transfers of information to and from the network.

16)Define the term firewall. (MP208-10)1
Ans) 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.

17) How firewall protect our Network? (MP209-10)1
Ans)A **firewall** is a part of a computer system or network that is designed to block unauthorized access while permitting authorized communications. It is a device or set of
devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria.

18) What do you mean by IP Address? How is it useful in Computer Security? 1
Ans) An Internet Protocol (IP) address is a numerical identification and logical address that is assigned to devices connected in a computer network.An IP Address is used to uniquely identify devices on the Internet and so one can quickly know the location of the system in the network.

19) What do you mean by Spam Mails? How can you protect your mailbox from Spams? (2000)
Ans) Spam mails, also known as junk e-mail, is a subset of spam that involves nearly identical messages sent to numerous recipients by e-mail.
We can protect our mailbox from spams by creating appropriate filters.

20)Give two major reasons to have network security. (MP108-10)1
Ans) 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.

INTERNET : OTHERS

1) Give two differences between 3G and 4G telecommunication technologies. 2019
Ans)

2) Write two advantages of 3G over 2G Mobile Telecommunication Technologies in terms of speed and services? (2016)1
Ans Speed -
● Faster web browsing ● Faster file transfer
Service -
● Better video clarity ● Better security

3) A teacher provides **2018 MP "http://www.XtSchool.com/default.aspx"** to his/her students to identify the URL & domain name.
Ans) **URL:** http://www.XtSchool.com/default.aspx
Domain name: XtSchool.com

4) What is the significance of cookies stored on a computer? 2018 MP 1
Ans) Cookies is small text file that web servers send to a web browser so that the web server can keep track of the user‟s activity on a particular website.

5) What is the difference between E-Mail and Chat? (2014)1
Ans: In Email, it is not necessary that receiver should be present online when the receiver is sending the E-mail, whereas in Chat, it is must that the communicators should be online at the time of communication.

6) Name any two common Web browsers. (OD2010)1
Ans. Internet explorer,Firefox,Netscape Navigator, Google Chrome, Opera, Safari

7)What is the purpose of using a Web Browser? Name any one commonly used Web Browser. (MP108-10)1

Ans) 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

8) Give one suitable example of each URL and Domain Name (2012)1

Ans URL Example: http://www.w3schools.com/htmlldefault.asp **OR** www.youtube.com

Domain Name Example: w3schools.com

OR

Any other correct URL and Domain Name Examples

Note: Domain names in both the examples may/may not be same

9) What is the importance of URL in networking? (MP208-10) (MP209-10)1

Ans) 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. . A URL is also referred to as a Web 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).

10. What is WEB2.0? (2011)1

Ans The term Web 2.0 is associated with **web applications that facilitate participatory information sharing,** interoperability, **user-centered design, and collaboration on the World Wide Web.** Web 2.0 is also used for social networking. Example: **Social Networking Sites, Blogs, Facebook,** Video Sharing Sites, Video Conferencing Applications etc.

11.Write two characteristics of Web 2.0. (2016) 1

Ans ● Makes web more interactive through online social medias

● Supports easy online information exchange

● Interoperability on the internet

● Video sharing possible in the websites

12. Write two characteristics of Wi-Fi. 2014 (1)

Ans: The characteristics of Wi-Fi are as follows:

1. It allows the devices to connect with the netwok without any wire.
2. Group of devices can be connected with single internet connection.

13. Write any two important characteristics of Cloud Computing. 2014

Ans:Two characteristics of Cloud Computing are:

(i) It is controlled by entity and restricted to their authorized user.

(ii) It is delivered through internet 24 X 7.

14. Describe the following in brief: (1998)2

i)MOSAIC ii)Usenet

Theory Question : Cyber Crimes

1) Which out of the following does not come under Cyber Crime? 2018 MP 1

(i) Copying data from the social networking account of a person without his/her information & consent.

(ii) Deleting some files, images, videos, etc. from a friend‟s computer with his consent.

(iii) Viewing & transferring funds digitally from a person‟s bank account without his/her knowledge.

(iv) Intentionally making a false account on the name of a celebrity on a social networking site.

Ans) (ii)

2) Out of the following, which all comes under cyber crime? (2015)1

(i) Stealing away a brand new hard disk from a showroom.

(ii) Getting in someone's social networking account without his consent and posting on his behalf.

(iii) Secretly copying data from server of a organization and selling it to the other organization.

(iv) Looking at online activities of a friends blog.

Ans (ii) & (iii)

3) Which out of the following comes under Cyber Crime? (2012)1

(i) Operating someone's Internet banking account, without his knowledge.

(ii) Stealing a keyboard from someone's computer.

(iii) Working on someone's computer with his/her permission.

Ans (i) Operating someone's Internet banking account, without his knowledge.

4) What is the significance of Cyber law? (OD2007)(D2007)1

Ans) Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including intellectual property, privacy, freedom of expression, and jurisdiction. **OR**

Cyber law helps prevent Cyber Crime, Hacking, Data theft, Software Piracy and protects rights of Cyber Users. **OR**

Restricting unauthorized access to user accounts. Promoting, coordinating and controlling e-business.

5) Write two application of Cyber Law. (D2005)1

Ans)Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including intellectual property, privacy, freedom of expression, and jurisdiction.

6) If someone has hacked your Website, to whom you lodge the Complain? (MP1 09-10)1

Ans) The complaint has to be lodged with the Police under IT Act.

Theory Question : XML & HTML

1. Differentiate between XML and HTML. (2011) (OD2005) 1

HTML	XML
Full form is Hyper Text Mark Up Language	**Full form of XML is extensible mark up language**
It contains predefined tags	It contains user defined tags
predominant markup language for the creation of web pages.	Initially visualized as a language for defining new document formats for the World Wide Web
It provides a means to describe the structure of text-based information in a document by denoting certain text as headings, paragraphs, lists, and to supplement that text with interactive forms, embedded images, and other objects using predefined Tags.	XML is textbased formats that provide mechanisms for describing document structures with the help of user defined Tags.

2) When do you prefer XML over HTML and why? (MP209-10)1

Ans) The first benefit of XML is that because you are writing your own markup language, you are not restricted to a limited set of tags defined by proprietary vendors.

Rather than waiting for standards bodies to adopt tag set enhancements (a process which can take quite some time), or for browser companies to adopt each other's standards (yeah right!), **with XML, you can create your own set of tags at your own pace.**

Theory Question : Scripts & Cookies

1) Classify each of the following Web Scripting as Client Side Scripting and Server Side Scripting:
(i) Java Scripting (ii) ASP (2018)
(iii) VB Scripting (iv) JSP

Ans: (i) Client Side Scripting / Server Side Scripting
(ii) Server Side Scripting
(iii) Client Side Scripting
(iv) Server Side Scripting

2) Categories the following under Client side and Server Side script category? (2016)(2011)
(i) Java Script (ii) ASP
(iii) VB Sript (iv) JSP

Client Side Scripts	Server Side Scripts
VB Script	**ASP**
Java Script	**JSP**

3) Name one server side scripting language and one client side scripting language. (2012)1

Ans)

Ex. Of Client Side Scripts	Ex. Of Server side Scripts
VB Script	ASP
Java Script	JSP
Peril Tcl	PHP
TK	CGI
REXX	Perl

4) Which of the following is not a Client Side script: (MP109-10)1
(i) VB Script (ii) Java Script
(iii) ASP (iv) PHP
Ans)(iii)ASP and (iv) PHP are not client side scripts

5.What are cookies? (2011)
Ans A small piece of information that a server sends to a client. When a person visits a Web site with cookie capabilities, its server sends certain information about him/her to the browser, which is stored on his/her hard drive as a text file. At some later time (such as returning to the site the next day), the server retrieves the cookie.

6) What kind of data gets stored in cookies and how is it useful? (2015)1
Ans When a Website with cookie capabilities is visited , its server sends certain information about the browser, which is stored in the hard drive as a text file. It's a way for the server to remember things about the visited sites.

7) What do you understand by the terms Cookies and Firewall? (OD2005)1
Ans)Cookies: A small piece of information that a server sends to a client When you visit a Web site with cookie capabilities, its server sends certain information about you to your browser, which is stored on your hard drive as a text file. At some later time (such as returning to the site the next day),the server retrieves the cookie. It's a way toi the server to remember things about you.

Theory Question : Open Source Softwares

(1) Write the name of any two popular Open Source Software which are used as operating systems. 2014
Ans: Linux and Unix are two open source operating systems.

(2) Write two advantages of using open source software over proprietary software. 2013
A) Two advantages of using open source software over proprietary software are:
Open Source Software is software whose source code is available to customer and it can be modified and redistributed without any limitations whereas source code of proprietary software is not available.
Open Source software may come free of cost or with payment of normal charges whereas proprietary software is neither open nor freely available.

(3) Name two Proprietary softwares along with their application. (2012)1

Ans) Microsoft Office - For office applications
Adobe Photoshop - For design related works
Autocad - For professional Design
MAYA - For professional animations & Movie making 3D Studio - For 3 dimensional objects
Tally - For accounting
Oracle Database - For database management

(4) Compare Open Source Software and Proprietary Software. (2011)1

Ans Open source software refers to a program or software in which the source code (the form of the program when a programmer writes a program in a particular programming language) is available to the general public for use and/or modification from its original design free of charge.

Proprietary software is software that is owned by an individual or a company (usually the one that developed it). There are almost always major restrictions on its use, and its source code is almost always kept secret.

5) Write one advantage of each for Open Source Software and Proprietary Software. 1

Ans. An Open Source Software is freely and liberally licensed because of which users have right to study, change. and improve its design and source code. A Proprietary Software has a copyright owner, who can restrict the user's control over the software, its modification, or restrictions in publishing of modified or unmodified versions.

6) Mention any two advantages of Open Source Software over Proprietary Software. (2000)

Ans) Open Source's proponents often claim that it offers significant benefits when compared to typical Proprietary Software. Proprietary Software typically favour visible features (giving marketing advantage) over harder-to measure qualities such as stability,security and similar less glamorous attributes.

Open Source Software developers are evidently motivated by many factors but favouring features over quality is not noticeable amongst them. For many developers, peer review and acclaim is important, so it's likely that they will prefer to build software that is admired by their peers. Highly prized factors are clean design, reliability and maintainability, with adherence to standards and shared community values preeminent.

7) Compare freeware and Shareware. (MP209-10)1

Ans)Freeware, the name derived from words "free" and"software". It is a computer software that is available for use at no cost or for an optional fee. Freeware is generally proprietary software available at zero price, and is not free software. The author usually restricts one or more rights to copy, distribute, and make derivative works of the software.

Shareware is usually offered as a trial version with certain features only available after the license is purchased, or as a full version, but for a trial period. Once the trial period has passed the program may stop running until a license is purchased. Shareware is often offered without support, updates, or help menus, which only become available with the purchase of a license. The words "free trial" or "trial version" are indicative of shareware.

Mislleneous

1) The following is a 32 bit binary number usually represented as 4 decimal values, each representing 8 bits, in the range 0 to 255 (known as octets) separated by decimal points. 140.179.220.200
What is it? What is its importance? (2017MP)1

Ans: It is an IP Address.It is used to identify the computers on a network.

"If wealth is lost, nothing is lost,
If health is lost, something is lost,
If character is lost, everything is lost"

4Marks Problem : Model 1(All in a single city)

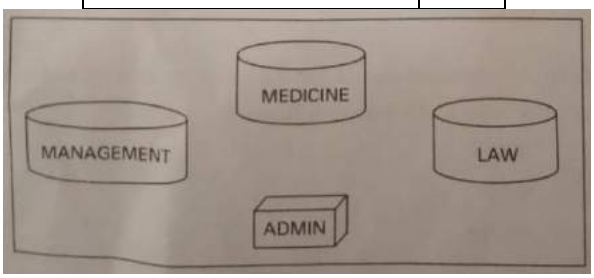
1.Jonathan and Jonathan Training Institute is planning to set up its centre in Amritsar with four specialized blocks for Medicine, Management, Law courses alongwith an Admission block in separate buildings. The physical distances between these blocks and the number of computers to be installed in these blocks are given below. You as a network expert have to answer the queries as raised by their board of directors as given in (i) to (iv). (2019)

Shortest distances between various locations in metres:

Admin Block to Management Block	60
Admin Block to Medicine Block	40
Admin Block to Law Block	60
Management Block to Medicine Block	50
Management Block to Law Block	110
Law Block to Medicine Block	40

Number of Computers installed at various locations are as follows:

Admin Block	150
Management Block	70
Medicine Block	20
Law Block	50



(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity.

Ans) Admin Block

(ii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following:
Modem Switch Gateway Router

Ans) Switch

(iii) Suggest by drawing the best cable layout for effective network connectivity of the blocks having server with all the other blocks.

Ans)

(iv) Suggest the most suitable wired medium for efficiently connecting each computer installed in every building out of the following network cables:

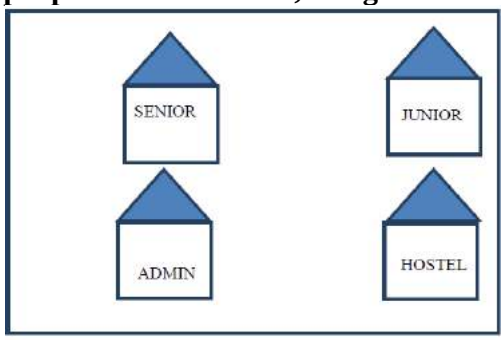
Co-axial cable Ethernet Cable

Single Pair Telephone Cable.

Ans)

2. Multipurpose Public School, Bangluru is Setting up the network between its Different Wings of school campus. There are 4 wings Named as SENIOR(S),JUNIOR(J), ADMIN(A) and HOSTEL(H). 2019MP

Multipurpose Public School, Bangluru



Distance between various wings are given below:

WingAtoWingS	100m
WingAtoWingJ	200m
WingAtoWingH	400m
WingStoWingJ	300m
WingStoWingH	100m
WingJtoWingH	450m

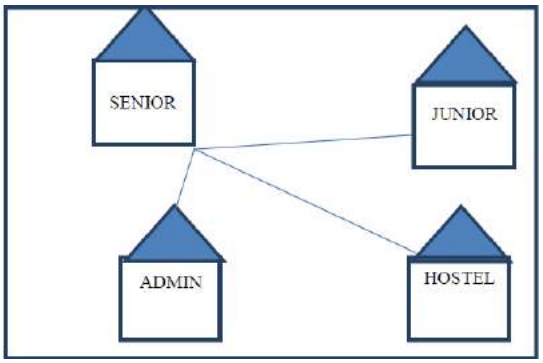
Number of Computers installed at various wings are as follows:

Wings	NumberofComputers
WingA	20
WingS	150
WingJ	50
WingH	25

(i) Suggest the best wired medium and draw the cable layout to efficiently connect various wings of Multipurpose PublicSchool, Bangluru.

Answer:

Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable



(ii) Name the most suitable wing where the Server should be installed. Justify your answer.

Answer:

Wing Senior(S)- Because it has maximum number of computers.

(iii) Suggest a device/software and its placement that would provide data security for the entire network of the School.

Answer: Firewall - Placed with the server at Senior

(iv) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of Multipurpose Public School, Bangluru.

Answer:

Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RFTransmitter

Protocol : WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11

3) CASE STUDY BASED QUESTION: (2018)

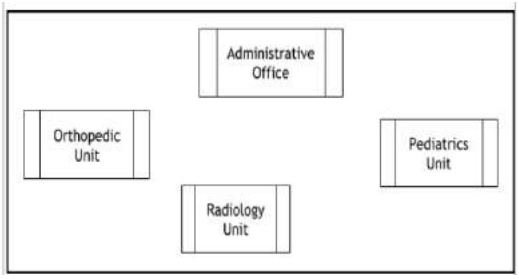
Ayurveda Training Educational Institute is setting up its centre in Hyderabad with four specialized departments for Orthopedics, Neurology and Pediatries along with an administrative office in separate buildings. The physical distances between these department buildings and the number of computers to be installed in these departments and administrative office are given as follows. You, as a network expert, have to answer the queries as raised by them in (i) to (iv)

Shortest distances between various locations in meters:

Administrative office to Orthopedics Unit	55
Neurology Unit to Administrative Office	30
Orthopedics Unit to Neurology Unit	70
Pediatrics Unit to Neurology Unit	50
Pediatrics Unit to Administrative Office	40
Pediatrics Unit to Orthopedics Unit	110

Number of Computers installed at various locations are as follows:

Pediatrics Unit	40
Administrative Office	140
Neurology	50
Orthopedics Unit	80

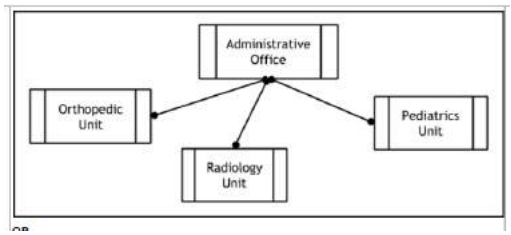


(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity.

Ans: **Administrative Office**

(ii) Suggest the best cable layout for effective network connectivity of the building having server with all the other buildings.

Ans:



OR

Administrative Office is connected to Orthopedic, Radiology, Pediatrics units
directly in a Star Topology

(iii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following:

* Gateway * Modem * Switch

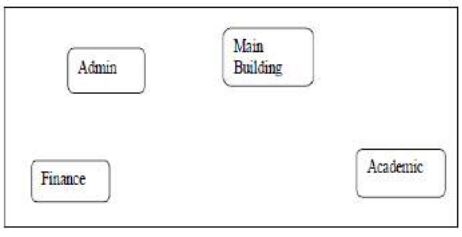
Ans: Switch

(iv) Suggest the topology of the network and network cable for efficiently connecting each computer installed in each of the buildings out of the following:

Topologies: Bus Topology, Star Topology
Network Cable: Single Pair Telephone, Coaxial Cable, Ethernet Cable.

Topology : Star Topology
Network Cable: Ethernet Cable / Coaxial Cable

4) Sanskar University of Himachal Pradesh is setting up a secured network for its campus at Himachal Pradesh for operating their day-to-day office & web based activities. They are planning to have network connectivity between four buildings. Answer the question (i) to (iv) after going through the building positions in the campus & other details which are given below:



The distances between various buildings of university are given as:-

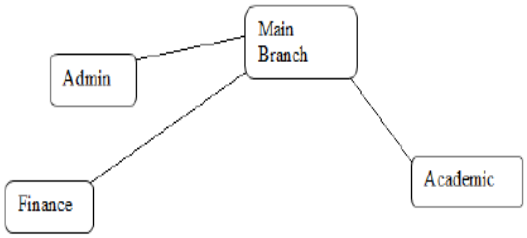
Building 1	Building 2	Distance(in mtrs.)
Main	Admin	50
Main	Finance	100
Main	Academic	70
Admin	Finance	50
Finance	Academic	70
Admin	Academic	60

Building	No. of Computers
Main	150
Admin	75
Finance	50
Academic	60

As a network expert, you are required to give best possible solutions for the given queries of the university administration:-

(a) Suggest cable layout for the connections between the various buildings,

Ans) Star topology



(b) Suggest the most suitable building to house the server of the network of the university,

Ans) Server should be placed at Main Building as it has the maximum number of computers.

(c) Suggest the placement of following devices with justification: 1. Switch/Hub 2. Repeater

Ans) Hub/Switch each would be needed in all the buildings to interconnect the group of cables from the different computers in each building

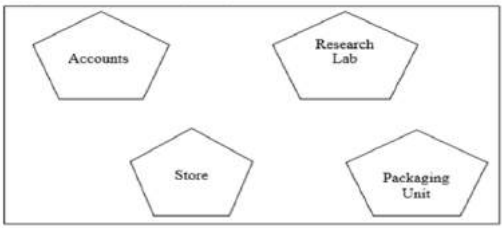
A repeater needs to be placed along the wire between main building & finance building as the distance between them is more than 70 mtr.

(d) Suggest the technology out of the following for setting-up very fast Internet connectivity among buildings of the university

1. Optical Fibre 2. Coaxial cable 3. Ethernet Cable

Ans) Optical Fibre

5) Rehaana Medicos Center has set up its new center in Dubai. It has four buildings as shown in the diagram given below: (2017MP)



Distances between various buildings are as follows:

Accounts to Research Lab	55 m
Accounts to Store	150 m
Store to Packaging Unit	160 m
Packaging Unit to Research Lab	60 m
Accounts to Packaging Unit	125 m
Store to Research Lab	180 m

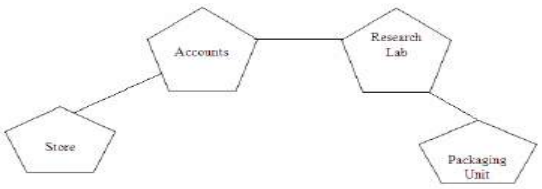
Number of Computers

Accounts	25
Research Lab	100
Store	15
Packaging Unit	60

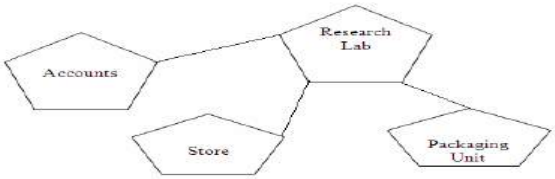
As a network expert, provide the best possible answer for the following queries:

i) Suggest a cable layout of connections between the buildings.

(i) Layout 1



Layout 2



ii) Suggest the most suitable place (i.e. buildings) to house the server of this organization.

Ans) The most suitable place/ building to house the server of this organization would be building Research Lab, as this building contains the maximum number of computers.

iii) Suggest the placement of the following device with justification: a) Repeater b) Hub/Switch

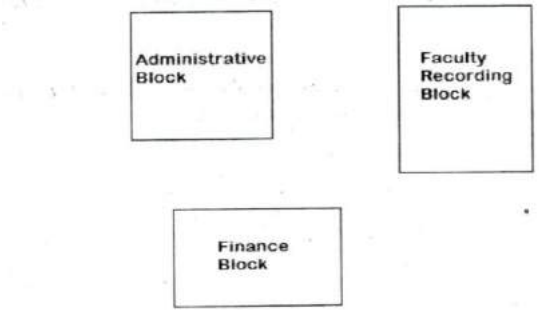
a) For layout1, since the cabling distance between Accounts to Store is quite large, so a repeater would ideally be needed along their path to avoid loss of signals during the course of data flow in this route. For layout2, since the cabling distance between Store to Recresearch Lab is quite large, so a repeater would ideally be placed.

b) 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 building.

iv) Suggest a system (hardware/software) to prevent unauthorized access to or from the network.

A) Firewall

6) Rovenza Communication International (RCI) is an online corporate training provider company for IT related courses. The company is setting up their new campus in Kolkata. You as a network expert have to study the physical locations of various blocks and the number of computers to be installed. In the planning phase, provider the best possible answer for the queries (i) to (iv) raised by them. 2013



Block to Block distance (in Mtrs.)

From	To	Distance
Administrative Block	Finance Block	60
Administrative Block	Faculty Recording Block	120
Finance Block	Faculty Recording Block	70

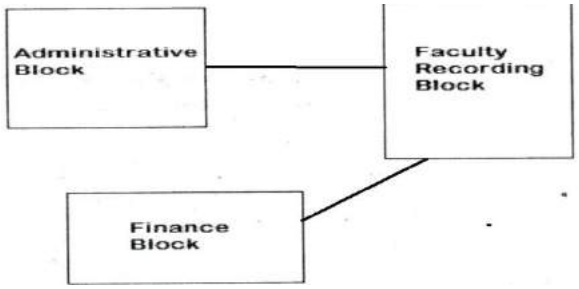
Expected computers to be installed in each block

Block	Computers
Administrative Block	**30**
Finance Block	**20**
Faculty Recording Block	**100**

(i) Suggest the most appropriate block, where RCI should plan to install the server.

A) Faculty Recording Block is most appropriate block to install the server.

(ii) Suggest the most appropriate layout to connect all three blocks for efficient communication.



(iii) Which type of network out of the following is formed by connecting the computers of these three blocks?

LAN MAN WAN

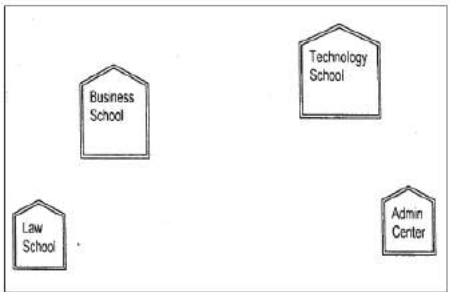
A)LAN

(iv) Which wireless channel out of the following should be opted by RCI to connect to students from all over the world?

Infrared Microwave Satellite

A) Satellite.

7.Great Studies University is setting up its Academic schools at Sunder Nagar and planning to set up a network. The university has 3 academic schools and one administration center as shown in the diagram below: (2011)



Center to center distances between various buildings is as follows :

Law School to Business School	60m
Law School to Technology School	90m
Law School to Admin Center	115m
Business School to Technology School	40m
Business School to. Admin Center	45m
Technology School to Admin Center	25m

Number of Computers in each of the Schools/Center is follows:

Law School	25
Technology School	50
Admin Center	125
Business School	35

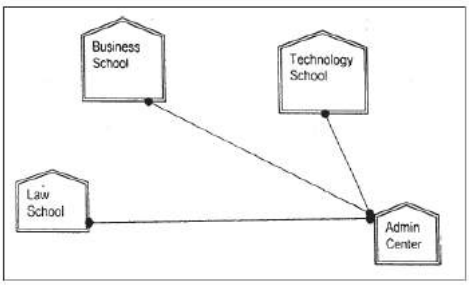
(i) Suggest the most suitable place (i.e. School/ Center) to install the server of this university with a suitable reason. 1

Ans Option 1 : Admin center as it has the most number of computers

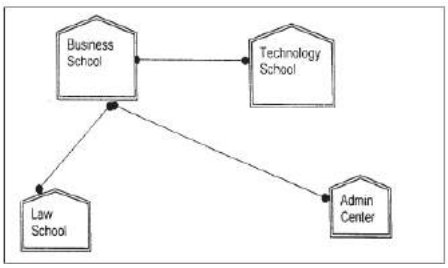
Option 2.Business School as it will require minimum cable length to connect other blocks

(ii) Suggest an ideal layout for connecting these schools/ center for a wired connectivity. 1

Ans Option 1:



Option 2:



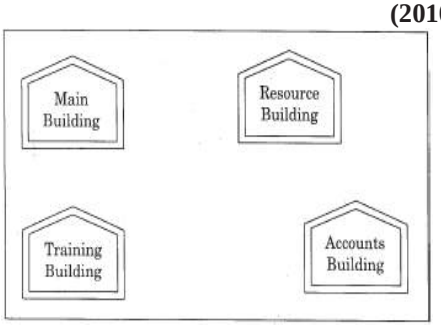
(iii) Which device will you suggest to be placed/installed in each of these schools /
center to efficiently connect all the computers within these schools / center? 1

Ans Switch

(iv) The university is planning to connect its admission office in the closest big city, which is more than 350 km from the university. Which type of network out of LAN, MAN or WAN will be formed? Justify your answer.1

Ans WAN as the distance is more than the range of LAN or MAN. 1

8) "Vidya for All" is an educational NGO. It is setting up its new campus at Jaipur for its web-based activities. The campus has four buildings as shown in the diagram below: (2010)



Center to center distances between various buildings as per architectural drawings (in meters) is as follows:

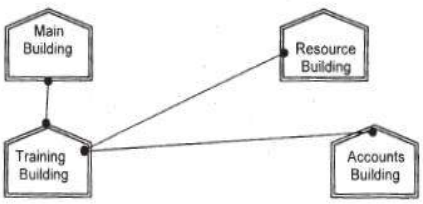
Main Building to Resource Building	120 m
Main Building to Training Building	40 m
Main Building to Accounts Building	135 m
Resource Building to Training Building	125 m
Resource Building to Accounts Building	45 m
Training Building to Accounts Building	110 m

Expected Number of Computers in each Building is as follows:

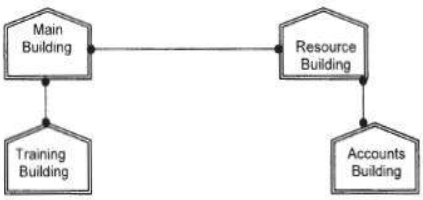
Main Building	15
Resource Building	25
Training Building	250
Accounts Building	10

(el) Suggest a cable layout of connections between the buildings.

Ans.



OR



(e2) Suggest the most suitable place (i.e. building) to house the server for this NGO. Also, provide a suitable reason for your suggestion.

Ans. Training Building as it contains maximum number of computers.

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

Ans. (i) A Repeater should be placed when the distance between any two connecting buildings exceeds 70 m.

(ii) Every building will need one Hub / Switch, to send signals to all of the workstations connected to it

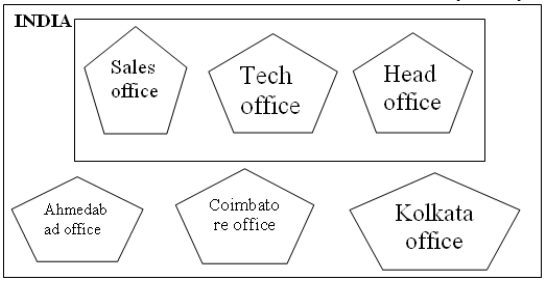
(e4) The NGO is planning to connect its International office situated in Delhi. Which out of the following wired communication links, will you suggest for a very high speed connectivity ?

(i) Telephone Analog Line(ii) Optical Fiber

(iii) Ethernet Cable

Ans. (ii) Optical Fibre

9) "Hindustan Connecting World Association "is planning to start their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture. The company has planned to set up their head office in New Delhi in three locations and have named their New Delhi offices as "Sales Office ","Head Office "and "Tech Office ".The company's regional offices are located at "Coimbatore","Kolkata"and "Ahmadabad". A rough layout of the same is as follows: (2007)



Approximate distance between these offices as per network survey team is as follows

Place From	Place To	Distance
Head Office	Sales Office	10 KM
Head Office	Tech Office	70 KM
Head Office	Kolkata Office	1291KM
Head Office	Ahmadabad Office	790 KM
Head Office	Coimbatore Office	1952KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Head Office	100
Sales Office	20
Tech Office	50
Kolkata Office	50
Ahmadabad Office	50
Coimbatore Office	50

1) Suggest network type(out of LAN,MAN,WAN) for connecting each of the following set of their offices:

Head Office and Tech Office

Head Office and Coimbatore Office

Ans) Head Office and Tech Office: **LAN**

Head Office and Coimbatore Office: **WAN**

2) Which device you will suggest to be produced by the company for connecting all the computers with in each of their offices out of the following devices?

Modem Telephone Switch/Hub

Ans) Switch / Hub

3) Which of the following communication media, will suggest to be procured by the company for connecting their local offices in New Delhi for very effective and fast communication?

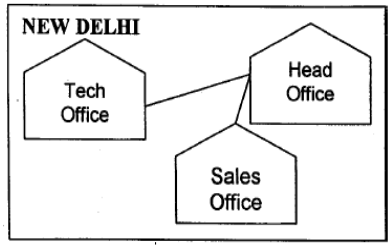
Ethernet Cable, Optical Fibre,Telephone Cable

Ans) Optical Fibre

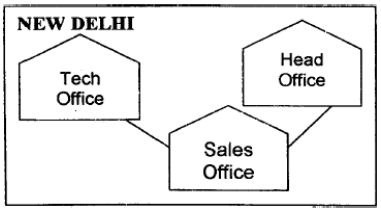
4) Suggest a cable/writing layout for connecting the company's local offices located in New Delhi. Also, suggest an effective method /technology for connecting the company's regional offices at "Kolkata","Coimbatore"and "Ahmadabad".

Ans) Optical Fiber/Star Topology

Wireless



OR



10) INDIAN PUBLIC SCHOOL in Darjeeling is setting up the network between its different wings. There are 4 wings named as SENIOR(S), JUNIORS (J), ADMIN (A) and HOSTEL (H). (2006)

Distance between various wings is given below:

Number of Computers

Wing A	10
Wing S	200
Wing J	100
Wing H	50

i) Suggest a suitable Topology for networking the computer of all wings. 1

Ans) Star Topology **OR** Bus Topology

ii) Name the wing where the server to be installed. Justify your answer. 1m

Ans) Wing S

as it has the maximum number of computers

OR

WingA as it is placed in the Admin Wing (for security reasons)

iii) Suggest the placement of Hub/Switch in the network.

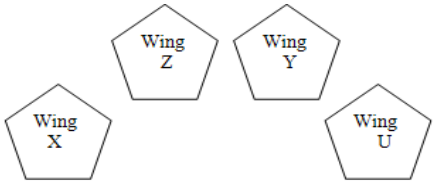
Ans) Inside all the four wings

iv) Mention in economic technology to provide internet accessibility to all wings. 1m

Ans: Any one of the following:

Dialup, TCP/IP, DSL, Modem, Broadband, Cable, ISDN, Telephone Line, Co-axial, Ethernet Cable, Radiowave

11) The Cyber Mind Organization has set up its new Branch at Mizoram for its office and web based activities. It has 4 Wings of buildings as shown in the diagram: (2005)



Center to center distances between various blocks

Wing X to Wing Z	40 m
Wing Z to Wing Y	60 m
Wing Y to Wing X	135 m
Wing Y to Wing U	70 m
Wing X to Wing U	165 m
Wing Z to Wing U	80 m

Number of computers

Wing X	50
Wing Z	130
Wing Y	40
Wing U	15

1) Suggest a most suitable cable layout of connections between the Wings, and topology. 1m

2) Suggest the most suitable place (i.e., Wing) to house the server of this organization with a suitable reason, with justification. 1m

Ans) Wing Z as it has largest number of computers

3) Suggest the placement of the following devices with justification:1m

(i)Repeater (ii) Hub/Switch

4) The organization is planning to link its head office situated in Delhi with the offices at Srinagar.1m Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer. 2m

Ans)TCP/IP Dial Up (Most Suitable answer 1)

OR

Telephone Link (Most Suitable answer 2)

OR

Microwave

OR

Radio Link/Radio Wave

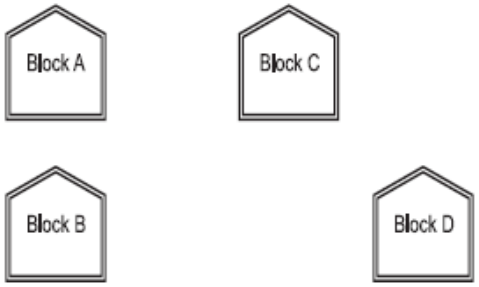
OR

Satellite Link

OR

WAN

12)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: (MP109-10)4



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

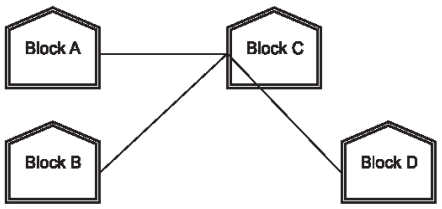
Number of Computers

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

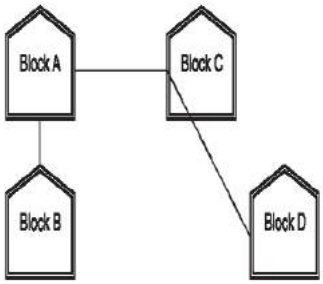
e1) Suggest a cable layout of connections between the blocks.

Ans)

Layout Option 1:



Layout Option 2: Since the distance between Block A and Block B is quite short



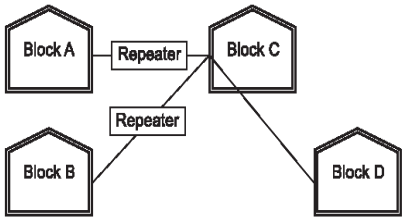
e2) Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.

Ans) 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.

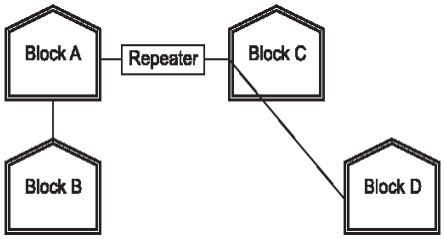
e3) Suggest the placement of the following devices with justification

(i) Repeater (ii) Hub/Switch

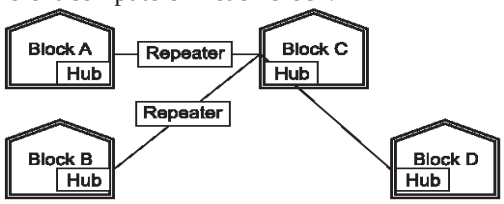
Ans) (i) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes.

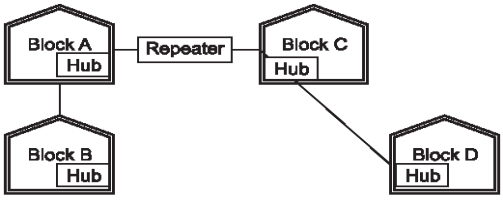


For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path.



(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.

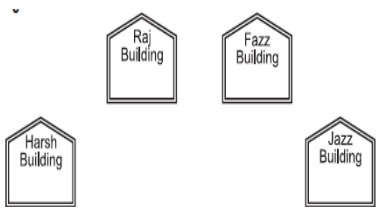




e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

Ans) 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.

13) 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: (MP209-10) 4

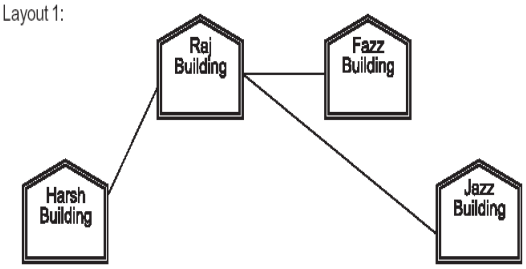


Center to center distances between various buildings is as follows:	
Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m
Number of Computers in each of the buildings is follows:	
Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Bulding	25

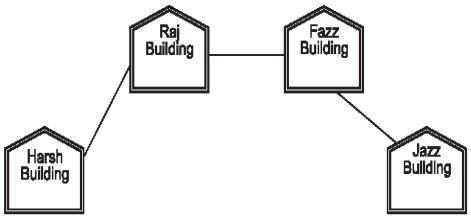
e1) Suggest a cable layout of connections between the buildings.

Ans)

Layout 1:



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



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

Ans) 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.

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

(i) Internet Connecting Device/Modem

(ii) Switch

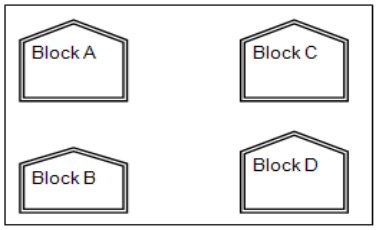
Ans)(i)Raj Building

(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

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.

Ans) 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.

14)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: (MP108-09)



Center to center distances between various blocks

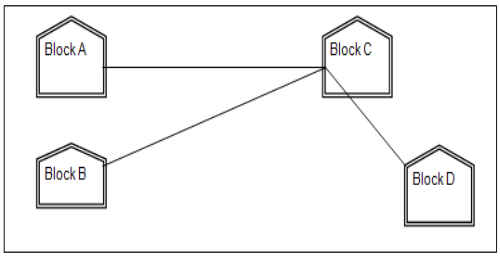
Black A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

Number of Computers

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

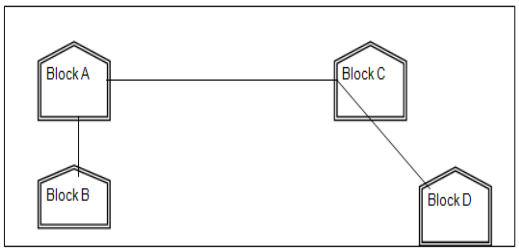
e1) Suggest a cable layout of connections between the blocks.1

Ans)Layout 1:



Layout Option 2:

Since the distance between Block A and Block B is quite short



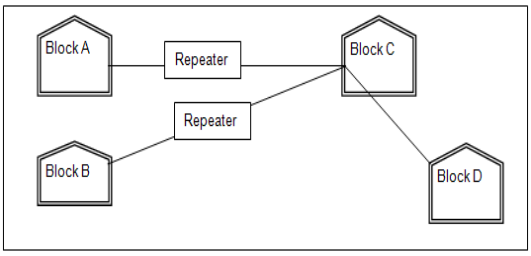
e2) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason. 1

Ans) 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.

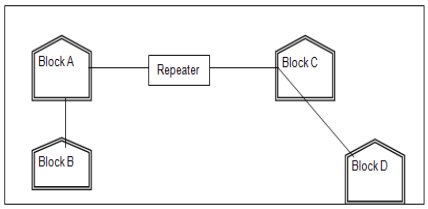
e3) Suggest the placement of the following devices with justification 1

i)Repeater ii)Hub/Switch

Ans) 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

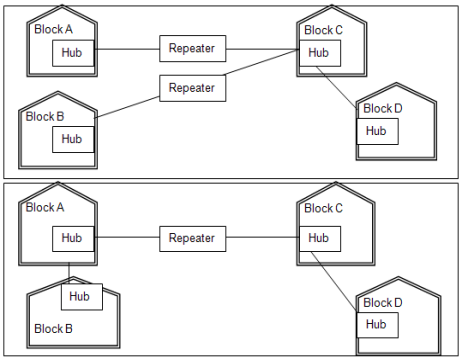


For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path



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



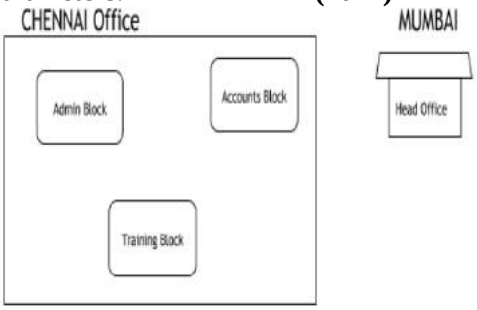
e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed? 1

Ans) 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.

4Marks Problem : Model 2 (Between 2 distant places)

1)Hi Standard Tech Training Ltd is a Mumbai based organization which is expanding its office set-up to Chennai. At Chennai office compound, they are planning to have 3 different blocks for Admin, Training and Accounts related activities. Each block has a number of computers, which are required to be connected in anetwork for communication, data and resource sharing.

As a network consultant, you have to suggest the best network related solutions for them for issues/problems raised by them in (i) to (iv), as per the distances between various blocks/locations and other given parameters. **(2017)**



Shortest distances between various blocks/locations:

Admin Block to Account Block	300 Metres
Accounts Block to Training Block	150 Metres
Admin Block to Training Block	200 Metres
MUMBAI Head Office to CHENNAI Office	1300 KM

Number of computers installed at various blocks are as follows:

Training Block	150
Accounts Block	30
Admin Block	40

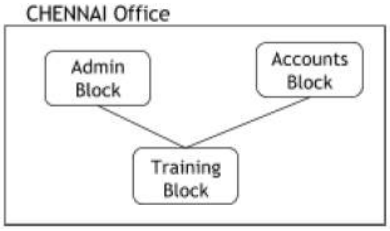
i) Suggest the most appropriate block/ location to house the SERVER in the CHENNAI Office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer. (1)

Ans) Training Block - Because it has maximum number of computers.

ii) Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various blocks within the CHENNAI office compound. 1

Ans) Best wired medium:

Optical Fibre **OR** CAT5 **OR** CAT6 **OR** CAT7 **OR** CAT8 **OR** Ethernet Cable



iii) Suggest a device/software and its placement that would provide data security for the entire network of the CHENNAI office. (1)

Ans) Firewall - Placed with the server at the Training Block **OR**

Any other valid device/software name

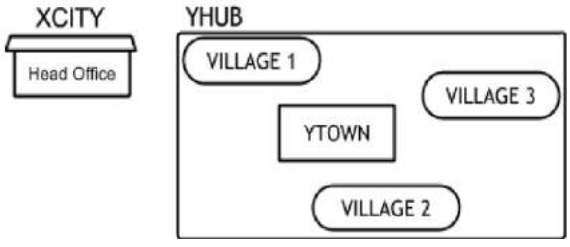
iv) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the CHENNAI office(1)

A)Device Name: WiFi Router **OR** WiMax **OR** RF Router **OR** Wireless Modem **OR** RF Transmitter

Protocol : WAP **OR** 802.16 **OR** TCP/IP **OR** VOIP **OR** MACP **OR** 802.11

2)Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities.They have created a model of their network with a city, a town and 3 villages as follows: (2016) 4

As a network consultant, you have to suggest the best network related solutionsfor their issues/problems raised in (i) to (iv), keeping in mind the distances between various locations and other given parameters.



Shortest distances between various locations:

VILLAGE 1 to YTOWN	2 KM
VILLAGE 2 to YTOWN	1.5 KM
VILLAGE 3 to YTOWN	3 KM
VILLAGE 1 to VILLAGE 2	3.5 KM
VILLAGE 1 to VILLAGE 3	4.5 KM
VILLAGE 2 to VILLAGE 3	3.5 KM
CITY Head Office to YHUB	30 Km

Number of Computers installed at various locations are as follows:

YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

Note: In Villages, there are community centers, in which one room has been given as training center to this organization to install computers.The organization has got financial support from the government and top IT companies.

(i) Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer. 1

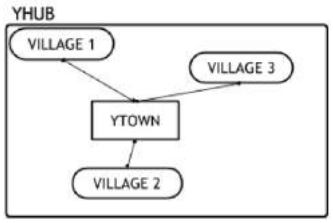
Ans YTOWN

Justification

- Since it has the maximum number of computers.
- It is closest to all other locations.

(ii) Suggest the best wired medium and draw the cable layout (location to location) toefficiently connect various locations within the YHUB. 1

Ans Optical Fiber



(iii) Which hardware device will you suggest to connect all the computers within each location of YHUB? 1

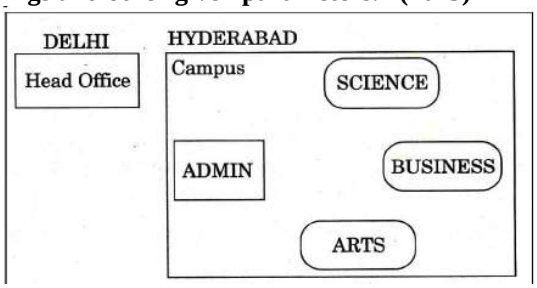
Ans Switch OR Hub

(iv) Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations? 1

Ans Videoconferencing OR VoIP OR any other correct service/protocol

3) Xcelencia Edu Services Ltd. is an educational organization. It is planning to set up its India campus at Hyderabad with its head office at Delhi. The Hyderabad campus has 4 main buildings -
ADMIN, SCIENCE, BUSINESS and MEDIA.

You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters. (2015)



Shortest Distances between various buildings:

ADMIN to SCIENCE	65M
ADMIN to BUSINESS	100m
ADMIN to ARTS	60M
SCIENCE to BUSINESS	75M
SCIENCE to ARTS	60M
BUSINESS to ARTS	50M
DELHI Head Office to HYDERABAD Campus	1600KM

Number of Computers installed at various building are as follows:

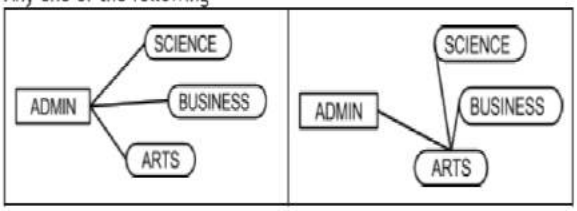
ADMIN	100
SCIENCE	85
BUSINESS	40
ARTS	12
DELHI Head Office	20

(i) Suggest the most appropriate location of the server inside the HYDERABAD campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer.**1**

Ans ADMIN (due to maximum number of computers)

(ii) Suggest and draw the cable layout to efficiently connect various buildings 'within the HYDERABAD campus for connecting the computers.

Any one of the following



(iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the intemet uses within the campus?1

Ans Firewall OR Router

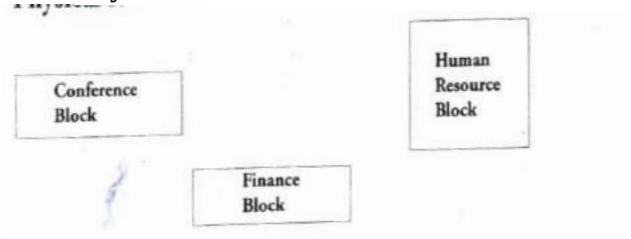
(iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of HYDERABAD campus and DELHI Head Office?

(a) E-mail (b) Text Chat (c) Video Conferencing
(d) Cable TV 1

Ans Video Conferencing

4) Tech Up Corporation (TUC) is a professional consultancy company. The company is planning to set up their new offices in India with its hub at Hyderabad. As a network adviser, you have to understand their requirement and suggest them the best available solutions. Their queries are mentioned as (i) to (iv) below: 2014

Physical locations of the blocks of TUC



Block to Block distances (in Mtrs.)

Block (From)	Block (To)	Distance
Human Resource	Conference	60
Human Resource	Finance	120
Conference	Finance	80

Expected Number of Computer to be installed in each bloc

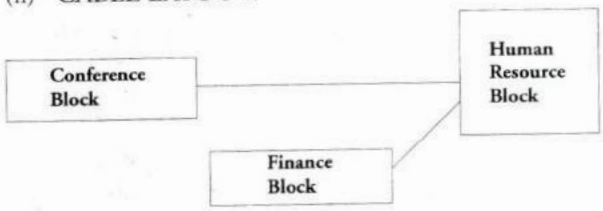
Block	Computers
Human Resource	125
Finance	25
Conference	60

(i) What will be the most appropriate block, where TU should plan to install their server?

Ans) Human Resource Block is appropriate to install server.

(ii) Draw a cable layout to connect all the buildings in the most appropriate manner for efficient communication.

(ii) CABLE LAYOUT:



(iii) What will be the possible connectivity out of the following you will suggest to connect the new setup of offices Hyderabad with its London based office.

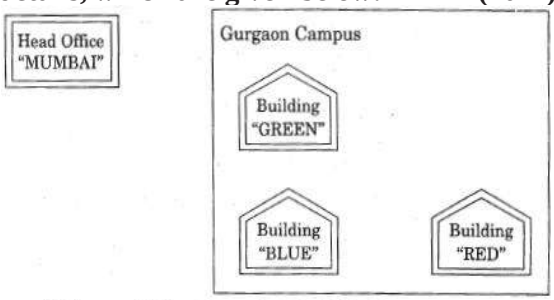
Infrared Satellite Link Ethernet Cable

Ans) Satellite Link.

(iv)

Ans) Switch

5)Workalot Consultants are setting up a secured network for their office campus at Gurgaon for their day-to-day office and web-based activities. They are planning to have connectivity between 3 buildings and the head office situated in Mumbai Answer the questions (i) to (iv) after going through the building positions in the campus and other details, which are given below: (2012)3



Distances between various buildings

Building "GREEN" to Building "RED"	110 m
Building "GREEN" to Building "BLUE"	45 m
Building "BLUE" to Building "RED"	65 m
Gurgaon Campus to Head Office	1760 KM

Number of Computers

Building "GREEN"	32
Building "RED"	150
Building "BLUE"	45
Head Office	10

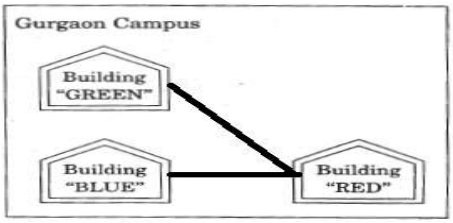
(i) Suggest the most suitable place (Le. building) to house the server of this organization. Also give a reason to justify your location.

Ans Building "RED", since it contains maximum number of computers **OR**

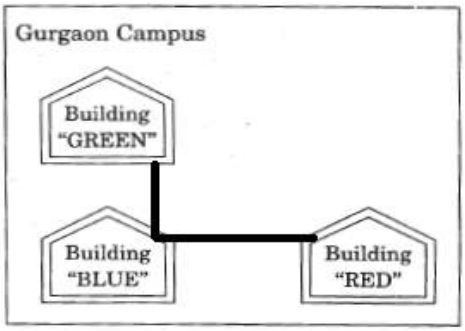
Building "BLUE", since it is closest to "GREEN" and "RED"

(ii) Suggest a cable layout of connections between the buildings inside the campus.

Ans Layout 1:



Layout 2



(iii) Suggest the placement of the following devices with justification:

(1) Switch (2) Repeater

Ans (1) Switch:

In each of the buildings, since a network switch is a networking device that joins multiple computers together within one local area network (LAN).

(2) Repeater:

For the Layout 1 drawn in (e2)- Between buildings "GREEN" and "RED", since distance between these two buildings is greater than 70 m which will otherwise lead to loss of signal intensity for data to be transferred.

For the Layout 2 drawn in (e2): Repeater is not needed, since distance between both the buildings connected to "Ganga" is less than 70 m, not leading to any signal loss

OR

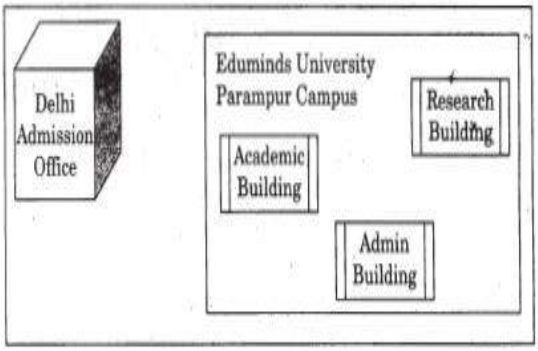
Any other placement of Repeater with proper justification

(iv) The organization is planning to provide a high speed link with its head office situated in the MUMBAI using a wired connection. Which of the following cable will be most suitable for this job?

(i) Optical Fibre (ii) Co-axial Cable (iii) Ethernet Cable

Ans (i) Optical Fibre

6) Eduminds University of India is starting its first campus in a small town Parampur of Central India with its center admission office in Delhi. The university has 3 major buildings comprising of Admin Building, Academic Building and Research Building in the 5 KM area Campus. As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters. (2009 OD)



Expected Wire distances between various locations:

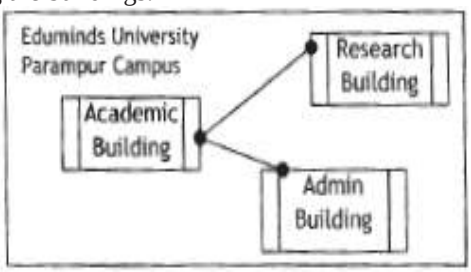
Research Building to Admin Building	90m
Research Building to Academic Building	80m
Academic Building to Admin Building	15m
Delhi Admission Office to Parampur Campus	1450 km

Expected number of computers to be installed at various locations in the university are as follows:

Research Building	20
Academic Building	150
Admin Building	35
Delhi Admission Office	5

(E1) Suggest to the authorities, the cable layout amongst various buildings inside the university campus for connecting the buildings. 1

Ans)



(E2) Suggest the most suitable place (i.e. building) to house the server of this organisation, with a suitable reason. 1

Ans Academic Building as it contains maximum number of computers.

(E3) Suggest an efficient device from the following to be installed in each of the buildings to connect all the computers : 1

(i) GATEWAY (ii) MODEM (iii) SWITCH

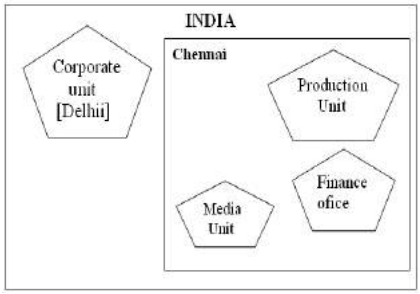
Ans SWITCH

(E4) Suggest the most suitable (very high speed) service to provide data connectivity between Admission Building located in Delhi and the campus located in Par am pur from the following options: 1

_ Telephone line
_ Fixed-Line Dial-up connection
_ Co-axial Cable Network
_ GSM
_ Leased line
_ Satellite Connection

Ans Satellite Connection **OR** Leased line

7) "China Middleton Fashion" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to setup their main office in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit ".The Company has its corporate unit in Delhi. A rough layout of the same is as follows: (2008 OD)



Approximate distance between these Units is as follows:

From	To	Distance
Production Unit	Finance Unit	70 Mtr
Production Unit	Media Unit	15 KM
Production Unit	Corporate Unit	2112 KM
Finance Unit	Media Unit	15 KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Production Unit	158
Finance Unit	79
Media Unit	90
Corporate Unit	51

1) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units: i) Production Unit and Media Unit
ii) Production Unit and Finance Unit

Ans) Production Unit and Media Unit : **MAN**
Production Unit and Finance Unit : **LAN**

2) Which one of the following devices will you suggest for connecting all the computers with in each of their office units? i) Switch/Hub ii) Modemii) Telephone

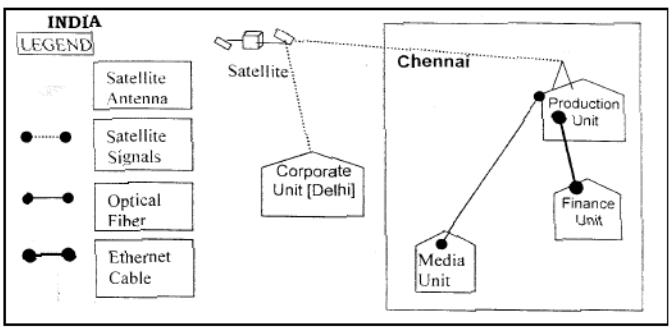
Ans) Switch / Hub

3) Which of the following communication media, you will suggest to be procured by the company for connecting their local office units in Chennai for very effective (High Speed) communication?
i) Telephone cable ii) Optical Fibre iii) Ethernet Cable

Ans) Optical Fibre

4) Suggest a cable/wiring layout for connecting the company's local office units located in Chennai. Also, suggest an effective method/technology for connecting the company's office unit located in Delhi.

Ans)



Optical Fiber/Star Topology
Wireless/Satellite Link/leased Line

SYLLABUS

UNIT 1: Object Oriented Programming in C++

Review: C++ covered in class XI,

Object Oriented Programming: Concept of Object Oriented Programming – Data hiding, Data encapsulation, Class and Object, Abstract class and Concrete class, Polymorphism (Implementation of polymorphism using Function overloading as an example in C++); Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies,

Implementation of Object Oriented Programming concepts in C++: Definition of a class, Member of a class – Data Members and Member Functions (methods), Using Private and Public visibility modes, default visibility mode (private); Member function definition: inside class definition and outside class definition using scope resolution operator (::); accessing members from object (s), Objects as function arguments–pass by value and pass by reference;

Constructor and Destructor: Constructor: special characteristics, declaration and definition of a constructor, default constructor, overloaded constructors, copy constructor, constructor with default arguments; **Destructor:** Special Characteristics, declaration and definition of destructor;

Inheritance (Extending Classes): Concept of Inheritances, Base Class, Derived classes, protected visibility mode; Single level inheritance, Multilevel inheritance and Multiple inheritance, Privately derived, publicly derived and Protectedly derived class, accessibility of members from objects and within derived class (es);

Data File Handling: Need for a data file, Types of data files – Text file and Binary file; **Text File: Basic** file operations on text file**:** Creating/Writing text into file, Reading and Manipulation of text from an already existing text File (accessing sequentially).

Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file; Implementation of above mentioned data file handling in C++; Components of C++ to be used with file handling: Header file: fstream.h; ifstream, ofstream, classes; Opening a text file in—in, out, and app modes; Using cascading operators (>>,<<) for writing text to the file and reading text from the file; open (), get (), read (), put (), write(), getline() and close() functions; Detecting end-of-file (with or without using eof() function), tellg(), tellp(), seekg(), seekp();

Pointers: Introduction to Pointer, Declaration and Initialization of Pointer; Dynamic memory allocation/de-allocation operators: **new, delete;** Pointers and Arrays: Array of Pointers, Pointer to an array (1 dimensional array), Function returning a pointer, Reference variables and use of alias; Function call by reference. Pointer to structure: De-reference/Deference operator: *, ->; self referential structure;

UNIT 2: Data Structures

Introduction to data structure- array, stack queues primitive and non-primitive data structure, linear and non-linear structure, static and dynamic data structure.

Arrays: One and two Dimensional arrays: Sequential allocation and address calculation; One dimensional array: Traversal, Searching (Linear, Binary Search), Insertion of an element in an array, deletion of an element from an array, Sorting (Insertion, Selection, Bubble)

Two-dimensional arrays: Traversal Finding sum/difference of two NxM arrays containing numeric values, Interchanging Row and Column elements in a two dimensional array;

Stack (Array and Linked implementation of Stack):
Introduction to stack (LIFO: Last in First out Operations)
Operations on stack (PUSH and POP) and its Implementation in C++, Converting expressions from INFIX to POSTFIX notation and evaluation of Postfix expression;

Queue: (Array and Linked Implementation)
Introduction to Queue (FIFO: First in First out operations)
Operations on Queue (Insert and Delete and its Implementation in C++, circular queue using array.

UNIT 3: Database Management System and SQL
Data base Concepts: Introduction to data base concepts and its need.
Relational data model: Concept of domain, tuple, relation, key, primary key, alternate key, candidate key;
Relational algebra: Selection, Projection, Union and Cartesian product;
Structured Query Language:
General Concepts: Advantages of using SQL, Data Definition Language and Data Manipulation Language;
DataTypes:NUMBER/DECIMAL, HARACTER/VARCHAR/VARCHAR2, DATE;
SQL COMMANDS: CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE ….SET…., INSERT, DELETE;
SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUP BY, HAVING, ORDER BY;
SQL functions: SUM ( ), AVG ( ), COUNT ( ), MAX ( ) AND MIN ( );
Obtaining results (SELECT query) from 2 tables using equi-join, Cartesian product and Union
Note: Implementation of the above mentioned commands could be done on any SQL supported software on one or two tables.

UNIT 4: Boolean Algebra
Role of Logical Operations in Computing.
Binary-valued Quantities, Boolean Variable, Boolean Constant and Boolean Operators: AND, OR, NOT; Truth Tables; Closure Property, Commutative Law, Associative Law, Identity law, Inverse Law, Principle of Duality, Idempotent Law, Distributive Law, Absorption Law, Involution Law, DeMorgan's Law and their applications;
Obtaining Sum of Product (SOP) and Product of Sum (POS) form the Truth Table, Reducing Boolean Expression (SOP and POS) to its minimal form, Use of Karnaugh Map for minimization of Boolean expressions (up to 4 variables);
Application of Boolean Logic: Digital electronic circuit design using basic Logic Gates (NOT, AND, OR, NAND, NOR)
Use of Boolean operators (NOT, AND, OR) in SQL SELECT statements;
Use of Boolean operators (AND, OR) in search engine queries.

UNIT 5: Communication Technologies
Evolution of Networking: ARPANET, Internet, Interspace Different ways of sending data across the network with reference to switching techniques (Circuit and Packet switching).
Data Communication terminologies: Concept of Channel, Bandwidth (Hz, KHz, MHz) and Data transfer rate (bps, Kbps, Mbps, Gbps, Tbps).
Transmission media: Twisted pair cable, coaxial cable, optical fiber, infrared, radio link, microwave link and satellite link.
Network devices: Modem, RJ45 connector, Ethernet Card, Router, Switch, Gateway, wifi card.
Network Topologies and types: Bus, Star, Tree, PAN, LAN, WAN, MAN.
Network Protocol: TCP/IP, File Transfer Protocol (FTP), PPP, SMTP, POP3 Remote Login (Talent), and Internet Wireless/Mobile Communication protocol such as GSM, CDMA, GPRS, and WLL.
Mobile Telecommunication Technologies: 1G, 2G, 3G and 4G; Mobile processors;
Electronic mail protocols such as SMTP, POP3
Protocols for Chat and Video Conferencing VOIP
Wireless technologies such as Wi-Fi and WiMax
Network Security Concepts:
Threats and prevention from Viruses, Worms, Trojan horse, Spams, Use of Cookies, Protection using Firewall, https;
India IT Act, Cyber Law, Cyber Crimes, IPR issues, hacking.
Introduction To Web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Website, Web browser, Web Servers; Web Hosting, Web Scripting – Client side (VB Script, Java Script, PHP) and Server side (ASP, JSP, PHP), Web 2.0 (for social networking).
E-commerce payment transactions using online banking, mobile banking and payment apps and services.

VERY IMPORTANT NOTICE

DEAR READER,

This material is meant only for slow learners to give an idea of questions pattern. If any student systematically practice these models, will get good marks (but not full marks).

Especially we cannot guess the theory questions. Theory questions will come from any corner of the syllabus. (Some times only theory questions were asked from the previous questions)

BUT STUDENTS ARE ADVISED TO READ ENTIRE SYLLABUS TO GET FULL MARKS.

As I collected this material from various sources, there might be some typing errors or technical errors, etc.

For Any Doubts or for good suggestions…….
Please feel free to contact:
MRK
ptlspecialsolutions@gmail.com

XII COMPUTER – 2019.20
SUGGESTED RECORD PROGRAMS

Computational based problems:
1.Four Function Calculator

Classes and objects:
2. Take marks of a student and to display total and average using constructors
3. Program to take heights of two persons in feets and inches and to display total height using class & constructors

File Operations:
4.Count no.of vowels from a text file
5.Count of a Word from a text file
6.Writing students record into a binary file
7. Search a record from a binary file

Arrays:
8. Matrix Addition
9. Displaying names of the city having more population & less population from 5 cities using structures.
10. Binary Search
11. Bubble Sort
12. Merge Sort
13. Insertion of elements into an array
14. Deletion of elements from an array
15. Program to exchange strings

Stacks:
16. Stack Operations-Arrays
17. Stack Operations-Linked Lists

Queues:
18.Queue Operations-Arrays
19.Circular Queues - Arrays
20.Queue Operations-Linked Lists

PROGRAMS

Program no.1: Four Function Calculator

```
#include<iostream.h>
#include<conio.h>
#include<process.h>
void main()
{clrscr();
 float op1,op2,res;
 int n;
 do
 { clrscr();
  cout<<"\nFOUR FUNCTION CALCULATOR...\n\n";
  cout<<"\n1.Addition";
  cout<<"\n2.Subtraction";
  cout<<"\n3.Multipllication";
  cout<<"\n4.Division";
  cout<<"\n5.Exit";
  cout<<"\nEnter your choice:";
  cin>>n;
  if(n!=5)
  {   cout<<"\nEnter operands:";
      cin>>op1>>op2;
  }
  switch(n)
  {case 1:res=op1+op2;
            break;
   case 2:res=op1-op2;
            break;
   case 3:res=op1*op2;
            break;
   case 4:if(op2==0)
              cout<<"\nDivision by zero error";
            else
               res=op1/op2;
           break;
   case 5: exit(0);
   default: cout<<"\nYou have to enter 1 to 4 only";
  }
  if(n!=4)
     cout<<"\nThe calculated result is:"<<res;
  else if (n= =4&&op2!=0)
     cout<<"\nThe calculated result is:"<<res;
  getch();
  }while(n!=5);
 }
```

Sample Data:

```
FOUR FUNCTION CALCULATOR….
1.Addition
2.Subtraction
3. Multiplication
4. Division
5. Exit
Enter your choice : 1
Enter operands :      10 20
The calculated result is : 30
```

Program no.2: Program to take marks of a student and to display total and average using class & constructors

```
#include<iostream.h>
#include<conio.h>
class student
{  int m[3],tot;
   float avg;
public:
   student()
  {      m[0]=m[1]=m[2]=tot=0;
         avg=0.0;
  }
 student(int x,int y,int z)
 {     m[0]=x;
       m[1]=y;
       m[2]=z;
       tot=m[0]+m[1]+m[2];
       avg=tot/3.0;
  }
 student(student &obj)
 {    m[0]=obj.m[0];
       m[1]=obj.m[1];
       m[2]=obj.m[2];
       tot=obj.tot;
       avg=obj.avg;
  }
~student()
{    cout<<"\nOne object deleted from memory…";
}
void take()
{ cout<<"\nEnter any three subject  marks:";
   cin>>m[0]>>m[1]>>m[2];
   tot=m[0]+m[1]+m[2];
   avg=tot/3.0;
}
void display()
{  cout<<"\nThe three subject marks of a
                        student is:";
cout<<m[0]<<'\t'<<m[1]<<'\t'<<m[2]<<'\t';
cout<<"\nTotal marks:"<<tot;
cout<<"\nAverage marks:"<<avg<<endl;
}
};
```

```
void main()
{
clrscr();
cout<<"\n&&PROGRAM TO DISPLAY TOTAL
            AND AVERAGE&&\n";
student  s1,s2(10,20,30),s3(s2),s4;
s1.display();
s2.display();
s4.take();
s4.display();
getch();
}
```

Sample Data:

```
 &&PROGRAM TO DISPLAY TOTAL AND AVERAGE &&
The three subject marks of a student is : 0      0       0
Total marks : 0
Average marks : 0

The three subject marks of a student is :10     20     30
Total marks : 60
Average marks : 20

Enter any three subject marks : 55   45     67
The three subject marks of a student is :55   45    67
Total marks : 167
Average marks : 55.666668

One object deleted from memory…
One object deleted from memory…
One object deleted from memory…
One object deleted from memory…
```

Program no.3: Program to take heights of two persons in feets and inches and to display total height using class & constructors

```
#include<iostream.h>
#include<conio.h>
class Height
{ int feets,inches;
public:
  Height()
  {  feets=0;
     inches=0;
  }
  Height(int f,int i)
  {   feets=f;
      inches=i;
  }
  Height(Height &H)
  {   feets=H.feets;
      inches=H.inches;
  }
  void take()
  {  cout<<"Enter Height in feets and inches : ";
     cin>>feets>>inches;
  }
  void display()
  {  cout<<"Height : Feets = "<<feets<<" Inches = "
                              <<inches<<endl;
  }
  Height TotalHeight(Height &H1, Height &H2)
  {  Height H3;
     H3.feets=H1.feets+H2.feets+(H1.inches+H2.inches)/12;
     H3.inches=(H1.inches+H2.inches)%12;
     return H3;
  }
   ~Height()
  {   cout<<"\nOne object is deleted...";
  }
};
void main()
{  clrscr();
   Height FIRST(5,7);
   Height SECOND(FIRST);
   Height THIRD;
   FIRST.take();
   SECOND.take();
   THIRD=THIRD.TotalHeight(FIRST,SECOND);
   cout<<"\nTotal Height : \n";
   THIRD.display();
   getch();
}
```

Sample Data:

```
Enter Height in feets and inches : 5     8
Enter Height in feets and inches : 6    11
One object is deleted…
One object is deleted…
Total Height :
Height : Feets = 12                  Inches = 7
One object is deleted…
One object is deleted…
One object is deleted…
```

Program no.4: Count no.of vowels from a text file

```
#include<fstream.h>
#include<conio.h>
#include<stdio.h>
#include<string.h>
void main()
{ clrscr();
  char line[80];
  int count=0;
  ofstream fout;
  fout.open("mytext.txt",ios::out);
  char ch='y';
  while(ch=='y'||ch=='Y')
  {cout<<"\nEnter a line of text...\n";
   gets(line);
   fout<<line;
   getch();
   cout<<"\nDo you want to insert more lines? (Y/N) : ";
   cin>>ch;
  }
  fout.close( );
  getch();
  ifstream fin;
  fin.open("mytext.txt",ios::in);
  while(fin.get(ch))
  { switch(ch)
    { case 'a':
      case 'A':
      case 'e':
      case 'E':
      case 'i':
      case 'I':
      case 'o':
      case 'O':
      case 'u':
      case 'U':count++; break;
    }
}
```

```
 cout<<"\nTotal number of vowels in the file = "
                              <<count;
 getch();
}
```

Sample Data:

Enter a line of text…
The fear of the LORD is the beginning of wisdom
Do you want to insert more lines?(Y/N): n
Total number of vowels in the file = 14

Program no.5: Count of a Word from a text file

```
#include<fstream.h>
#include<conio.h>
#include<stdio.h>
#include<string.h>
void main()
{ clrscr();
 char line[80],word[20],sword[20];
 int count=0;
 ofstream fout;
 fout.open("mytext.txt",ios::out);
 char ch='y';
 while(ch=='y'||ch=='Y')
 {cout<<"\nEnter a line of text...\n";
  gets(line);
  fout<<' '<<line;
  getch();
  cout<<"\nDo you want to insert more lines... (Y/N)";
  cin>>ch;
 }
 fout.close();
 getch();
 ifstream fin;
 fin.open("mytext.txt",ios::in);
 cout<<"\nEnter the search word: ";
 gets(sword);
 while(!fin.eof())
 { fin>>word;
   if(strcmpi(strupr(word),strupr(sword))==0)
              count++;
 }
cout<<"\nTotal number of words "<<sword
          <<" in the file = "  <<count;
getch();
}
```

Sample Data:

Enter a line of text…
The fear of the LORD is the beginning of wisdom
Do you want to insert more lines…(Y/N) y
Enter a line of text…
The was the the man
Do you want to insert more lines…(Y/N)n
Enter the search word: the
Total number of words THE in the file = 6

Program no.6 : Writing students record into a binary file

```
#include<fstream.h>
#include<conio.h>
#include<stdio.h>
struct student
{ int rno;
  char name[20];
  float marks;
};
void main()
{ clrscr();
  student s;
  ofstream fout;
  fout.open("marks.dat",ios::app|ios::binary);
  char ch;
  cout<<"\nEnter students details....";
do
{  cout<<"\nEnter the roll number: ";
 cin>>s.rno;
 cout<<"Enter the name: ";
 gets(s.name);
 cout<<"Enter the marks: ";
 cin>>s.marks;
 fout.write((char *)&s,sizeof(s));
 cout<<"\nOne record successfully inserted....";
 cout<<"\nDo you want to enter more records?(y/n)";
 cin>>ch;
}while((ch=='y')||(ch=='Y'));
fout.close();
clrscr();
ifstream fin;
fin.open("marks.dat",ios::in|ios::binary);
while(fin.read((char*)&s,sizeof(s)))
{ cout<<"\nThe roll number of the student: "<<s.rno;
  cout<<"\nThe name of the student:"<<s.name;
  cout<<"\nThe marks of the student:"<<s.marks;
  cout<<"\n\n";
 }
 fin.close();
 getch();
}
```

Sample Data:

Enter student details…
Enter the roll number:1
Enter the name: Raju
Enter the marks: 34
One record successfully inserted….
Do you want to enter more records?(y/n) y

Enter the roll number:2
Enter the name: Nani
Enter the marks:89
One record successfully inserted….
Do you want to enter more records?(y/n)n

Displaying students details from the file….
The roll number of the student : 1
The name of the student: Raju
The marks of the student:34

The roll number of the student:2
The name of the student: Nani
The marks of the student:89

Program no.7: Program to search a record from a binary file

```
#include<fstream.h>
#include<conio.h>
#include<stdio.h>
```

```
struct student
{ int rno;
  char name[20];
  float marks;
};

void main()
{ clrscr();
  int r,found=0;
  student s;
  ofstream fout;
  fout.open("student.dat",ios::app|ios:: binary);
  char ch;
  cout<<"\nEnter the students details....";
  do
  { cout<<"\nEnter the roll number: ";
    cin>>s.rno;
    cout<<"Enter the name: ";
    gets(s.name);
    cout<<"Enter the marks: ";
    cin>>s.marks;
    fout.write((char *)&s,sizeof(s));
    cout<<"\nOne record successfully inserted....";
    cout<<"\n\nDo you want to enter more  records?(y/n)";
    cin>>ch;
   }while((ch=='y')||(ch=='Y'));
   getch();
   fout.close();
   ifstream fin;
   fin.open("student.dat",ios::in|ios::binary);
   cout<<"\nEnter the roll number to be  searched for: ";
   cin>>r;
   while(fin)
   {fin.read((char *)&s,sizeof(s));
    if(r==s.rno)
    {cout<<"record found";
     cout<<"\nDetails of the Record.....\n\n\n";
     cout<<"\nRoll number: "<<s.rno;
     cout<<"\nThe name of the student: "<<s.name;
     cout<<"\nThe marks of the student: "<<s.marks;
     found=1;
     break;
     }
   }
  if(found==0)
     cout<<"\nRecord not found....";
  getch();
  fin.close();
}
```

Sample Data:

```
Enter the students details….
Enter the roll number : 1
Enter the name: Praveen
Enter the marks: 45
One record successfully inserted….
Do you want to enter more records?(y/n) y

Enter the roll number: 2
Enter the name: Suresh
Enter the marks: 78
One record successfully inserted….
Do you want to enter more records?(y/n)y

Enter the roll number:3
Enter the name: Naveen
Enter the marks:99
One record successfully inserted….
Do you want to enter more records?(y/n) n

Enter the roll number to be searched for:2
Record found
Details of the student:Suresh
The marks of the student: 78
```

Program no.8:Matrix Addition

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

void main()
{
clrscr();
int a[10][10],b[10][10],c[10][10],i,j,m,n,p,q;
cout<<"\n\t\tMATRIX ADDITION";
cout<<"\nInput no.of rows and columns of  matrix A:";
cin>>m>>n;
cout<<"Input no.of rows and columns of matrix B:";
cin>>p>>q;
if((m==p)&&(n==q))
            cout<<"Matrix can be added";
else
{ cout<<"Matrix cannot be added";
  getch();
  exit(0);
}
cout<<"\nEnter elements "<<m*n<<" into matrix A:";
for(i=0;i<m;i++)
            for(j=0;j<n;j++)
                  cin>>a[i][j];
cout<<"\nEnter elements "<<m*n<<" into matrix B:";
for(i=0;i<p;i++)
            for(j=0;j<q;j++)
                  cin>>b[i][j];
cout<<"\nMatrix A is:";
for(i=0;i<m;i++)
{ cout<<"\n";
             for(j=0;j<n;j++)
                   cout<<'\t'<<a[i][j];
}
cout<<"\nMatrix B is:";
for(i=0;i<p;i++)
{ cout<<"\n";
   for(j=0;j<q;j++)
   cout<<'\t'<<b[i][j];
}
for(i=0;i<p;i++)
{   for(j=0;j<q;j++)
   c[i][j]=a[i][j]+b[i][j];
}
cout<<"\nThe sum of two matrices is\n";
for(i=0;i<p;i++)
{ cout<<"\n";
   for(j=0;j<q;j++)
         cout<<"\t"<<c[i][j];
}
 getch();
}
```

Sample Output:

```
                    MATRIX ADDITION
Input no.of rows and columns of matrix A : 4  3
Input no.of rows and columns of matrix B : 4 3
Matrix can be added
Enter elements 12 into matrix A :
1    2    3    4    5     6     7    8     9     10    11    12
Enter elements 12 into matrix B :
11  12  13   14    15    16    17    18    19     20    21    22

Matrix A is :
1     2     3
4     5     6
7      8     9
10   11    12

Matrix B is :
11          12          13
14          15          16
17          18          19
20          21          22

The sum of two matrices is
12          14           16
18          20           22
24          26          28
30          32          34
```

Program no.9: Displaying names of the city having more population & less population from 5 cities using structures.

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
struct city
{char name[20];
 long pop;
};
void main()
{int i,n,sindex=0,lindex=0;
 long small=0,large=0;
 city c[20];
 clrscr();
 cout<<"\nHow many cities details you want ? ";
 cin>>n;
 cout<<"\n\tDISPLAYING CITY HAVING MORE &
                        LESS POPULATION\t\n";
 for(i=0;i<n;i++)
 {  cout<<"Enter the name of the city "<<i+1 <<" : ";
    gets(c[i].name);
    cout<<"Enter the population of "<<c[i].name<<":";
    cin>>c[i].pop;
 }
 for(i=0;i<n;i++)
 {  if(c[i].pop<small)
    {  small=c[i].pop;
       sindex=i;
     }
    if(c[i].pop>large)
     { large=c[i].pop;
       lindex=i;
     }
}
cout<<"\n\tLargest population city is "<<c[lindex].name;
cout<<"\n\tIts population is "<<c[lindex].pop;
cout<<"\n\n\tSmallest population city is "
                        <<c[sindex].name;
cout<<"\n\tIts population is "<<c[sindex].pop;
cout<<"\nDifference between largest and smallest city = "
                        <<c[lindex].pop - c[sindex].pop;
getch();
}
```

Sample Data:

```
How many cities details you want ? 5
 DISPLAYING CITY HAVING MORE & LESS POPULATION
Enter the name of the city 1 : Bangalore
Enter the population of Bangalore:350000
Enter the name of the city 2 : Hyderabad
Enter the population of Hyderabad:300000
Enter the name of the city 3 : Vijayawada
Enter the population of Vijayawada:225000
Enter the name of the city 4 : Chennai
Enter the population of Chennai:400000
Enter the name of the city 5 : Kolkatta
Enter the population of Kolkatta:500000

  Largest population city is Kolkatta
  Its population is 500000

  Smallest population city Vijayawada
  Its population is 225000

Difference between largest and smallest city = 275000
```

Program no.10: Binary Search

```
#include<iostream.h>
#include<conio.h>
int Bsearch(int[],int,int);
void main()
{
clrscr();
int a[50],n,i,se,index;
cout<<"\n##BINARY SEARCH##";
cout<<"\nEnter the desired array size:";
cin>>n;
cout<<"\nEnter array elements(ascen):";
for(i=0;i<n;i++)
    cin>>a[i];
cout<<"\nEnter element to be searched for:";
cin>>se;
index=Bsearch(a,n,se);
if(index= =-1)
       cout<<"\nSorry!given element not found";
else
{  cout<<"\nElement found at index no  "
            <<index<<" position is "<<index+1<<'\n';
}
getch();
}

int Bsearch(int a[ ], int size,int item)
{int beg,last,mid;
 beg=0;last=size-1;
 while(beg<=last)
 {  mid = (beg+last)/2;
                    if(item==a[mid])

          return mid;
                    else if(item>a[mid])
```

```
        beg=mid+1;
    else
        last=mid-1;
 }
 return -1;
}
```

Sample Data:

```
##BINARY SEARCH##
Enter the desired array size: 5
Enter array elements (ascen) : 10   23    45   556   1023
Enter element to be searched for : 45
Element found at index no 2 position is 3
##BINARY SEARCH##
Enter the desired array size: 5
Enter array elements (ascen) : 10   23    45   556   1023
Enter element to be searched for : 30
Sorry!given element not found
```

Program no.11: Bubble Sort

```
#include<iostream.h>
#include<conio.h>
void BSort(int b[ ],int size);

void main()
{int a[20], i, n;
 clrscr();
 cout<<"\n\n\t\t&&BUBBLE SORTING&&\n";
 cout<<"\Enter how many elements:";
 cin>>n;
 cout<<"\Enter array elements:";
 for(i=0;i<n;i++)
   cin>>a[i];
 BSort(a,n);
 cout<<"\nThe sorted array is:";
 for(i=0;i<n;i++)
   cout<<a[i]<<" ";
 getch();
}

void BSort(int b[],int size)
{ int i,j,k,temp;
  for(i=0;i<size;i++)
  {  for(int j=0;j<(size-1)-i;j++)
     if(b[j]>b[j+1])
     { temp=b[j];
        b[j]=b[j+1];
        b[j+1]=temp;
     }
    cout<<"\nArray after iteration "<<i+1<<" is:";
    for(int k=0;k<size;k++)
      cout<<b[k]<<" ";
    cout<<"\n";
  }
}
```

Sample Data:

```
                &&BUBBLE SORTING&&
Enter how many elements: 5
Enter array elements:      45      23      67      345     -32
Array after iteration-1 is : 23     45      67      -32     345
Array after iteration-2 is : 23     45      -32     67      345
Array after iteration-3 is:  23     -32     45      67      345
Array after iteration-4 is:  -32    23      45      67      345
Array after iteration-5 is:  -32    23      45      67      345

The sorted array is: -32  23  45  67  345
```

Program no.12: Merge Sort

```
#include<iostream.h>
#include<conio.h>
void Merge(int A[ ],int, int B[ ],int, int C[ ]);

void main( )
{clrscr();
 int A[50],B[50],C[100],i,j,M,N,MN=0;
 cout<<"\n\n\t\tPROGRAM FOR MERGE SORTING";
 cout<<"\nEnter how many elements in first array:";
 cin>>M;
 cout<<"Enter elements to first array(ascending order):";
 for(i=0;i<M;i++)
        cin>>A[i];
 cout<<"Enter how many elements in second array:";
 cin>>N;
 cout<<"Enter elements to second array(descending
                                order):";
 for(j=0;j<N;j++)
        cin>>B[j];
 MN=M+N;
 Merge(A,M,B,N,C);
 cout<<"\nThe merged array is as shown below (in
                                ascending order : ";
 for(i=0;i<MN;i++)
        cout<<C[i]<<"\t";
 cout<<'\n';
 getch();
}

void Merge(int A[ ],int M,int B[ ],int N,int C[ ])
{ int a,b,c;
  for(a=0,b=N-1,c=0;a<M && b>=0;)
  { if(A[a]<=B[b])
                C[c++]=A[a++];
        else
                C[c++]=B[b--];
  }
  if(a<M)
  {  while(a<M)
        C[c++]=A[a++];
  }
  else
  { while(b>=0)
        C[c++]=B[b--];
  }
}
```

Sample Data:

```
            PROGRAM FOR MERGE SORTING
Enter how many elements in first array : 5
Enter elements to first array (ascending order):
10          20          30          40          50
Enter how many elements in second array:3
Enter elements to second array (descending order):
77          45          39
The merged array is as show below (in ascending order):
10      20      30      39      40      45      50      77
```

Program no.13: Insertion of elements into an array

```
#include<iostream.h>
#include<conio.h>
#include<process.h>
int findpos(int[],int,int);
```

```
void main()
{ clrscr();
  int a[50],i,index,n,item;
  char ch='y';
  cout<<"\n\tINSERTION OF ELEMENTS INTO AN
          ARRAY\t\n";
  cout<<"Enter the array size:";
  cin>>n;
  cout<<"\nEnter the array elements (ascending order) : ";
  for(i=0;i<n;i++)
        cin>>a[i];
  while(ch=='y'||ch=='Y')
  {  cout<<"\nEnter the element to be inserted:";
     cin>>item;
     if(n= =50)
     { cout<<"\noverflow";
       getch( );
       exit(0);
     }
     index=findpos(a,n,item);
    for(i=n;i>index;i--)
    {    a[i]=a[i-1];
    }
    a[index]=item;
    n=n+1;
    cout<<"\nWant to insert more elements?(y/n)";
    cin>>ch;
  }
  cout<<"\nThe array is as shown below ";
  for(i=0;i<n;i++)
        cout<<a[i]<<" ";
   cout<<"\n";
   getch();
}

int findpos(int a[],int size,int item)
{ int pos;
 if(item<a[0])
          pos=0;
 else
 {        for(int i=0;i<size-1;i++)
          {   if((a[i]<=item) && (item<a[i+1]))
           {  pos=i+1;
                    break;
                    }
           }
           if(i==size-1)
                     pos=size;
           }
           return pos;
 }
```

Sample Data:

```
  INSERTION OF ELEMENTS INTO AN ARRAY
Enter the array size : 5
Enter the array elements : 10  20   30   40  50
Enter the element to be inserted : 35
Want to insert more elements? (y/n) n
The array is as shown below 10  20  30  35  40  50
  INSERTION OF ELEMENTS INTO AN ARRAY
Enter the array size : 3
Enter the array elements : 10  20   30
Enter the element to be inserted : 5
Want to insert more elements? (y/n) y
Enter the element to be inserted: 2
Want to insert more elements? (y/n) n
The array is as shown below 2    5    10  20  30

  INSERTION OF ELEMENTS INTO AN ARRAY
Enter the array size : 3
Enter the array elements : 25   35   45
Enter the element to be inserted : 55
Want to insert more elements? (y/n) y
Enter the element to be inserted : 65
Want to insert more elements? (y/n) y
Enter the element to be inserted : 77
Want to insert more elements? (y/n) n
The array is as shown below 25   35   45   55   65  77
```

Program no.14: Deletion from an array

```
#include<iostream.h>
#include<process.h>
#include<conio.h>
int Lsearch(int[],int,int);
void main()
{ clrscr();
int AR[50],ITEM,N,index;
cout<<"\n\nHow many elements do u want to
                    create array with?(max.50)....";
cin>>N;
cout<<"\n Enter array elements....\n";
for(int i=0;i<N;i++)
    cin>>AR[i];
char ch='y';
while(ch=='y'||ch=='Y')
{
cout<<"\n Enter elements to be deleted....";
cin>>ITEM;
if(N==0)
{cout<<"Underflow!\n";
exit(0);
}
index=Lsearch(AR,N,ITEM);
 if(index!=-1)
    AR[index]=0;
else
     cout<<"\nSorry! no such element in the array.\n";
cout<<"\nThe array now is as shown below...\n";
cout<<"Zero(0)signifies deleted element\n";
for(i=0;i<N;i++)
cout<<AR[i]<<" ";
 cout<<"\nAfter this emptied space will be shifted to the
                    end of array";
for(i=index;i<N;i++)
 {     AR[i]=AR[i+1];
}
N -=1;
cout<<"\nWant to delete more elements?(y/n)...";
cin>>ch;
}
cout<<"\nThe array after shifting all emptied spaces
towards right is:\n";
for(i=0;i<N;i++)
   cout<<AR[i]<<" ";
cout<<endl;
getch();
}
```

```
int Lsearch (int AR[ ],int size,int item)
{
 for(int i=0;i<size;i++)
 {   if (AR[i]==item)
            return i;
}
return-1;
}
```

Sample Data:

```
How many elements do you want to create array with
?(max.50)….  4
Enter array elements….
11   22    33   44
Enter elements to be deleted….33
The array now is as shown below…
Zero(0) signifies deleted element
11    22   0   44
After this emptied space will be shifted to the end of the
array
Want to delete more elements?(y/n)…n
The array after shifting all emptied spaces towards right is:
11   22     44
```

```
How many elements do you want to create array with
?(max.50)….  5
Enter array elements….
10   20   30   40   50
Enter elements to be deleted….35
Sorry! No such element in the array.
The array now is as shown below…
Zero(0) signifies deleted element
10  20   30   40  50
After this emptied space will be shifted to the end of the
array
Want to delete more elements? (y/n) n
```

Program no.15: Program for string operations

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
#include<process.h>
int vowel(char ch)
{  switch(ch)
   { case 'a':
     case 'A':
     case 'e':
     case 'E':
     case 'i':
     case 'I':
     case 'o':
     case 'O':
     case 'u':
     case 'U': return 0;
   }
   return 1;
}

void main()
{
int i,j,n,flag=1,vowelcount=0,wordcount=0,slength;
char str[80];
do
{ clrscr();
  cout<<"\n\t\tSTRING OPERATIONS...";
cout<<"\n1.To check PALINDROME or not";
cout<<"\n2.To find length of a string without using
                              string function";
cout<<"\n3.To find number of vowels in a given
                              line of text";
cout<<"\n4.To find total words in a given line of text";
cout<<"\n5.To Replace every space in a string
                              with a hyphen";
cout<<"\n6.Exit\n";
cout<<"\nEnter your choice: ";
cin>>n;
switch(n)
{ case 1:  cout<<"\nEnter any string (upto 80
                              Characters): ";
           gets(str);
           for(i=0;str[i]!='\0';i++);
           slength=i;
           for(i=0,j=slength-1;i<slength/2;i++,j--)
           {   if(str[i]!=str[j])
                  {  flag=0;
                    break;
                  }
           }
           if(flag==0)
             cout<<"\nGiven String is not a palindrome";
           else
             cout<<"\nGiven String is a palindrome";
           break;
  case 2:  cout<<"\nEnter any string
                        (upto 80 Characters): ";
           gets(str);
           for(i=0;str[i]!='\0';i++);
           cout<<"\nLength of the given String = "<<i;
           break;
  case 3:  cout<<"\nEnter any string
                         (upto 80 Characters): ";
           gets(str);
           for(i=0;str[i]!='\0';i++)
            if((vowel(str[i]))==0)
                    vowelcount++;
           cout<<"\nTotal number of vowels ="
                     <<vowelcount;
           break;
  case 4:  cout<<"\nEnter any string
                           (upto 80 Characters): ";
           gets(str);
           for(i=0;str[i]!='\0';i++)
            if(str[i]==' ')
                    wordcount++;
           cout<<"\nTotal number of words = "
                           <<wordcount+1;
           wordcount=0;
           break;
  case 5:  cout<<"\nEnter any string
                          (upto 80 Characters): ";
           gets(str);
           for(i=0;str[i]!='\0';i++)
            if(str[i]==' ')
                    str[i]='-';
           cout<<"\nThe entered string after
                           replacing :\n"<<str;
           break;
  case 6: exit(0);
```

```
   default: cout<<"\nYou must enter from 1 to 6 only..";
  }
 getch();
}while(n!=6);
}
```

Sample Data:

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice : 1
Enter any string (upto 80 Characters): LIRIL
Given String is a palindrome

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice : 1
Enter any string (upto 80 Characters): JAWAHAR
Given String is not a palindrome

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice : 2
Enter any string (upto 80 Characters): RAJU
Length of the given String = 4

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice : 3
Enter any string (upto 80 Characters):
JAWAHAR NAVODAYA VIDYALAYA
Total number of vowels = 11

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice : 4
Enter any string (upto 80 Characters):
JAWAHAR NAVODAYA VIDYALAYA
Total number of words = 3

STRING OPERATIONS…

1. To check PALINDROME or not
2. To find length of a string without using string function
3. To find number of vowels in a given line of text
4. To find total words in a given line of text
5. To Replace every space in a string with a hyphen
6. Exit

Enter your choice :5
Enter any string (upto 80 Charactoers):
JAWAHAR NAVODAYA VIDYALAYA

The entered string after replacing:
JAWAHAR-NAVODAYA-VIDYALAYA

16. Program for stack operations using arrays

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

class stack
{ int s[5],top;
public:
  stack()
  { top=-1;
  }
  void push(); //to push an element into the stack
  void pop();  //to pop an element from the stack
  void display();
};

void stack::push()
{ if(top>=4)
    cout<<"Stack Overflow";
  else
  { top++;
    cout<<"\nEnter the element to be inserted";
    cin>>s[top];
  }
}

void stack::pop( )
{ if(top==-1)
     cout<<"\nStack Underflow";
  else
  {  cout<<"\nThe element to be deleted = "<<S[top];
     top--;
  }
}

void stack::display()
{  if(top==-1)
      cout<<"\nStack is empty..";
   else
   {  cout<<"\nElements in the stack.....\n";
      for(int i=top;i>=0;i--)
              cout<<s[i]<<'\t';
   }
}

void main()
{
 int n;
 stack s1;
 do{
 clrscr();
 cout<<"\nStack operations...\n\n";
 cout<<"\n1.Push";
 cout<<"\n2.Pop";
```

```
 cout<<"\n3.Display";
 cout<<"\n4.Exit";
 cout<<"\nEnter ur choice:";
 cin>>n;
 switch(n)
 { case 1: s1.push();
           break;
  case 2: s1.pop();
           break;
  case 3: s1.display();
           break;
  case 4: exit(0);
  default:cout<<"\nYou have to enter 1 to 4 only..";
 }
getch();
}while(n!=4);
}
```

Sample Data:

```
Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choice:3
Stack is empty...

Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choice:1
Enter the element to be inserted 45

Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choice:3
Elements in the stack…..
45

Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choice:1
Enter the element to be inserted 77

Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choic:3
Elements in the stack….
77      45

Stack operations…
1.Push
2.Pop
3.Display
4.Exit
Enter ur choice:2
The element to be deleted = 77
```

17.Program for stack operations using linked lists (dynamic memory allocation)

```
#include<iostream.h>
#include<conio.h>
#include<process.h>
#include<stdio.h>

struct node
{char city[20];
 long pop;
 node *next;
};

class student
{ node *top;
public:
  student();
  void push();
  void pop();
  void display();
  ~student();
};
student::student()
{ top=NULL;
}
void student::push()
{node *p=new node;
 cout<<"\nEnter City Name : ";
 gets(p->city);
 cout<<"\nEnter its population : ";
 cin>>p->pop;
 p->next=top;
 top=p;
}
 void student::pop()
{ if(top==NULL)
      cout<<"\nUnder flow\n";
 else
  {
  node *save=top;
  top=top->next;
  cout<<save->city<<" is deleted\n";
  delete save;
  }
}
void student::display()
{if(top==NULL)
   cout<<"\nStack empty";
 else
 {cout<<"\nThe City names and its population in the
stack...\n";
  node *np=top;
  while(np!=NULL)
     {       cout<<np->city<<"\t"<<np->pop<<endl;
             np=np->next;
      }
    }
}
student::~student()
{while(top!=NULL)
    {
     node *temp=top;
     top=top->next;
     delete temp;
   }
}
```

```
void main()
{
clrscr();
student s;
int n;
cout<<"\t$$STACK OPERATIONS$$\n";
do{
  clrscr();
  cout<<"\nSTACK OPERATIONS USING LINKED
LISTS ";
  cout<<"\n1.PUSH";
  cout<<"\n2.Pop";
  cout<<"\n3.DISPLAY";
  cout<<"\n4.EXIT";
  cout<<"\nEnter your choice:";
  cin>>n;
  switch(n)
{ case 1:s.push();
              break;
  case 2:s.pop();
              break;
  case 3:s.display();
              break;
    case 4:exit(0);
} getch();
}while(n!=4);
}
```

Sample Data:

```
STACK OPERATIONS USING LINKED LISTS
1.PUSH
2.Pop
3.DISPLAY
4.EXIT
Enter your choice: 3
Stack empty

STACK OPERATIONS USING LINKED LISTS
1.PUSH
2.Pop
3.DISPLAY
4.EXIT
Enter your choice: 1
Enter City Name : Hyderabad
Enter its population : 700000

STACK OPERATIONS USING LINKED LISTS
1.PUSH
2.Pop
3.DISPLAY
4.EXIT
Enter your choice: 1
Enter City Name : Bangalore
Enter its population : 500000

STACK OPERATIONS USING LINKED LISTS
1.PUSH
2.Pop
3.DISPLAY
4.EXIT
Enter your choice: 31

The City names and its population in the stack.. ..
Bangalore        500000
Hyderabad        700000
```

18. Program for Queue operations using arrays

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

class queue
{ int q[5],front,rear;
public:
  queue()
  { front=rear=-1;
  }
  void insertion();
  void deletion();
  void display();
};

void queue::insertion()
{ if(front==-1)
  {  front=rear=0;
     cout<<"\nEnter the element to be inserted: ";
     cin>>q[rear];
  }
  else if(rear==4)
     cout<<"\nQueue is full";
  else
  {   rear++;
      cout<<"\nEnter the element to be inserted: ";
      cin>>q[rear];
  }
}

void queue::deletion()
{ if((front==-1)||(front>rear))
              cout<<"\nQueus is empty";
  else
  {  cout<<"\nThe element to be deleted = "<<q[front];
     front++;
  }
}
void queue::display()
{  if((front==-1)||(front>rear))
      cout<<"\nQueue is empty..";
   else
   {  cout<<"\nElements in the Queue.....\n";
      for(int i=front;i<=rear;i++)
              cout<<q[i]<<'\t';
   }
}

void main()
{
 int n;
 queue Q1;
 do{
 clrscr();
 cout<<"\nQueue operations...\n\n";
 cout<<"\n1.Insertion";
 cout<<"\n2.Deletion";
 cout<<"\n3.Display";
 cout<<"\n4.Exit";
 cout<<"\nEnter ur choice:";
 cin>>n;
```

```
 switch(n)
 {
  case 1: Q1.insertion();
            break;
  case 2: Q1.deletion();
            break;
  case 3: Q1.display();
            break;
  case 4: exit(0);
  default:cout<<"\nYou have to enter 1 to 4 only..";
 }
getch();
}while(n!=4);
}
```

Sample Data:

```
Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Queue is empty..

Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:1
Enter the element to be inserted:10

Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Elements in the Queue…
10

Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Elements in the Queue…..
10   20    30    40

Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice2
The element to be deleted = 10
```

19. Program for Circular Queue operations using arrays

```
#include<iostream.h>
#include<conio.h>
#include<process.h>
class Cqueue
{ int Cq[5],front,rear;
public:
  Cqueue()
  { front=rear=-1;
  }
  void insertion();
  void deletion();
  void display();
};

void Cqueue::insertion()
{ if((front==0 && rear==4)||(front==rear+1))
     cout<<"\nCircular Queue is full";
  else if(rear==-1)
  {  front=rear=0;
     cout<<"\nEnter the element to be inserted: ";
     cin>>Cq[rear];
  }
  else if(rear==4)
  {  rear=0;
     cout<<"\nEnter the element to be inserted: ";
     cin>>Cq[rear];
  }
  else
  {  rear++;
     cout<<"\nEnter the element to be inserted: ";
     cin>>Cq[rear];
  }
}

void Cqueue::deletion()
{ if(front==-1)
             cout<<"\nCircular Queus is empty";
  else
             cout<<"\nElement to be deleted is "<<Cq[front];

  if(front==rear)
           front=rear=-1;
  else if(front==4)
           front=0;
  else
           front++;
}
void Cqueue::display()
{  int i;
   if(front==-1)
      cout<<"\nCircular Queue is empty..";
   else
   {
     if (rear>=front)
     {  cout<<"\nElements in the Circular Queue.....\n";
           for(i=front;i<=rear;i++)
                    cout<<Cq[i]<<'\t';
     }
     else
     { for(i=front;i<=4;i++)
             cout<<Cq[i]<<'\t';
       for(i=0;i<=rear;i++)
             cout<<Cq[i]<<'\t';
     }
   }
}
```

```
void main()
{
 int n;
 Cqueue CQ1;
 do{
 clrscr();
 cout<<"\nCircular Queue operations...\n\n";
 cout<<"\n1.Insertion";
 cout<<"\n2.Deletion";
 cout<<"\n3.Display";
 cout<<"\n4.Exit";
 cout<<"\nEnter ur choice:";
 cin>>n;
 switch(n)
 { case 1: CQ1.insertion();
           break;
  case 2: CQ1.deletion();
           break;
  case 3: CQ1.display();
           break;
  case 4: exit(0);
  default:cout<<"\nYou have to enter 1 to 4 only..";
 }
getch();
}while(n!=4);
}
```

Sample data:

```
Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Circular Queue is empty…

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
10   20   30   40   50

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:1
Circular Queue is full

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Elements in the Circular Queue….
66  77   88   99   101

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:2
Element to be deleted is 66

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:3
Elements in the Circular Queue….
77  88  99  101

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice:1
Enter the element to be inserted : 222

Circular Queue operations…
1.Insertion
2.Deletion
3.Display
4.Exit
Enter ur choice : 3

Elements in the Circular Queue….
77  88  99  101  222
```

20. Program for Queue Operations using Linked Lists (Dynamic memory allocation)

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
#include<process.h>

struct NODE
{  char City[20];
   NODE *Next;
};

class Queue
{  NODE *Rear,*Front;
public:
  Queue()
  {    Rear=NULL;Front=NULL;
  }
  void Qinsert();
  void Qdelete();
  void Qdisplay();
  ~Queue();
};

void Queue::Qinsert( )
{
  NODE *Temp;
  Temp=new NODE;
  cout<<"Enter name of the City: ";
  gets(Temp->City);
  Temp->Next=NULL;
  if(Rear==NULL)
  {  Rear=Temp;
     Front=Temp;
  }
  else
  {  Rear->Next=Temp;
     Rear=Temp;
  }
}
```

```
void Queue::Qdelete( )
{ if (Front!=NULL)
  {   NODE *Temp=Front;
      cout<<Front->City<<" is Deleted \n ";
      Front=Front->Next;
      delete Temp;
      if (Front==NULL)
                Rear=NULL;
   }
  else
      cout<<"Queue Empty..";
}

void Queue::Qdisplay( )
{  if(Front==NULL)
    cout<<"\tQueue is Empty...";
  else
  {  cout<<"\n\nThe names of the Cities in the Queue...\n";
     NODE *Temp=Front;
     while (Temp!=NULL)
     { cout<<"\t"<<Temp->City<<endl;
           Temp=Temp->Next;
     }
  }
}

Queue:: ~Queue( )//Destructor Function
{  while (Front!=NULL)
  {  NODE *Temp=Front;
     Front=Front->Next; delete Temp;
  }
}

void main( )
{ Queue Q;
 int n;
 do
 {  clrscr();
    cout<<"\nQueue Operations....";
    cout<<"\n1.Insert";
    cout<<"\n2.Delete";
    cout<<"\n3.Display";
    cout<<"\n4.Exit";
    cout<<"\nEnter your choice";
    cin>>n;
    switch(n)
    {  case 1:Q.Qinsert(); break;
           case 2:Q.Qdelete(); break;
           case 3:Q.Qdisplay(); break;
           case 4:exit(0);
           default:cout<<"\nYou have to enter 1 to 4 only..";
    }
    getch();
  } while (n!=4);
}
```

Sample Data:

```
Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 3
Queue is Empty…

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 1
Enter name of the City : Hyderabad

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 1
Enter name of the City : Vijayawada

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 1
Enter name of the City: Bangalore

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 3

The names of the Cities in the Queue…
     Hyderabad
     Vijayawada
     Bangalore

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 2
Hyderabad is Deleted

Queue Operations….
1.Insert
2.Delete
3.Display
4.Exit
Enter your choice 3
The names of the Citites in the Queue…
       Vijayawada
       Bangalore
```

XII COMPUTER

2019 MODEL PAPER BASED SAMPLE PAPER

1A) Write the type of C++ Lexical Units from the following:
(i) { (ii) ++ (iii) Int (iv) "How are you?" **(2)**

A) (i) Separator/Punctuator (ii) Operator (Increment)
(iii) Identifier (iv) Literal (String)

1B) Observe the following program very carefully and write the name of those header file(s), which are essentially needed to compile and execute the following program successfully: (1)

```
void main()
{  char String[20];
   gets(String);
   for(int i=0;String[i]!='\0';i++) ;
   cout<<"String Length = "<<i
}
```

A) stdio.h, iostream.h

1C) Rewrite the following C++ code after removing any/all Syntactical Error(s) with each correction underlined. Note: Assume all required header files are already being included in the program. (2)

```
#define NAME(A)=A*A;
void main( )
{  float SQ=10.0;
   Area=NAME[SQ];
   cout<<'Area=' AREA;
   return 0;
}
```

A)

```
#define NAME(A)  A*A                  //Error 1 and 2
void main( )
{  float SQ=10.0;
   float Area=NAME(SQ);               //Error 3 and 4
   cout<<"Area=" << Area;             //Error 5,6 and 7
                        // Error 8 -  return 0 is removed
}
```

1D) Find and write the output of the following C++ program code: Note: Assume all required header files are already being included in the program. (3)

```
void main( )
{ int Ar[ ] = {10,11,12,13,14,15,16,17} ;
  int *Ptr = Ar+2 , I ;
  cout<<++*Ptr++ << '@' ;
  I = Ar[6] - Ar[2] ;
  cout<<++*(Ptr+I+1)<<'@'<<"\n" ;
  cout<<++I + *Ptr++ << '@' ;
  cout<<*Ptr++ <<'@'<< '\n' ;
  for( ; I >=0 ; I -=2)
              cout<<Ar[I] << '@' ;
}
```

A) **13@18@**
17@14@
14@13@10@

1E) Find and write the output of the following C++ program code: (2)

```
typedef char STRING[80];
void MIXNOW(STRING S)
{  int Size=strlen(S);
  for(int I=0;I<Size-1;I+=3)
 {    char WS=S[I];
              S[I]=S[I+2];
              S[I+2]=WS;
  }
  for (I=1;I<Size;I+=2)
    if (S[I]>='A' && S[I]<='J')
            S[I]='*';
    else if (S[I]>='M' && S[I]<='n')
            S[I]='@';
  cout<<S<<endl;
  for(I=0;I<Size-1;I++)
    if(isupper(S[I]))
            tolower(S[I]);
    else if (islower(S[I]))
            S[I]=S[I]+1;
    else
            S[I]=S[I-1];
}
void main()
{  STRING Word="WgDt@2019#AP";
   MIXNOW(Word);
   cout<<Word<<endl;
}
```

Output:
D@W2@t910@A#
DDWWWuuuuuA#

1F) Observe the following program and find out, which output(s) out of (i) to (iv) will be expected from the program? What will be the minimum and the maximum value assigned to the variable N? (2)

Note: Assume all required header files are already being included in the program.

```
void main( )
{ randomize();
  int Ar[ ]={3,6,9,12,15}, N;
  int Alter;
  for (int C=0;C<2;C++)
  {  N=random(2)+2 ;
     Alter=random(2) + 7 ;
     cout<<Ar[N+1] +Alter<<"@"<<endl;
   }
}
```

(i) 23@ (ii) 19@ (iii) 18@ (iv) 20@
24@ 19@ 19@ 23@

A)The output expected from the program is
(ii) 19@ (iv) 20@
19@ 23@
Minimum Value of N = 2
Maximum Value of N = 3

C	N	Alter	Ar[N+1]	Possible Values
0	0+2=2 1+2=3	0+7=7 1+7=8	Ar[3]=12 Ar[4]=15	19#/20#/22#/23#
1	0+2=2 1+2=3	0+7=7 1+7=8	Ar[3]=12 Ar[4]=15	19#/20#/22#/23#

Possible Output:
19#/20#/22#/23#
19#/20#/22#/23#

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

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

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

Constructor	Destructor
Purpose: Is used to initialize the objects of that class type with a legal initial value	Purpose: Is used to destroy the objects that have been created by a constructor
Name: The name of the class	Name: The name of the class preceded by a ~.
Calling: It will be called automatically at the time of creation or declaration of the object. Ie Implicit calling	Calling: It is automatically called and executed when scope of an object gets over. Ie Implicit calling
Return Type: No return type not even void --- Constructor can be overloaded --- It is defined in public visibility mode	Return Type: No return type not even void --- Destructors cannot be overloaded --- It is defined in public visibility mode

Pointers and references cannot be used on constructors and destructors because their addresses cannot be taken.
Example:
class Area
{ float l,b,a;
public:
Area( )
{ l=b=a=0.0; }
---------- 	
---------- 	
};
	Pointers and references cannot be used on constructors and destructors because their addresses cannot be taken.
	Example:
	class Area
	{ float l,b,a;
	public:
	---------- 	
	---------- 	
	~Area( )
	{ cout<<"One Object destroyed";
	}
	---------- 	
	---------- 	
	};

2B) Write the output of the following C++ code. Also, write the name of feature of Object Oriented Programming used in the following program jointly illustrated by the Function 1 to Function 4. (2)

```
#include<iostream.h>
#include<conio.h>
void My_fun (int N=5)                  // Function 1
{ for (int I=1 ; I<=N ; I++) cout<<"#" ;
            cout<<endl ;
}
void My_fun (int A, int B)             // Function 2
{ for (int I=A ;I<=B ;I++) cout <<char(I);
            cout<<endl ;
}
void My_fun (char T, int N)            // Function 3
{ for (int I=1 ; I<=N ; I++) cout<<T+2 ;
            cout<<endl;
}
void main ( )
{ int X=2, Y=5, M=100,N=105;
  clrscr();
  My_fun('b',Y);
  My_fun();
  My_fun (M-97) ;
  My_fun (N,M+7) ;
  My_fun(X);
  getch();
}
```

A) **100100100100100**
#####
###
ijk
**(OR)**

Differentiate between public and private visibility modes.

(**Access Specifiers:** It is used to define the behaviour of the variable and function in a class. It tells which object can access the variable and function. It is public, private and protected. It is therefore used in class.

Visibility Mode: It is used in C++ to show the relationship between the base and the derived class. It specifies what the derived class can derive from the base class. It is therefore used in inheritance.)

(**Important Note: For** Visibility modes differences, in the marking schemes answers were given for access specifier differences. So Student is adviced to differentiate in context of access specifiers as well as visibility modes)

Public Visibility	Private visibility
Members in public visibility mode of the class are accessible from within the class as well as outside of the class ie (member functions of the class & objects of the class.)	Members in private visibility mode of the class are accessible from within the class only (member functions of the class only). They cannot access from objects of the class.
Must keep keyword "**public**" to make a member as public. (explicit visibility mode)	It is default visibility mode. (implicit visibility mode)

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.

Public and private visibility modes in context of INHERITANCE:

Public visibility mode: With publicly derived class, the public members of the base class become the public members of the derived class, the protected members of the base class become the protected members of the derived class and the private members of the base class are not accessible in the derived class.

Private visibility mode: With privately derived class, the public and protected members of the base class become private members of the derived class and the private members of the base class are not accessible in 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	

2C) Define a class Student in C++ with the following descriptions: (4)

Private members:
SName of type character array
RNo of type long
M1,M2,M3,Total,Avg of type float
Division of type character array
Message of type character array
Calc( ) This member function should calculate
Total as M1+M2+M3;
Avg as Total/3;

Avg	Division
>=75	DISTINCTION
>=60	FIRST
>=50	SECOND
>=40	THIRD
<40	FAIL

Division	Message
DISTINCTION	VERY GOOD
FIRST	GOOD
SECOND	CONGRATS
THIRD	MUST GET GOOD MARKS
FAIL	YOU MUST PASS

Public members:

* A function Accept( ) which allows user to enter SName, RNo,M1,M2,M3 and invoke function Calc().
* A function Display( ) to display the values of all the data members on the screen.

A)

```
class Student
{ char Sname[20],Division[20],Message[20];
  long RNo;
  float M1,M2,M3,Total,Avg;
  void Calc( );
public:
  void Accept();
  void Display();      };
```

```
void Student : : Calc( )
{   if (Avg>=75)
          strcpy(Division,"DISTINCTON");
   else if (Avg>=60)
         strcpy(Division,"FIRST");
   else if (Avg>=50)
         strcpy(Division,"SECOND");
   else if (Avg>=40)
         strcpy(Division,"THIRD");
   else
         strcpy(Division,"FAIL");
  if(strcmp(Division,"DISTINCTION")= =0)
       strcpy(Message,"VERY GOOD");
  else if(strcmp(Division,"FIRST")= =0)
       strcpy(Message,"GOOD");
  else if(strcmp(Division,"SECOND")= =0)
       strcpy(Message,"CONGRATS");
  else if(strcmp(Division,"THIRD")= =0)
       strcpy(Message,"MUST GET GOOD MARKS");
  else
       strcpy(Message,"YOU MUST PASS");
}
void Student::Accept( )
{ cout<<"\nEnter Student name, Roll number, 3 subject marks:";
  gets(SName);
  cin>>RNo>>M1>>M2>>M3;
  Calc( );
}
void Student::Display( )
{ cout<<"\nStudent Name: "<<SName;
   cout<<"\nRoll Number : "<<RNo;
   cout<<"\nSubject Marks: "<<M1<<M2<<M3;
   cout<<"\nTotal and Average: "<<Total<<Avg;
   cout<<"\nDivision : "<<Division;
   cout<<"\nMessage: "<<Message;
}
```

2D) Answer the questions (i) to (iv) based on the following: (4)

```
class FA
{  int FArno;
protected:
   char Names[40[20];
   int retmarks( );
public: FA( );
  void FAR( );
  void FAD( );
  ~FA( );
};
class SA: protected FA
{  float SArno;
    char MyName[10];
protected: int Rank;
    void SAR( );
    void SAD( );
public: SA( );
   float SAMarks;
   void Test( );
  ~SA( );
};
class Annual: public SA
{   double Annualrno;
     long AnnualMarks;
protected: float AnnualRank;
public: Annual( );
    void AnnualR( );
    void AnnualD( );
    void Test( );
    ~Annual( );
};
void main( )
{ Annual A;
   SA S;
   _____ //Statement 1
}
```

(i) Write the names of all the members, which are directly accessible by the object A of class Annual as declared in main() function.

A)Member Variables : SAMarks
Member Functions : AnnualR( ), AnnualD( )

(ii) Write the names of all the members, which are directly accessible by the memberfunction AnnualR( ) of class Annual.

A)Member Variables : AnnualRno, AnnualMarks, AnnualRank, Rank, SAMarks, Names
Member Functions : AnnualD( ), SAR( ), SAD( ), retmarks( ), FAR( ), FAD( ).

(iii) Write Statement 1 to call function Test( ) of class SA from the object A of class Annual.

A) A.SA::Test( );

(iv) What will be the order of execution of the Constructors & destructors when the object A of class Annual is declared inside main()?

A) FA( ),SA( ), Annual( ), ~Annual( ),~SA( ),~FA( ).

OR

Consider the following class State :

```
class Son
{   int No;
protected:
    char SName[20];
    int retNo( );
public:
    void SonTake( )
   {  No = 1;
      strcpy(SName, "Raju");
    }
   void SonDisp( )
  {  cout<<No<<endl<<SName;
  }
};
```

Write a code in C++ to **protectedly** derive another class '**Father**' with the following additional members.

Data Members :
FName string
FNo int
Public Member functions :
FTAKE( ) : To enter FName and FNo
FDISP( ) : To display FName and FNo on the screen.

Further, write a code in C++ to **publicly** derive another class '**GrandFather**' from class 'Father' with the following additional members.

Data Members :
GName string
GNo int
Public Member functions :
GTAKE( ) : To enter GName and GNo
GDISP( ) : To display GName and GNo on the screen.

A)

```
class Son
{   int No;
protected:
    char SName[20];
    int retNo( );
public:
    void SonTake( )
   {  No = 1;
      strcpy(SName, "Raju");
    }
   void SonDisp( )
  {  cout<<No<<endl<<SName;
  }
};
class Father : protected Son
{ public :
     char FNname[20];
     int FNo;
 public:
     void FTAKE( )
     { cout<<"\nEnter Father Name and Father No: "
       gets(FName);
       cin>>FNo;
     }
     void FDISPLAY( )
     { cout<<"\nFather Name: "<<FName;
       cout<<"\nFather No: "<<FNo;
     }
};
```

```
class GrandFather : public Father
{ public :
     char GNname[20];
     int GNo;
  public:
     void GTAKE( )
     { cout<<"\nEnter Father Name and Father No: "
       gets(GName);
       cin>>GNo;
     }
     void GDISPLAY( )
     { cout<<"\nFather Name: "<<GName;
       cout<<"\nFather No: "<<GNo;
     }
};
```

3A) Write a user-defined function AddEnd4(int A[][4],int R,int C) in C++ to find and display the total of all the elements in alternate columns, which are ending with 4 (i.e., unit place is 4). (2)
For example if the content of array is:

1	2	**3**	4
5	6	**7**	8
9	10	**11**	12

The output should be (1+3+5+7+9+11 =) **36**

```
A)void AddEnd4(int A[ ][4], int R, int C)
   {  int i,i,sum=0;
     for(i=0;i<R;i++)
     {   for(j=0;j<C;j+=2)
          if(A[i][j]%10 = =4)
             sum=sum+A[i][j];
     }
     cout<<sum;
  }
```

OR

Write a user defined function in C++ to find the Total of elements displayed in Bold (Z shape) from a two dimensional array.
For example if the content of array is:

10	**11**	**12**	**13**	**14**
20	21	22	**23**	24
30	31	**32**	33	34
40	**41**	42	43	44
50	**51**	**52**	**53**	**54**

The output should be (10+11+12+13+14+23+32+41+50+ 51+52+53+54)) **416**

```
A)  void ZTotal(int A[ ][], int  n)
   {  int Total=0;
     for(int i=0;i<n;i++)
       for(j=0;j<n;j++)
           if( (i==0)||(i==(n-1))||(i=j)==(n-1)) )
                Total +=A[i][j];
     cout<<Total;
  }
```

3B) Write a user-defined function EXTRA_ELE (int A[ ], int B[ ], int N) in C++ to remove extra element from array A. Array A contains all the elements of array B but one more element extra. (Restriction: array elements are not in order) (3)
Example If the elements of Array A is 14, 21, 5, 19, 8, 4, 23, 11 and the elements of Array B is 23, 8, 19, 4, 14, 11, 5
Then output will be 21

```
A)void EXTRA_ELE(int A[ ], int B[ ],int N)
   { int i,j,k, flag=0;
     for(i=0;i<N;i++)
     {  for(j=0;j<N;j++)
        {   if(A[i]==B[j])
            { flag=1;
              break;
            }
        }
       if(flag==0)
       { cout<<"Extra element"<<A[i];
         while(i<N-1)
            A[i]=A[i+1];
        cout<<"\nArray A after removing extra element: ";
        for(int k=0;k<N-1;k++)
            cout<<A[k]<<"\t ";
       }
   }
}
```

OR

Write a user defined function Cubed(int A[],int n) which accepts an integer array and its size as arguments(parameters) and **last digits in every location must be cubed and added to the total;**
Example : if the array is 23,31,5322,-32201.
It should play (3*3*3+1*1*1+2*2*2+1*1*1)=37
then reversed array is 50,40,30,20,10

```
A)void Cubed( int A[ ] , int n)
  {  int Total=0,i,Temp;
     for(int i=0;i<n;i++)
     {  Temp=0;
        Temp = A[i]%10;
        Total +=Temp*Temp*Temp;
     }
  }
```

3C) An array S[15] [25] is stored in the memory along the column with each of its element occupying 8 bytes. Find out the memory location of S[5][10], if element S[2][7] is stored at the location 8200. (3)
A)
OPTION 1:
ASSUMING LBR=LBC=0 W=2 BYTES,
NUMBER OF ROWS(R)=10,
NUMBER OF COLUMNS(C)=30
LOC(S[I][J]) = B +W *[(I-Lr) + R*(J-Lc)]
LOC(S[2][7]) = B +8 * (2+7*15)
8200 = B + 8*(2+105)
B = 8200 - 856
B = 7344
LOC(S[5][10]) = 7344 +8*(5+10*15)
= 7344 +8* (155)
= 7344 +1240
= 8584
OPTION 2:
ASSUMING LBR=2,LBC=7 AND B = 8200 W=2 BYTES
NUMBER OF ROWS(R)=15,
NUMBER OF COLUMNS(C)=25
LOC(S[I][J]) = B +W*((I-LBR) + R*(J-LBC))
LOC(S[5][10])= 8200 + 8* ((5-2) + 15 * (10-7))
= 8200 + 8 * (3 + 15*3)
= 8200 + 8 *48 = 8200 + 384 = 8584

OR

An array A[10][20] is stored in the memory with each element requiring 4 bytes of storage ,if the base address of A is 4500 ,Find out memory locations of A[5][7], if the content is stored along the row.
A) ASSUMING LBR=LBC=0 W=4 BYTES,
NUMBER OF ROWS(R)=10,
NUMBER OF COLUMNS(C)=20
LOC(A[I][J]) = B +W *[C*(I-Lr) + (J-Lc)]
LOC(A[5][7]) = 4500 +4 * (20*(5-0)+(7-0)
B = 4500 + 4*107 = 4500 + 428 = 4928

3D) Write the definition of a member function Del_Student() for a class CQUEUE in C++, to delete a Player in a statically allocated circular queue of PLAYERs considering the following code is already written as a part of the program: (4)

```
struct  Student
{  long RNo;
   char Sname[20];
};
const int size=5;
class CQUEUE
{  Student Ar[size];
   int Front, Rear;
public:
   CQUEUE( )
   { Front = -1;
     Rear=-1;
   }
void Ins_Student();    // To add player in a static circular queue
void Del_Student();    // To remove player from a static circular queue
```

```
void Show_Student(); // To display static circular queue
};
A)void CQUEUE : : Del_Player( )
{ if((Front==-1)||(Front>Rear))
    cout<< "Queue Underflow"
 else
 {  cout<<"\nElement to be deleted: "<<CQ(Front);
    if(Front= =Rear)
          Front = Rear = -1;
    else if(Front = = (size -1))
         Front = 0;
    else
         Front ++;
  }
}
```

OR

Write a function in C++ to insert a node containing Employee information ,from a dynamically allocated stack of Employees implemented with the help of the following structure:

```
struct Emp
{ int ENo;
  char EName[20];
  float ESalary;
  Emp *Next;
};
```

A)

```
struct Emp
{ int ENo;
  char EName[20];
  float ESalary;
  Emp *Next;
};
class EmpSal
{  Emp *Top;
 public:
  Stack( ){Top = NULL; }
  void Push( );
  void Pop( );
  void Display( );
};
void EmpSal::Push()
{ Emp *temp=new Emp ;
  if(temp= =NULL)
  {     cout<<"No Memory…….";
        exit(0);
  }
  cout<<"Enter the employee no, name and salary: ";
  cin>>temp→ENo;
  gets(temp→EName);
  cin>>temp→ESalary;
  temp→Next = Top;
  temp=Top;
}
```

3E) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion.

MN – D/F + K **(2)**

Ans)((M*N) – (D/F) + K)

Element	Stack	Postfix
(	(	
(	((	
M	((	M
*	((*	M
N	((*	M N
)	(	M N *
-	(-	M N *
(	(- (	M N *
D	(- (	M N * D
/	(- (/	M N * D
F	(- (/	M N * D F
)	(-	M N * D F /
+	(- +	M N * D F /
K	(- +	M N * D F / K
)	(-	M N * D F / K +
		M N * D F / K+ -

(**Checking – Postfix to Infix Conversion**

M, N, *, D, F, /, K, +, - = **M * N**, D, F, /, K, +, -
=M * N, **D/F**, K, +, -
=M * N, **D/F + K**, -
=M * N – **D/F + K**

OR

Evaluate the following Postfix expression :

20,10,6,3,/,*,-

A) **0**

Element Scanned	STACK
20	20
10	20,10
6	20,10,6
3	20,10,6,3
/	20,10,**2** **(6/3)**
*	20,20 **(10*2)**
-	0 **(left 20 – right 20)**

4A) Write a function Counts() to read a text file " Input.txt " and Print alphabet statistics as follows:

Sample Output: **(2)**

```
Total alphabets = 10
Total vowels    = 3
Total consonants = 7
Upper alphabets = 6
Lower alphabets = 4
Total digits = 5
Total special symbols (other than alphabets and digits.
Including spaces)
Total Words = 2
```

A)

```
void Counts( )
{ ifstream Fin("Input.txt");
  int Alphabets = 0, Lower = 0, Upper = 0, Vowels = 0,
      Conso = 0;Digits = 0; Special = 0; Words = 1;Total=0;
  char ch;
  while(!Fin.eof())
  { fin.get(ch);
    if (isalpha (ch))
          Alphabets++;
   if(islower(ch))
          Lower++;
   if (isupper(ch))
          Upper++;
   if(isdigit(ch))
          Digits++;
   Total++;
   if (ch= =' ')
         Words++;
    switch(ch)
   { case 'A': case 'a': case 'E': case 'e':
     case 'I': case 'i': case 'o': case 'O':
     case 'u': case 'U': Vowels ++; break;
   }
 }
cout<<"\nTotal Alphabets: "<<Alphabets;
cout<<"\nTotal Vowels : "<<Vowels;
cout<<"\nTotal Consonents: "<<Alphabets – Vowels;
cout<<"\nUpper Alphabets: "<<Upper;
cout<<"\nLower Alphabets: "<<Lower;
cout<<"\nTotal Digits: "<<Digits;
cout<<"\nSpecial Symbols : "<<Total-Alphabets-Digits;
cout<<"\nTotal Words: "<<Total;
Fin.close( );
}
```

OR

Assuming that a text file named FIRST.TXT contains some text written into it, write a function named vowelwords( ), that reads the file FIRST.TXT and creates a new file named SECOND.TXT, to contain only those words from the file FIRST.TXT which start with start with a lowercase vowel (i.e. with 'a', 'e', 'I', 'o', 'u').

For example if the file FIRST.TXT contains

Carry umbrella and overcoat when it rains

Then the file SECOND.TXT shall contain:

umbrella and overcoat it

Ans)

```
void Vowelwords( )
{  ifstream fin("FIRST.TEXT");
```

```
   ofstream fout("SECOND.TXT");
   char Word[20];
   while(fin)
   { fin>>Word;
     if((Word[0]= ='a')||(Word[0]= ='e')||
        (Word[0]= ='i')||(Word[0]= ='o') ||
        (Word[0]= ='u'))
              fout<<Word<<"  ";
   }
  fin.close( );
  fout.close( );
}
```

4B) Write a function in C++ to search and display details, whose BlockName is "JRG", MandalName is "Kukkunur" from binary file "JNVST.Dat". Assuming the binary file is containing the objects of the following class: (3)

```
class JNVST
{   long  RegNo;              //Registered Number
    char SName[20];           //Student Number
    char BName[20];           //Block Name
    char MName[20];           // Mandal Name
public:
  char * RetSName( )
  { return SName;
  }
char * RetBName( )
 { return BName;
}
char * RetMName( )
 { return MName;
}
 void input( )
{ cout<<"\nEnter Student RegNo, Name,
          Block Name and Mandal Name: "
  cin>>RegNo;
  gets(SName);
  gets(BName);
  gets(MName);
}
void show( )
{ cout<<"\nStudents Details: "
  cout<<RegNo<< ":"<<SName << ":"
      <<SName<<":"<<BName<endl;
 }
};
```

Ans)

```
void Display( )
{  ifstream fin("JNVST.DAT", ios::binary);
   JNVST J;
   while(fin)
    {  fin.read((char *) &J, sizeof(J));
       if( (strcmp(J.RetBName( ),"JRG")= = 0) &&
          (strcmp(J.RetmName( ),"Kukkunur")= = 0)
          J.show( );
   }
   fin.close( );
}
```

OR

Write a function in C++ to read 5 new objects from user and to store in a binary file "NewStu.dat". After storing these 5 new objects in the file "NewStu.dat", all the objects of file "Student.dat" must be added at bottom of file "NewStu.dat" containing the objects of the following class:

```
class STU
{ int Rno;
  char Sname[20];
public:
  void Enter()
  { cin>>Rno;gets(Sname);
  }
  void show()
  { count << Rno<<sname<<endl;
   }
};
```

A)

```
void Addrecord()
{ ifstream fin("STUDENT.dat", ios ::in|ios::binary);
  ofstream fout("NewStu.dat",ios::out|ios::binary);
  STU S;
  for(int i=1;i<=5;i++)
  {   S.Enter( );
      fout.write((char *)&S, sizeof(S));
  }
  while (fin)
  { fin.read((char *)&S,sizeof(S));
    fout.write((char *)&S,sizeof(S));
  }
  fin.close();
  fout.close( );
}
```

4C) Find the output of the following C++ code considering that the binary file PRODUCT.DAT exists on the hard disk with a list of data of 500 products. (1)

```
class City
{  char CName[30];
   long Pop;
public:
  void CEntry( );
  void Disp( );
};
void main()
{ fstream In;
  In.open("PRODUCT.DAT",ios::binary|ios::in);
  PRODUCT P;
  In.seekg(2*sizeof(P),ios::cur);
  cout<<"Present Record: "<<In.tellg( )/sizeof(P);
  In.seekg(-sizeof(P),ios::cur);
  cout<<In.tellg( )/sizeof(P);
  In.seekg(-2*sizeof(P),ios::end);
  cout<<In.tellg( )/sizeof(P) + 1;
  In.seekg(68,ios::beg);
  cout<<"\nFinal Position: "<<In.tellg( )/sizeof(P);
  In.read((char *)&P,sizeof(P);
  cout<<"\n"<<In.tellg( );

}
```

A)

```
Present Record: 21499
Final Position:2
102
```

OR

Fill in the blanks marked as Statement 1 and Statement 2, in the program segment given below with appropriate functions for the required task.

```
class Club
{long int MNo;                 //Member Number
 char MName[20];               //Member Name
 char Email[30];               //Email of Member
public:
  void Register( );          //Function to register member
  void Disp( );              //Function to display details
  void ChangeEmail( )   //Function to change Email
  {   cout<<"Enter Changed Email: ";
      cin>>Email;
   }
   long int GetMno( )
  {         return MNo;
   }
};
void ModifyData( )
{ fstream File;
 File.open("CLUB.DAT", ios::binary | ios::in|ios::out);
int Modify=0, Position;
long int ModiMno;
cout<<"Mno – Whose email required to be modified: ";
cin>>ModiMno;
Club CL;
while(!Modify && File.read((char *)&CL.sizeof(CL)))
{  if(CL.GetMno( )==ModiMno)
    {   CL.ChangeEmail( );
```

```
    Position=File.tellg( )-sizeof(CL);
  //Statement 1: To place file pointer to the required position
    _____
  //Statement:To write the object CL on to the binary file
    _____
   Modify++;
  }
}
if(Modify)
  cout<<"Email changed….."<<endl;
else
cout<<"Member not found…."<<endl;
File.close( );
}
```

Ans)

Statement 1: File.seekp(Position);
OR File.seekp(File.tellp( ) – sizeof(CL));
OR File.seekp(-sizeof(CL),ios::cur);
Statement 2: File.write((char *)&CL,sizeof(CL));

5A)Observe the following table and answer the parts (i) and(ii) accordingly (2)

Table: STUDENT

AdmNo	Roll No	FirstName	LastName	SurName	Adhaar

Assume 10 students details are stored in the above table.
(i) Write the names of most appropriate columns, which can be considered as candidate keys.
Write Primary Key and alternate keys also.

A) Candidate Key: AdmNo, Adhaar, {FirstName,LastName,SurName}
Primary Key: AdmNo
Alternate Keys:Adhaar, {FirstName,LastName,SurName}

(ii) What is the degree and cardinality of the above table?

A) Degree:6 Cardinality:10

5B) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. (4+2)

DVD

DCODE	DTITLE	DTYPE
F101	Henry Martin	Folk
C102	Dhrupad	Classical
C101	The Planets	Classical
F102	Universal Soldier	Folk
R102	A day in life	Rock

MEMBER

MID	NAME	DCODE	ISSUEDATE
101	AGAM SINGH	R102	2017-11-30
103	ARTH JOSEPH	F102	2016-12-13
102	NISHA HANS	C101	2017-07-24

(i) To display all details from the table MEMBER in descending order of ISSUEDATE.

Ans) SELECT * FROM MEMBER ORDER BY ISSUEDATE DESC;

(ii) To display the DCODE and DTITLE of all Folk Type DVDs from the table DVD

Ans) SELECT DCODE,DTITLE FROM DVD WHERE DTYPE='Folk';

(iii) To display the DTYPE and number of DVDs in each DTYPE from the table DVD

Ans) SELECT COUNT(*),DTYPE FROM DVD GROUP BY DTYPE;

(iv) To display all NAME and ISSUEDATE of those members from the table MEMBER who have DVDs issued (i.e ISSUEDATE) in the year 2017

Ans) SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE>='2017-01-01' AND ISSUEDATE<='2017-12-31';

OR

SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE BETWEEN '2017-01-01' AND '2017-12-31';

OR

SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE LIKE '2017%';

(v) SELECT MIN(ISSUEDATE) FROM MEMBER;

Ans)
MIN(ISSUEDATE)
2016-12-13

(vi) SELECT DISTINCT DTYPE FROM DVD;

Ans)
DISTINCT DTYPE
Folk
Classical
Rock

6A) State any one Demorgan's Law of Boolean Algebra and Verify it using truth table. (2)

A) (i) (X+Y)'= X'.Y' (ii) (X.Y)'= X'+Y'

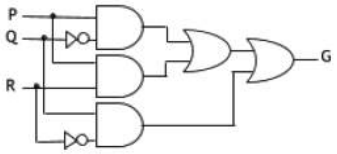
Verification

P + P' = 1 (Complementary Law)
Let P = (X+Y)
Then (X+Y)+(X+Y)' = 1
Let us assume (X+Y)'=X'Y',
Then by substituting this in complementary law, the result Must be 1.
(X+Y)+(X+Y)'=1
(X+Y)+X'Y' = (X+Y+X')(X+Y+Y') (A+BC=(A+B)(A+C))
= (X+X'+Y)(X+1)
= (1+Y)(X+1) (1+X = 1, Property of 1)
= 1.1 = 1

As the result is 1,
(X+Y)'= X'.Y'
By Duality principle, second law is also proved.

6B) Draw the Logic Circuit of the following Boolean Expression: P.Q' + P.R + Q.R' (2)

A)



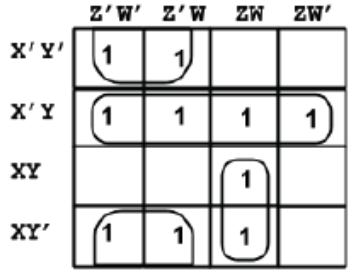
6C) Derive a Canonical SOP expression for a Boolean function G(P,Q,R) represented by the following truth table: (1)

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

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

6D) Reduce the following Boolean Expression to its simplest form using K-Map:

F(X.Y.Z.W) = Σ(0.1.4.5.6.7.8.9.11.15)



Ans) Simplified Expression: Y'Z' + X'Y + XZW

7A) Mr.Raju has used his knowledge to unauthorized login into a bank's server and did some modifications.
Mr Nani has unauthorized login into a website and mailed Website Loopholes to the website management team.
Then Raju is a _____ and Nani is a _____ (2)

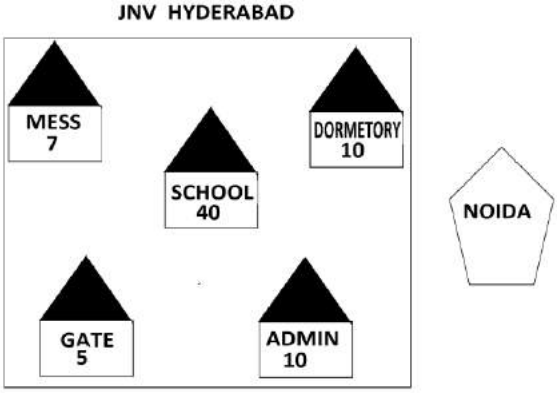
A) Raju is a Cracker and Nani is a Hacker.

7B) When Suresh is creating a mail id, when he is filling details as he kept only 4 characters password, immediately it showed password must be 8 characters. Which type of scripting language is useful. And name any example of such scripting language. (1)
A) Client side scripting language.
Examples: Java Script, VB Script, PHP

7c) Write two advantages of using open source Software over proprietary software. Name one example of each. (2)
A) Two advantages of using open source software over proprietary software are:
Open Source Software is software whose source code is available to customer and it can be modified and redistributed without any limitations whereas source code of proprietary software is not available.
Open Source software may come free of cost or with payment of normal charges whereas proprietary software is neither open nor freely available.
Ex.ofOpen Source S/W: OpenOrg, Linux
Proprietary Software: MS Office, Windows, Photoshop

7D) Write the expanded names for the following abbreviated terms used in Networking and Communications: (i) GSM (ii) NCP (iii) WiFi (iv) VoIP (2)
A)(i) Global System for Mobile
(ii) Network Control Protocol
(iii) Wireless Fidelity
(iv) Voice Over Internet Protocol

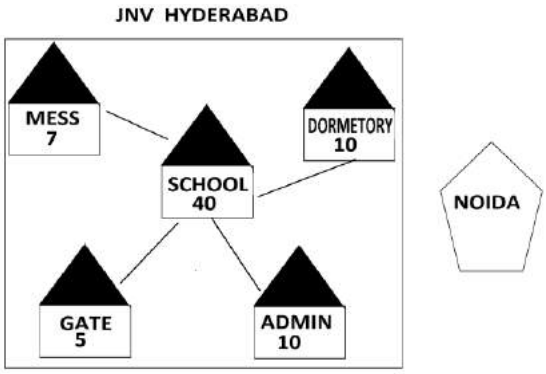
7E) JNV, Hyderabad is Setting up the network between its Different Wings of school campus.
There are 5 wings along with their number of systems named as MESS(7), SCHOOL(40), DORMETORY(10), GATE(5) and ADMIN(10). (4)
Main office is located in Noida.



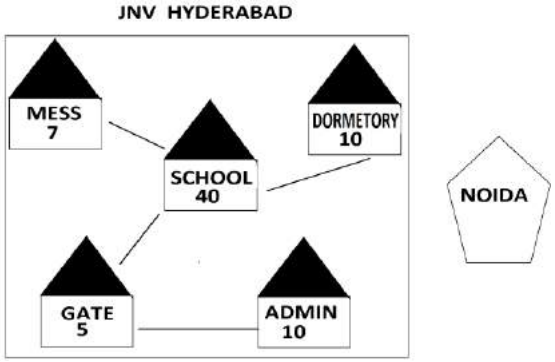
Distance between various wings are given below:

Between Wings	Distance (meters)
MESS to SCHOOL	60
MESS to DORMETORY	110
MESS to GATE	65
MESS to ADMIN	130
SCHOOL to DORMETORY	40
SCHOOL to GATE	50
SCHOOL to ADMIN	68
DORMETORY to GATE	115
DORMETORY to ADMIN	100
GATE to ADMIN	65

(i) Suggest the best wired medium, topology and draw the cable layout to efficiently connect various wings JNV, HYDERABAD.
A)**Best wired medium:** Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable (CAT5 OR CAT6 OR CAT7 OR CAT8 are categories of twisted pair cables)
Topology: Star topology
Best Layout 1 (Server to all other wings):



Best Layout 2 (Less cable length):



(ii) Name the most suitable wing where the Server should be installed. Justify your answer.
A) SCHOOL- Because it has maximum number of computers.

(iii) Suggest a device/software and its placement that would provide data security for the entire network of the School.
A) Firewall - Placed with the server at SCHOOL.

(iv) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of JNV, Hyderabad
A) **Device Name:** WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RFTransmitter
Protocol: WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11

(v) Suggest the placement of the following device with justification: a) Repeater b) Hub/Switch
A)a) Wherever distance between two wings is more than 70meter, there Repeater must be installed.
For Layout1, and Layout2, since the cabling distance Between any two wings is lesser distance, so no need to install any repeater.
For example is Mess and Dormetory has to connect, between them repeater must be installed as distance is 110 meters.
b) 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 building.

(vi) Which type of network out of the following is formed by connecting the computers of Hyderabad and Noida?
LAN MAN WAN
A)WAN

(vii) Which wireless channel out of the following should be opted by JNV students from all over the world?
Infrared Microwave Satellite
A) Satellite.
(viii) JNV, Hyderabad is planning to connect its Office located in Secunderabad, which is 25 KM away from Hyderabad Campus. Which out of the following wired Communication links, will you suggest for a very high speed connectivity ?
(i) Telephone Analog Line(ii) Optical Fiber
(iii) Ethernet Cable
Ans. (ii) Optical Fibre

Q. 1 Answer the following question.

A. What do you mean by Data Abstraction in OOPs? Explain its significance in programming with a suitable example. 2

A) Data abstraction in OOPs is the process of showing only the essential details of a class without going into background details.

Example-

```
#include<iostream.h>
class PRODUCT
{  int a,b;
public:
   void Mult( )
   {  int c;
      cout<<"Enter 2 nos";
      cin>>a>>b;
      c=a*b;
      cout<<"Product is: "<<c;
    }
};
void main( )
{  PRODUCT p;
   p.Mult( );
}
```

In the above example, public member Mult( ) is invoked using the object p of class PRODUCT. Thus, demonstrating Data abstraction. (1 marks for correct definition of data abstraction.
1 mark for giving a valid example)

B. Write the names of the *header files,* which is/are essentially reqd to execute the following functions: 1
i) isdigit( ) ii) sin( )

A) i) isdigit( ) - ctype.h ii) sin( ) – math.h
(deduct ½ if write only one)

C (i) Give the *output* of the following program (Assuming that all required header files are included in the program): 2

```
#include<iostream.h>
#include<stdio.h>
#include<conio.h>
void TRANSFER(char *s1,char *s2)
{ int n,j=0;
  for(int i=0;*(s1+i)!='\0';i++)
  {   n=*(s1+i);
      if(n%2==0)
           *(s2+j++)=*(s1+i);
   }
}
void main()
{  char *p="ChaRlesBabBaGe",q[80];
   TRANSFER(p,q);
   cout<<q<<endl;
}
```

A) **hRlBbB** (Give ½ marks for each correct output)

(ii) What are errors in C++? Explain . 2

A) Error is a abnormal condition whenever it occurs execution of the program is stopped these are mainly classified into following types.

Types of Error in C++

(1)Compile time error – Syntax Errors, Symantix errors
(2)Run time error (3) Logical Errors (4) Type Errors.
(Give 1 marks for correct definition)

D) Explain Type Conversion and Type Casting ? 3

A) Type Conversion: The process of converting one predefined type into another is called type conversion. These are of two types.

(i) Implicit type conversion (Type promotion) : An implicit type conversion is a conversion performed by the compiler without programmer's intervention. In this type conversion, C++ compiler converts all operands up to the type of the largest operand.

```
Eg:  int a=20;
     float b=33.77;
     cout<<a+b;
// Then it displays 53.77 as float is the biggest type.
```

(ii) Explicit type conversion (Type casting) : An explicit type conversion is user defined that makes an expression to be of specific type. Explicit type conversion will be done by the programmer.

Syntax: (type) expression;

```
Eg: float  a=77.37;
    cout<<(int)a;
// Will makes a as an int.  Now 77 will be displayed.
```

(1 marks each for correct definition of type conversion and type casting)

E. Consider the following C++ program code and choose the option(s) which are not possible as output. Also, print the minimum & maximum value of variable Pick during complete execution of the program.(assume all necessary header files are included in program): 3

```
const int Num=5;
void main( )
{   randomize( );
    int V1=1,V2=5,Pick;
    while (V1<V2)
     {   Pick = random (NUM) + (V2 – V1);
         cout<<Pick<<":";
         V1++;
     }
}
```

Options: (a) 5:6:6:6: (b)4:7:5:3:
(c) 8:6:1:2: (d)7:5:3:1

A) Option **(a) & (c)** (1/2 mark for each correct option)
Maximum value of Pick will be 8
Minimum value of Pick will be 1
(1 mark each giving correct values of both max & min)

F. 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];}
```

A)

```
#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(int Loc=Max-1;Loc>=0;Loc--)
        cout<<Numbers[Loc];
}
```

G.What is the difference between 'x' and "x" in c++. 1

A) 'x' is character size is 1 and "x" is string size is 2
(deduct ½ for wrong ans for each)

Q. 2 Answer the following question.

A. What is function overloading? 1

Ans) function name are same but passing of arguments are different.

```
Sum(int,int);
Sum(int,float);
```

(Give ½ Marks for correct definition. Give ½ marks for correct syntax)

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

```
class Test
{          char paper[20];
           int marks;
public:
           Test () // Function 1
           {   strcpy (paper, "Computer");
                     marks = 0;
            }
           Test (char p[]) // Function 2
           {    strcpy(paper, p);
                marks = 0;
          }
```

```
    Test (int m) // Function 3
   { strcpy(paper,"Computer");
     marks = m;
    }
   Test (char p[], int m) // Function 4
   {  strcpy (paper, p);
      marks = m;
   }
};
```

i. Write statements in C++ that would execute Function 1, Function 2, Function 3 and Function 4 of class Test.

```
A)  Test t1;                    // Execute funtion 1
    Test t2("English");         // Execute funtion 2
    Test t3(50);                // Execute funtion 3
    Test t4("Maths",49);        // Execute funtion 4
```

ii. Which feature of Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 together in the above class Test?

A) Constructor Overloading (Polymorphism)

C.(i) Define a class REPORT with the following specification: 4

Private members :

adno	4 digit admission number
name	20 characters
marks	an array of 5 floating point values
average	average marks obtained
GETAVG()	a function to compute the average obtained in five subject

Public members:

READINFO() function to accept values for adno, name, marks. Invoke the function GETAVG()
DISPLAYINFO() function to display all data members of report on the screen.
You should give function definitions.

Answer)

```
#include<iostream.h>
#include<stdio.h>
#include<conio.h>
class REPORT
{  int adno;
   char name[20];
   float marks[5];
   float average;
   void GETAVG()
  { average =
    (marks[0]+marks[1]+marks[2]+marks[3]+marks[4])/5;
   }
public:
   void READINFO();
   void DISPLAYINFO();
};
void REPORT :: READINFO( )
{ cout<<"Enter 4 digit admission number ";
   cin>>adno;
  cout<<"Enter name";
   gets(name);
   cout<<"Enter marks in ";
  for(int i=0;i<5;i++)
  {  cout<<"Subject "<<i+1<<":";
     cin>>marks[i];
  }
  GETAVG();
}
void REPORT :: DISPLAYINFO( )
{  cout<<"Admission number:"<<adno
    <<"Name:"<<name<<" Marks are:"<< marks[0]
    <<" "<< marks[1] <<" "<<marks[2]<<" "<< marks[3]<<"
"<< marks[4]<<" Average:"<<average;
}
void main()
{ REPORT obj;
   obj. READINFO();
   obj. DISPLAYINFO();
   getch();
}
```

(ii) 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)

```
#include<iostream.h>
#include<conio.h>
class FLIGHT
{ private: int FlightNo;
           char Description[20];
           float Distance, Fuel;
           void CALFUEL()
           { if(Distance<=1000)
                  Fuel=500;
             else if(Distance <=2000)
                  Fuel=1100;
             else
                  Fuel=2200;
           }
  public: void FEEDINFO( );
          void SHOWINFO( );
};
void FLIGFT : :FEEDINFO( )
{ cout<<"Enter Flight No. ";
  cin>> FlightNo;
  cout<<"Enter description ";
  gets(Description);
  cout<< "Enter Distance ";
  cin>>Distance;
  CALFUEL( );
}
void FLIGFT :: SHOWINFO( )
{  cout<<"Flight Number : "<<FlightNo<<"\nDescripton "
       <<Description<<"\n Distance : "<<Distance
       <<"\n Fuel : "<<Fuel;
}
void main ()
{  FLIGHT obj;
   obj.FEEDINFO( );
   obj.SHOWINFO( );
   getch();
}
```

D) (i) 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 ?

A) Multiple Inheritance. Since here the class Institute is deriving from the classes Learner and Trainer.

(ii) Identify the member function(s) that can be called directly from the objects of class Institute from the following: TEntry(), LDisplay(), IEntry()

A) All the 03 member functions given below can be called directly from the objects of class Institute.

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

A) **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 ( )
(IDisplay can call IEntry( ))
Institute::IDisplay( )
(IEntry can call IDisplay( ))

(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.

A) 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.
Institute:: IEntry( ), Institute :: IDisplay( )

E. What is the difference between nesting or containership and inheritance? Explain with example? 2

A) **Containership or Nesting:** When a class contains object of other class type as its data member is known as containership or nesting.

Inheritance: Inheritance is the process of creating new class by reusing the properties of an existing class by accessing them depending on different visibility mode. The new class is called derived and existing class is called base class. (Give 1 – 1 marks each for correct definition)

Q 3. Answer the following question.

A. Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse. **3**

Example:
If an array of nine elements initially contains the elements as
4, 2, 5, 1, 6, 7, 8, 12, 10.
Then the function should rearrange the array as
10,12, 8, 7, 6, 1, 5, 2, 4

Ans)

```
void receive(int A[ ], int size)
{ int temp;
  for(i=0,j=size-1;i<size/2;i++,j--)
  {   temp=A[i];
      A[i]=A[j];
      A[j]=temp;
  }
}//end of receive function.
```

B. (i) An array VAL[1…15][1…10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored (i) Row wise (ii) Column wise. (6)

A) **Solution:**
Given Data: VAL[1…15][1…10]
Word Length (W) = 4 Bytes
Base Address of VAL(B) = 1500

VAL[12][9] = ?
R = Total No of Rows
= Upper Bound – Lower Bound +1 = 15–1+1 = 15
C = Total No of Columns
= Upper Bound – Lower Bound +1 = 10-1+1 = 10
Lr = Least Row =1
Lc = Least Column =1

(i) Row Major:
Address of an element (I,J) in row major
= B + W (C *(I-Lr) + (J – Lc))
VAL [12][9] = 1500 + 4 (10 * (12-1) + (9-1))
= 1500 + 4 (10 * 11+8)
= 1500 + 4 (118) = 1500 + 472 = 1972.

(ii) Column Major:
Address of an element (I,J) in column major
= B + W ((I-Lr) + R*(J – Lc))
VAL [12][9] = 1500 + 4 ((12-1) +15 * (9-1))
= 1500 + 4 (11 + 15 * 8)
= 1500 + 4 (11+ 120)
= 1500 + 4 * 131 = 1500 + 524= 2024.

(1 marks for correct formula each. 1 marks for placing correct value 1 for right output)

(ii) Write a user-defined function in C++ to find and display the sum of diagonal elements from a 2D array MATRIX[6][6] containing integers. 3

Ans)

```
void displaysum( )
{  int i,j,D1=0,D2=0,MATRIX[6][6];
   cout<<"\nEnter any 36 values….";
   for(i=0;i<6;i++)
       for(j=0;j<6;j++)
   {  cin>>MATRIX[i][j];
      if(i= = j)
          D1=D1+MATRIX[i][j];
       else if ((i+j)= =(size-1))
          D2=D2+MATRIX[i][j];
   }
cout<<"\nThe sum of the elements of the Main Diagonal = "<<D1;
cout<<"\nThe sum of the elements of the Other Diagonal = "<<D2;
}
```

(½ marks for function declaration.½ marks for insertion in array. 2 marks for right logic)

C. Write a function in C++ to insert an element into a dynamically allocated Queue where each node contains a name (of type string) as data. Assume the following definition of THENODE for the same. 4

```
struct THENODE
{ char Name[20];
  THENODE *Link;
};
```

Ans) Solution:

```
struct THENODE
{  char Name[20];
   THENODE *Link;
};
class Queue
{  THENODE *front,*rear;
public:
   Queue( )
   { front = rear = NULL;
   }
   void Insert( );
   void Delete( );
        void Display( );
};
void Queue::Insert( )
{   THENODE *ptr;
    ptr=new THENODE;
    if(ptr= = NULL)
    {cout<<"\nNo memory to create a new node….";
     exit(1);
    }
    cout<<"\nEnter the name….";
    gets(ptr→ Name);
    ptr→ Link=NULL;
    if(rear= = NULL)
       front=rear=ptr;
    else
    {  rear→ Link=ptr;
       rear=ptr;
    }
} (1 marks for class contains function; 1 marks for creating Node.2 marks for insert code )
```

D. Change the following infix expression into postfix expression. (A + B) * ((C + D) / (E – F)) 2

A) = (**(A + B) * ((C + D) / (E – F)))**

S No	Symbol Scanned	Stack	Expression Y
1	(	(	
2	(	((	
3	A	((	A
4	+	((+	A
5	B	((+	A B
6	)	(	A B +
7	*	(*	A B +
8	(	(* (	A B +
9	(	(* ((	A B +
10	C	(* ((	A B + C
11	+	(* ((+	A B + C
12	D	(* ((+	A B + C D
13	)	(* (	A B + C D +
14	/	(* (/	A B + C D +
15	(	(* (/ (	A B + C D +
16	E	(* (/ (	A B + C D + E
17	-	(* (/ (-	A B + C D + E
18	F	(* (/ (-	A B + C D + E F
19	)	(* (/ -	A B + C D + E F -
20	)	(*	A B + C D + E F - /
20	)		A B + C D + E F - / *

AB+ CD+ EF- / * (Give ½ for each correct operator)2

E. "Pointers always contain integers " Comment. 1

A) Pointer variable always store address of a variable which is always an integer. So pointers always store integers. (Give 1 marks for correct reason.)

F. Differentiate Stack and Queue. 2

A) Stack – 1. All operation done on the top (PUSH & POP) 2. Based on LIFO

Queue – 1. Insertions can done on end called rear and Deletions can done from front
2 Based on FIFO (1 marks for correct definition)

G. Evaluate the following postfix expression using a stack and show the contents of stack after execution of each operation: 50,40,+,18, 14,-, * 2

Element Scanned	Stack
50	50
40	50,40
+	90
18	90,18
14	90,18,14
-	90,4
*	360

Q.4

A. What is difference between text file and binary file? 1

Ans) A text file stores information in ASCII characters. In text files, each line of text is terminated(delimited) with a special character known as EOF (End of Line) character. In text files some internal translations take place when this EOL character is read and written.

A binary file is just a file that contains information in the same format in which the information is held in memory. In binary file, there is not delimiter for a line. Also no translations occur in binary files. As a result, binary files are faster and easier for a program to read and write than text files. (Give 1 marks for right answer.)

B. Write a User-defined function in C++ to read the content from a text file OUT.TXT, count and display the number of alphabets present in it. 2

A)
```
void alphabets()
{ ifstream fin;
  fin.open("out.txt",ios::in);
  char ch;
  int count=0;
  while(!fin.eof())
  {  fin.get(ch);
     if(isalpha(ch))
        count++;
  }
  cout<<"Number of alphabets in file are "<<count;
  fin.close();
}
```
(½ marks for object creation of file.½ marks for opening file. 1 marks for logic)

C. Write a Function in C++ to count and display the number of lines not starting with alphabet 'A' present in a text file "STORY.TXT" 3

Example:

If the file "STORY.TXT" contains the following lines,
The rose is red.
A girl is playing there.
There is a playground.
An aeroplane is in the sky.
Numbers are not allowed in the password.

The function should display the output as 3

A)
```
void countlines()
{ ifstream fin;
  fin.open("STORY.TXT");
  char str[80];
  int count=0;
  while(!fin.eof())
  {    fin.getline(str,80);
       if(str[0]!='A')
            count++;
  }
cout<<"Number of lines not starting with A are "<<count;
fin.close();
}
```
(1. ½ for function 2. ½ marks object creation
3. 1 ½ marks open file and logic 4. ½ closing file)

D. Write the syntax for reading and writing in binary file. 2

A) For writing – fileobject.write((char*) & classoject , sizeof(class object));
For reading – fileobject.read((char*) & classoject , sizeof(class object));
(Give 1 marks for each correct statement .)

E. User defined function in C++ named copyupper(), that reads the file FIRST.TXT and creates a new file named SECOND.TXT contains all words from the file FIRST.TXT in uppercase 3

A)
```
void copyupper()
{  ifstream fin;
   fin.open("FIRST.TXT");
   ofstream fout;
   fout.open("SECOND.TXT");
   char ch;
   while(!fin.eof())
   {  fin.get(ch);
      ch=toupper(ch);
      fout<<ch;
   }
   fin.close();
   fout.close();
}
```

Alternate Logic:
```
char Word[80];
while (!fin.eof())
{  fin>>Word;
   strcpy(Word,strupr(Word));
   fout<<Word<<' ';
}
```

F. How will you detect end of file. 1

A) For detect the end of file with the help of eof(). (Give 1 mark for correct function)

G. What is the purpose of seekg() function. 2

A) The seekg function is a "get pointer " which indicate the position in the file from which the next input is occur. (Give 2 marks for right answer.)

Ex:
```
ifstream fin("Test.Dat",ios::in|ios::binary);
fin.seekg(50); //sets get pointer to fifty byte
fin.seekg(fin.tellg( ) – sizeof(C));
//Here seekg( ) function sets the get pointer to the previous record.
```

Ques.1 Answer the following question.
(A) Give the difference between the type casting and automatic type conversion. Also, give a suitable C++ code to illustrate both. 2

(Ans) Explicit type casting is used by the programmer to convert value of one type to another type. It is forced type conversion. It is done by putting the target data type in parentheses before the data to be converted, for example ,in the following statement 15 would be type cast into 15.0 first.

float x=(float)15/4; 3.75 will be assigned as result.

Automatic type conversion is the type conversion done by the compiler itself wherever required. It is implicit type conversion, eg. In the following code before assigning the value 3 to float x, it will be automatically converted to 3.0

float x=3

(B) Write the names of header files to which the following belong. (i) setw( ) (ii) sqrt( ) 1

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

(C) Rewrite the corrected code for the following program. Underline each correction (if any). 2

```
#include<iostream.h>
structure super
{ int member number;
  char membername[20];
  char membertype[ ]="HIG";
};
void main( )
{  super person1,person2;
   cin<<"member number";
   cin>>person1.membernumber;
   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 super
{   int membernumber;
    char membername[20];
    char membertype[4];
};
void main( )
{  super person1,person2;
   cout<<"member number";
   cin>>person1.membernumber;
   cout<<"member name";
   cin>>person1.membername;
   strcpy(person1.membertype,"MIG");
   person2=person1;
   cout<<"member number"<<person2.membernumber;
   cout<<"member name"<<person2.membername;
   cout<<"member type"<<person2.membertype;
}
```

(D) find the output of the following program. 3

```
#include<iostream.h>
void main ( )
{  int *Queen, Moves [ ] = {11, 22, 33, 44};
   Queen = Moves;
   Moves [2] + = 22;
   cout<< "Queen @"<<*Queen<<endl;
   *Queen - = 11;
    Queen + = 2;
   cout<< "Now @"<<*Queen<<endl;
   Queen++;
   cout<< "Finally @"<<*Queen«end1;
   cout<< "New Origin @"<<Moves[0]<<endl;
}
```

Ans: Queen @11
Now @55
Finally @44
New Origin @0

(E) Write the output of the following program: 2

```
#include <iostream.h>
#include <ctype.h>
void Secret (char Msg [ ], int N);
void main ( )
{  char SMS[ ] = "rEPorTmE" ;
   Secret{SMS,2);
   cout<<SMS<<end1;
}
void Secret(char Msg[ ], int N)
{  for (int C=0; Msg[C] ! =' \0' ;C++)
   if (C%2==0)
       Msg[C] = Msg[C]+N;
   else if (isupper(Msg[C]))
       Msg[C] = tolower(Msg[C]);
   else
       Msg[C] = Msg[C]-N;
}
```

Ans: **teRmttoe**

(F) In the following program, find the correct possible output(s) from the options. Also write the minimum and maximum values which can be assigned to the variable MyNum. 2

```
# include <iostream.h>
# include <stdlib.h>
void main ( )
{ randomize ( );
  int MyNum , Max =5;
  MyNum= 20 + random (Max);
  for (int P= MyNum; P <= 25; P++)
        cout<< P << "*";
}
```

(i) 20*21*22*23*24*25 (ii) 22*23*24*25*
(iii) 23*24* (iv) 21*22*23*24*25

Ans: (ii) 22*23*24*25*
Minimum possible value = 20
Maximum possible value =24

Ques 2) Answer the following question.
A)What is function overloading? Give an example in C++ to illustrate function overloading. 2

(A) function overloading is an example of polymorphism, where the function having same name with different set of parameters perform different operations.

Example:

```
void disp( )                          //Function1
{   cout<<"Hello"<<endl;
}
void Disp(int n)                      //Function2
    for(int i=1;i<=n;i++)
        cout<<i<<endl;
}
void main( )
{  int x=5;
   Disp(x); //call for Function2 –prints number from 1 to 5
   Disp( ); //call for Function 1 –prints Hello
}
```

(B) Write the output of the following C++ code . Also, write the name of the feature of Object Oriented programming used in the following program jointly illustrated by the functions [I] to [IV] 2

```
#include <iostream.h>
void Print ( ) // Function [I]
{  for (int K=1 ; K<=60 ; K++) cout<< "-" ;
        cout<<end1 ;          }
void Print (int N) // Function [II]
{   for (int K=1 ; K<=N ; K++) cout<<"*" ;
        cout<<endl ;
}
void Print (int A, int B) // Function [III]
{   for (int K=1 ;K<=B ;K++) cout<<A*K ;
         cout<<endl ;
}
void Print (char T, int N) // Function [IV]
{   for (int K=1 ; K<=N ; K++) cout<<T ;
        cout<<endl;
}
void main ( )
{   int U=9, V=4, W=3;
    char C='@' ;
    Print (C,V) ;
    Print (U,W) ;
}
```

Ans: **@@@@**
9 18 27

The OOP feature used here is function overloading (polymorphism feature).

(C) Define a class Garments in C++ with the following descriptions : 4

Private members :

Gcode	of type string
Gtype	of type string
Gsize	of type integer
Gfabric	of type string
Gprice	of type float

A function **Assign( )** which calculates and assigns 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 word "NOT ALLOTTED" and Gsize and Gprice with 0.

A function Input( ) to input the values of the data members Gcode, Gtype, Gsize and Gfabric and invoke the Assign( ) function.

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

Ans)

```
class Garments
    {    char Gcode[15];
         char Gtype[15];
         int Gsize;
         char Gfabric[15];
         float Gprice;
         void Assign( )
         { if(strcmp(Gfabric,"COTTON")==0)
            { if(strcmp(Gtype,"TROUSER")==0)
                    Gprice=1300;
              else if(strcmp(Gtype,"SHIRT")==0)
                    Gprice=1100;
         }
        else
        { if(strcmp(Gtype,"TROUSER")==0)
              Gprice=1300-0.10*1300;
           else if(strcmp(Gtype,"SHIRT")==0)
                Gprice=1100-0.10*1100;
         }
  }
public:
        Garments( )
        {   strcpy(Gcode, "NOT ALLOTED");
            strcpy(Gtype, "NOT ALLOTED");
            strcpy(Gfabric, "NOT ALLOTED");
           Gsize=0;
           Gprice=0;
        }
       void Input( )
      { cout<<"Enter Garment code";
        cin>>Gcode;
        cout<<"\n Enter Garment type(TROUSER/SHIRT)";
        cin>>Gtype;
        cout<<"\n Enter Garment size";
        gets(Gsize);
       cout<<"\n Enter Garment fabric";
       gets(Gfabric);
       Assign( );
      }
      void Display( )
     { cout<<" Garment code "<<Gcode<<endl;
       cout<<"Garment type"<<Gtype<<endl;
       cout<<" Garment size"<<Gsize<<endl;
       cout<<" Garment fabric"<<Gfabric<<endl;
       cout<<"Garment price"<<Gprice<<endl;
     }
};
```

(D) Answer the questions (i) to (iv) after going through the following class: 4

```
class ORGANIZATION
{  char Address[20];
   double Budget, Income;
   protected:
   void Compute();
public:
   ORGANIZATION();
   void Get();
   void Show();
} ;
class WORKAREA: public ORGANIZATION
{  char Address[20];
   int Staff;
 protected:
  double Pay;
  void Calculate();
public:
  WORKAREA () ;
  void Enter() ;
  void Display() ;
} ;
class SHOWROOM: private ORGANIZATION
{   char Address [20];
   float Area;
  double Sale;
public:
  SHOWROOM();
  void Enter() ;
  void Show() ;
} ;
```

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

Ans) Hierarchical inheritance

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

Ans) Address, Area, Sale

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

Ans) Get( ), Show( ), Enter( ), Display( )

(iv) Write the name of all the members, which are accessible from objects of class SHOWROOM.

Ans) Enter( ),SHOWROOM:: Show()

Ques 3) Answer the following question.

(A) Write a user defined function in C++ to display the sum of row element of two dimensional array A[5][6] containing integer. 2

Ans)

```
void Rowsum(int A[5][6], int r, int c)
{  int sum[5],i,j;
   for(i=0;i<r;i++)
   {    sum[i]=0;
        for(j=0;j<c;j++)
        {   sum[i]+=A[i][j];
        }
     cout<<"sum of row <<(i+1)<<":"<<sum[i]<<endl;
   }
}
```

(B) An array arr[40][10] is stored in the memory along the column with each element occupying 4 bytes find out the address of the location arr[3][6] if the location arr[30][10] is stored at the address 9000. 3

Ans)

arr[40][10]
No. of rows (R)=40 No. of columns(C) =10
Element size(W)=4 bytes
Arr[I][J]=arr[3][6]
I=3, J=6 address of arr[30][10]=9000 base address=?
Lowest Row(lr)=0 Lowest column(lc)=0

arr[P][Q]=B+W((P-lr)+R(Q-lc))
arr[30][10]=B+4((30-0)+40(10-0)) =B+4(430)
9000 =B+1720
B=9000-1720=7280
arr[I][J]=B+W((I-lr)+R(J-lc))
arr[3][6]=7280+4((3-0)+40(6-0))
arr[3][6]=7280+4*243=7280+972=8252

(C) Write a function in C++, which accepts an integer array and its size as arguments and swap the elements of every even location with its following odd location. 3

Example : if an array of nine elements initially contains the elements as 2,4,1,6,5,7,9,23,10
Then the function should rearrange the array as
4,2,6,1,7,5,23,9,10

Ans)

```
void Elementswap(int A[ ],int size)
{  int limit, tmp;
   if(size%2!=0)
        limit=size-1;
   else
        limit=size;
   for(int i=0;i<limit;i+=2)
   {  tmp=A[i];
      A[i]=A[i+1];
      A[i+1]=tmp;
    }
}
```

(D) Consider the following portion of a program, which implements passengers queue for a bus. Write the definition of a function Insert (whose prototype in shown below). To insert a new node in the queue with the required information. 4

```
struct NODE
{           int ticketno;
            char pname[20]; //passenger name
            NODE *next;
};
class queueofbus
{           NODE *rear, *front;
public:
            queueofbus( )
                { rear=NULL; front=NULL; }
            void insert();
            void delete();
            ~queueofbus();
};
```

Ans)

```
void NODE::Insert( )
{  NODE *nptr;
   nptr=new NODE;
   nptr->next=NULL;
   cout<<"\n Enter the ticket number";
   cin>>nptr->ticketno;
   cout<<"\n Enter passenger name";
   gets(nptr->pname);
   if(rear==NULL)
   {    front =rear=nptr ;
   }
  else
  {  rear->next=nptr;
     rear=nptr;
   }
}
```

(E) Evaluate the following postfix expression using a stack and show the contents of stack after execution of each operation: 2

20, 45 , + , 20 , 10 , - , 15 , + , *

Ans) **1625**

Scanning from left to right
If operand then push
If binary operator, pop twice
else if unary operator, pop once
Calculate result and push it back

Ques 4) Answer the following question.

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

Ans)

```
int countupcase( )
{   ifstream fin("ARTICLE.TXT");
    int count=0;
   char ch;
   while(!fin.eof( ) );
   {  fin>>ch;
      if(isupper(ch))
          count++;
    }
   fin.close( );
   return count;
}
```

(B) Given a binary file TELEPHONE.DAT, containing records of the following class Directory 3

```
class Directory
{ char name[20],address[30], areacode[5], phone_no[15];
public:
  void register();
  void show();
  int checkcode(char AC[ ])
  { return strcmp(areacode, AC);
  }
};
```

Write a function COPYABC() in C++, that would copy all those records having areacode as "123" from TELEPHONE.DAT to TELEBACK.DAT

Ans)

```
void COPYABC( )
{ ifstream fin("TELEPHONE.DAT",ios::in|ios::binary);
  ofstream fout("TELEBACK",ios::out|ios::bainary);
  Directory ph;
  while(!fin.eof( ) )
  {  fin.read((char *)&ph, sizeof(ph));
```

```
   if(ph.checkcode("123")==0)
        fout.write((char *)&ph,sizeof(ph));
  }
  fin.close( );
  fout.close( );
}
```

(C) Observe the program segment given below and fill the blanks marked as carefully and answer the question that follows: 1

```
class Applicant
{          long aid;
           char name[20];
           float score;
public:
           void enroll();
           void disp();
           void marksscore();
           long R_aid( )
           { return aid;
           } };
void score_update(long id)
{ fstream File;
  File.open("APPLI.DAT", ios::binary|ios::in|ios::out);
  Applicant A;
  int record=0, found=0;
  while (! found &&File.read((char*)&A, sizeof(A));
  { if(id==A.R_aid)
    {  cout<<"Enter new score";
       A.marksscore();
        _____ //Statement 1
        _____ //Statement 2
        found=1;
     }
    record++;
  }
  if(found==1)
       cout<<"Record Updated";
  File.close();
}
```

Write the statement 1 to position the file pointer at the beginning of the record for which the applicant's id matches with the argument passed and statement 2 to write the updated record at that position.

Ans) statement1 : File.seekg(-1*sizeof(A),ios::cur);
statement2 : File.write((char*)&A,sizeof(A));

Ques 5) Answer the following question.

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

Ans) Degree: Number of columns or attributes or field in a table are called table's degree

Cardinality: Number of rows/tuples/records in a table are called table's cardinality

(B) Consider the following tables Employees & EmpSalary

Table : Employee

Empid	firstname	lastname	address	city
010	Ravi	Kumar	Raj nagar	GZB
105	Harry	Waltor	Gandhi nagar	GZB
152	Sam	Tones	33 Elm St.	Paris
215	Sarah	Ackerman	440 U.S.110	Upton
244	Manila	Sangupta	24 Friends street	New Delhi
300	Robert	Samuel	9 Fifth Cross	Washington
335	Ritu	Tondon	Shastri Nagar	GZB
400	Rachel	Lee	121 Harrison St.	New York
441	Peter	Thompson	11 Red Road	Paris

Table: EmpSalary

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)Write the SQL commands for the following statements:4

(i) To show 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 Employees and EmpSalary , where total salary is calculated as salary+benefits.
Ans) SELECT firstname,lastname,salary+benefits "total salary" FROM Employees E, EmpSalary ES WHERE E.empid=ES.empid AND designation ='Manager';

(iv) To display the maximum salary among Managers and Clerks from the table EmpSalary.
Ans) SELECT MAX(salary) FROM EmpSalary GROUP BY designation HAVING designation IN ('Manager',Clerk');

(II)Give the Output of following SQL commands: 2

(i) Select firstname, salary from Employees ,EmpSalary where designation = 'Salesman' AND Employees.empid=Empsalary.empid;
Ans) Rachel 32000
Peter 28000

(ii) Select count(distinct designation) from EmpSalary;
Ans) 4

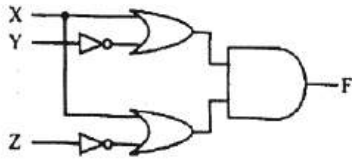
(iii) Select designation, sum(salary) from EmpSalary group by designation having count(*) >2;
Ans) Manager 215000
Clerk 135000

(iv) Select sum(benefits) from EmpSalary where designation ='Clerk';
Ans) 32000

Ques 6) Answer the following question.

(A) Verify the following using truth table 2
X + Y . Z = (X + Y) . (X + Z)
Ans)(Show and compare the column X+Y.Z AND (X+Y).(X+Z) using truth table, obtain that both these column are identical.)

(B) Write the equivalent Boolean expression for the following logic circuit. 2



Ans) **F=(X+Y').(X+Z')**

(C) Write the SOP form of a Boolean function F, which is represented in a truth table as follows **1**

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

F=A'B'C'+A'BC+ABC'+ABC

(D) Obtain a simplified form for a Boolean expression. 3
F(U,V,W,Z)= Σ (0,2,3,4,7,9,10,13,14,15) using Karnaugh Map
Ans) F(U,V,W,Z)=U'W'Z'+U'V'W+VWZ+UW'Z+UWZ'

Ques 7) Answer the following question.

(A) Give the full form of DHTML And GSM. **1**
Ans) Dynamic Hyper Text Markup Language and Global System for Mobile communication

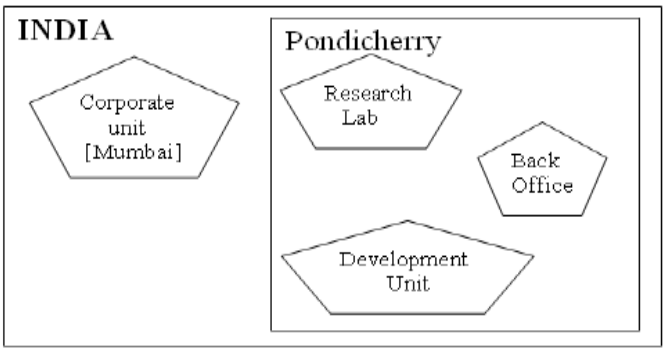
(B)Name two open source software with their application **1**
Ans) OpenOffice.org –Office Application suite
Linux – Operating System

(C) Write two Advantage and disadvantage of the Bus topologies in network **2**
Ans) Advantage: short cable length and simple wiring layout, easy to extend
Disadvantage: fault diagnosis is difficult, fault isolation is difficult

(D) What is the difference between virus and worms in the computers **1**
Ans) Virus is a malicious program that damages data and files and causes harm to computer system. Worms disrupt services and create system management problems, generally by replicating self. In some cases worms can install viruses that cause damages to system.

(E) What is 80-20 rules of network design **1**
Ans) The 80-20 rule of network is that:80% of the traffic on a given network segment should be local and not more than 20% of the network traffic need to move across a backbone i.e. the spine connecting various sub networks.

(F)"Bias methodologies" is planning to expand their network in India, starting with three cities in India to build infrastructure for research and development of their chemical products. The company has planned to setup their main office in Pondicherry – at three different locations and have named their offices as "Back Office", "Research Lab" and "Development Unit". The company has one more Research office namely "Corporate Office" in "Mumbai". A rough layout of the same is as follows: 4



From	To	Distance
Research Lab	Back Office	111 Mtr
Research Lab	Development Unit	16 KM
Research Lab	Corporate Unit	1800 KM
Back Office	Development Unit	13 KM

In continuation of the above , the company experts have planned to install the following number of computers in each of their offices:

Research Lab	158
Back Office	79
Development Unit	90
Corporate Unit	51

(a) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:
i) Research Lab and Back Office
ii) Research Lab and Development Unit
Ans)
Between Research Lab and Back Office- LAN
Between Research Lab and Development unit – MAN

(b) Which one of the following devices will you suggest for connecting all the computers with in each of their office units?
i)Switch/Hub ii) Modem iii) Telephone
Ans) Switch/Hub

(c) Which of the following communication media, you will suggest to be procured by the company for connecting their local office units in Pondicherry for very effective (High Speed) communication?
i) Telephone cable
ii) Optical Fibre
iii) Ethernet Cable
Ans) Optical Fibre

(d) Suggest a technology/layout for connecting the Company's local office units located in Pondicherry. Also, suggest an effective method / technology for connecting the company's office unit located in Mumbai.
Ans) Local office unit at Pondicherry to be connected using LAN/MAN/Star Topology/Tree topology. Mumbai Office to be connected using Satellite/WAN.

గెలవడం ముఖ్యం కాదు.

గెలవడం కోసం చేసే పోరాటం ముఖ్యం.

Honesty is the best policy

XI & XII COMPUTER - PREFIX & POSTFIX

(i) ++ (Increment Operator): Used to increment one value to the existing value.

If a=10; a++;

Then a value will becomes 11.

(ii) - - (Decrement Operator): Used to decrement one value to the existing value.

If a=10; a--; Then a value will becomes 9..

Note: While we use ++ and - - operators, there are two notations.

(A) **Prefix :** If operator comes before operand, it is called as prefix notation.

Eg: ++a; - - a;

Prefix notation means change and store.

a=10; b= ++a; //Now a=11,b=11.

a=10; b= - - a; //Now a=9,b=9.

(B) **Postfix:** If operator comes after operand, it is called as postfix notation.

Eg: a++; a- -;

Postfix notation means store and change.

a=10; b= a++; //Now a=11,b=10.

a=10; b= a- -; //Now a=9,b=10.

1) What will be the output of the following Program.

```
#include<iostream.h>                    (2004)
void main( )
{  int var1=5,var2=10;
   for(inti=1,i<=2;i++)
   { cout<<var1++<<'\t'<< - - var2<<endl;
     cout<<var2- -<<'\t'<<+ + var1<<endl;
   }
}
```

Ans: Output:

5	9
9	7
7	7
7	9

2)Write the output of the following Program

```
void main( )                                    (2002) 2
{  int x=5,y=5;
   cout<<x- -;
   cout<<",";
   cout<- - x;
   cout<<",";
   cout<<y- -<<","<<- -y;
}
```

Ans: Output: 5,3,4,4

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

Output: 5,3,3,3,5,2

3.What will be the result of the following two expressions if i=10 initially? 2

i) cout<<i<<i++<<++i;

A) 121111

ii) cout<<i<<i+1<<++i;

A) 111211

4. Find the output of the following: 3

```
#include<iostream.h>
#include<conio.h>
void main( )
{  clrscr();
   int a=7,c ;
   c= a++ + ++a;
   cout<<"\na= "<<a;
   cout<<"\nc= "<<c;
   c=--a+ ++a + a++;
   cout<<"\na= "<<a;
   cout<<"\nc= "<<c;
   getch();
}
```

A) a=9
c=16
a = 10
c = 27

5. What will be value of x for following expression.

(i)if a=5, b=7, c=10, d=13.
x=c!=a*b?++b: (b=16,b+=2, b - -);

Ans) 8

(ii)

```
#include<iostream.h>
void main()
{ int a=5, b=7, c=10, d=13,x;
  x=(c==a*b)?++b: (b=16,b+=2,b--);
  cout<<"\nx = "<<x;
  cout<<"\nc = "<<c;
  cout<<"\nb = "<<b;
}
```

Ans) x = 18
c = 10
b = 17

6. What will be value of x for following expression.

```
#include<iostream.h>
void main()
{  int a=10,x;
   x=a++%5+ ++a + ++a;
   cout<<"\na = "<<a;
   cout<<"\nx = "<<x;
}
```

Output: a = 13
x = 26

In C/C++, precedence of Prefix ++ (or Prefix --) and dereference (*) operators is same, and precedence of Postfix ++ (or Postfix --) is higher than both Prefix ++ and *.

CODE SNIPPETS FOR VARIOUS PREFIX & POSTFIX DEMO:

int a=10,b;		Final a
b=a++;	b=10	11
b=++a;	b=11	11
b=a++ + a++;	b=20	12
b=a++ + ++a;	b=22	12
b=++a + a++;	b=22	12
b=++a + ++a;	b=24	12
b=a++ + a++ + a++;	b=30	13
b=a++ + a++ + ++a;	b=33	13
b=a++ + ++a + a++;	b=33	13
b=a++ + ++a + ++a;	b=36	13
b=++a + a++ + a++;	b=33	13
b=++a + a++ + ++a;	b=36	13
b=++a + ++a + a++;	b=36	13
b=++a + ++a + ++a;	b=39	13

int a=10,b;		Final a
b=a--;	b=10	9
b=--a;	b=9	9
b=a-- + a--;	b=20	8
b=a-- + --a;	b=18	8
b=--a + a--;	b=18	8
b=--a + --a;	b=16	8
b=a-- + a-- + a--;	b=30	7
b=a-- + a-- + --a;	b=27	7
b=a-- + --a + a--;	b=27	7
b=a-- + --a + --a;	b=24	7
b=--a + a-- + a--;	b=27	7
b=--a + a-- + --a;	b=24	7
b=--a + --a + a--;	b=24	7
b=--a + --a + --a;	b=21	7

int a=10,b;		Final a
b=a--+ a++;	b=20	10
b=a-- + ++a;	b=22	10
b=--a + a++;	b=18	10
b=--a + ++a;	b=20	10
b=--a + a++ + a--;	b=27	9
b=--a + a++ + --a;	b=24	9
b=--a + ++a + a--;	b=30	9
b=--a + ++a + --a;	b=27	9
b=a-- + a++ + a--;	b=30	9
b=a-- + a++ + --a;	b=27	9
b=a-- + ++a + a--;	b=33	9
b=a-- + ++a + --a;	b=30	9

```
int x=6;
cout<<++x<<'\t'<<x<<'\t'<<x++;
cout<<"\n x = "<<x;
```
output: 8 7 6
x = 8

```
int k=7;
int l= k++ + ++k;
cout<<"\n l = "<<l;
cout<<"\n k = "<<k;
```
Output : l = 16
k = 9

```
int m=7;
int n=--m + ++m + m++;
cout<<"\n n = "<<n;
cout<<"\n m = "<<m;
```
Output: n = 20
m = 8

```
int a=5, b=7, c=10, d=13;
int x=c!=a*b?++b:(b=16,b+=2,b--);
cout<<x<<'\t'<<c;
```
output: **8 10**

```
int a=10, x=a++%5+ ++a + ++a;
cout<<x<<'\t'<<a;
```
output:**25 13**

```
int x=6;
cout<<--x<<'\t'<<x<<'\t'<<x--;
cout<<"\n x = "<<x;
```
Output: 4 5 6
x = 4

```
int y=10;
cout<<y<<y--<<--y;
cout<<"\n y = "<<y;
```
Output: 899
y = 8

```
int z=10;
cout<<z<<z+1<<--z;
```
output: **9109**

```
int z=10;
cout<<++z<<z+1<<--z<<z++;
cout<<"\nz = "<<z;
```
Output: 11111010
z =11

```
int a=7;
int c= a-- + --a;
cout<<"\nc = "<<c;
cout<<"\na = "<<a;
c=++a + --a + a--;
cout<<"\nc = "<<c;
cout<<"\na = "<<a;
```
Output: c = 12 a = 5 c = 15 a = 4

```
int a=5, b=7, c=10, d=13;
int x=c!=a*b?--b:(b=16,b+=2,b++);
cout<<x<<'\t'<<c;
```
output: **6 10**

```
int a=10, x=a--%5+ --a + a++;
cout<<x<<'\t'<<a;
```
Output:16 9

```
int x=6,y=10,z;
z=x++ - y-- + --x;
cout<<z<<'\t'<<x<<'\t'<<y;
```
Output: **0 6 9**

SOME OTHER IMPORTANT QUESTIONS FOR PRACTICE

CLASSES & CONSTRUCTORS

1. Define a class BALANCED_MEAL in C++ with following description: 4

Private Members:

Access number	Integer
Name of Food	String of 25 characters
Calories	Integer
Food type	String
Cost	Float
AssignAccess( )	Generates random numbers between 0 to 99 and return it.

Public Members:

*A function INTAKE( ) to allow the user to enter the values of Name of Food,Calories, Food type cost and call function AssignAccess() to assign Access number.

*A function OUTPUT( ) to allow user to view the content of all the data members, if the Food type is fruit.

ANSWER:

```
class BALANCED_MEAL
{  intAccessnumber, Calories;
   char Name_of_Food[25], Foodtype[20];
   float Cost;
   intAssignAccess( );
public:
   void INTAKE();
   void OUTPUT();
};
int BALANCED_MEAL::AssignAccess( )
{    randomize();
     return random(100);
}
void BALANCED_MEAL::INTAKE( )
{   cout<<"Enter name of food: ";
    gets(Name_of_Food);
    cout<<"Enter Calories: ";
    cin>>Calories;
    cout<<"Enter Food Type: ";
    gets(Foodtype);
   Accessnumber=AssignAccess( );
}
void BALANCED_MEAL::OUTPUT( )
{  cout<<"Access Number = "<<Accessnumber;
   cout<<"Name of food: "<<Name_of_Food;
   cout<<"Calories: "<<Calories;
   cout<<"Food Type: "<<Foodtype;
   gets(Foodtype);
}
```

2. Define a class SalesCounter with following specifications: 4

Private Data members:

Net_amt, Amount	– Real values
ClothType	- string(30),
Pay_mode	string (30)

Public Member functions

*Constructor – to initialize the Amount as 0, ClothType as "Cotton", Pay_mode as "Cash", Net_amt as 0

*Calc_net () – to calculate discount and net_amt .

The Company offers discount scheme on each purchase to the customer. The scheme is as follows

For Cotton :

Purchase above 5000 and avail discount of 10%

Purchase above 7500 and avail discount of 15%

For Silk :

Purchase above 5000 and avail discount of 5%

Purchase above 7500 and avail discount of 10%

For Synthetic:

Purchase above 5000 and avail discount of 15%

Purchase above 7500 and avail discount of 25%

Now if the customer is paying by Cash an additional 2% discount will be given to them.

If by Cheque no discount will be given, if payment mode is credit card 2.5% tax has to be paid by the customer on the total purchase.

*Purchase () – The Salesman will enter the detail of the purchasing made by the customer and will also enter the payment mode(CASH/CHEQUE/CREDITCARD), and will invoke the Calc_net() to calculate the net amount

*Show() – The function will generate the bill to the customer along with the purchase details and the amount to be paid

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
#include<string.h>
class SalesCounter
{  float Net_amt,Amount;
   char ClothType[30],Pay_Mode[30];
public:
   SalesCounter()
   { Amount=0;
     strcpy(ClothType,"Cotton");
     strcpy(Pay_Mode,"Cash");
     Net_amt=0;
   }
   void Calc_net();
   void Purchase();
   void Show();
};
void SalesCounter::Calc_net()
{ float Discount=0;
  if(strcmpi(ClothType,"Cotton")==0)
  {  if(Amount>7500)
            Discount=0.15*Amount;
     else if(Amount>5000)
            Discount=0.10*Amount;
  }
  if(strcmpi(ClothType,"Silk")==0)
  {  if(Amount>7500)
            Discount=0.10*Amount;
     else if(Amount>5000)
            Discount=0.05*Amount;
  }
  if(strcmpi(ClothType,"Synthetic")==0)
  {  if(Amount>7500)
            Discount=0.25*Amount;
     else if(Amount>5000)
            Discount=0.15*Amount;
  }
  if(strcmpi(Pay_Mode,"Cash")==0)
            Discount=Discount+0.02*Amount;
```

```
  if(strcmpi(Pay_Mode,"CreditCard")==0)
     Net_amt=Amount+0.025*Amount-Discount;
  else
     Net_amt=Amount-Discount;
}
void SalesCounter::Purchase()
{ cout<<"Enter the Cloth type (Cotton/Silk/Synthetic): ";
  gets(ClothType);
  cout<<"Enter payment mode (Cash/Cheque/CreditCard): ";
  gets(Pay_Mode);
  cout<<"Enter the total amount: ";
  cin>>Amount;
  Calc_net();
}
void SalesCounter::Show()
{  cout<<"\nCloth Type: "<<ClothType;
  cout<<"\nPayment Mode : "<<Pay_Mode;
  cout<<"\nTotalAmont  : "<<Amount;
  cout<<"\nNet Amount to Pay: "<<Net_amt;
}
void main()
{   SalesCounter S;
   S.Purchase();
   S.Show();
}
```

3. Define a class MARKER with the following specifications : 4

Private members:

product_code - to store 6 characters,
brand_name - to store 15 character
Price - float
Product_type - to store a character(L-long , S-short)
category - to store 20 characters

* A function det( ) which calculates category of the product based on the following calculations :

Price	category
<10000	Economy
>=10000 and <30000	Elegant
>30000	Luxury

Public members:

* A constructor to assign initial values of product_code as “ST200”, brand_name as “SONY” , product_type as ‘L’ and price as 10000 .
* Another constructor which takes initial values as parameters and assigns them to the respective member data .
* A function readdata( ) to read product_code, brand_name, price and product type.
Then it should call function det( ).
* A fuctiondispdata( ) to display the values of all data members.

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
#include<string.h>
class MARKER
{ char product_code[7];
  char brand_name[16];
  float price;
  char product_type;
  char category[21];
  void det()
  {  if(price<10000)
       strcpy(category,"Economy");
     else if(price<30000)
       strcpy(category,"Elegant");
     else
       strcpy(category,"Luxury");
  }
public:
  MARKER()
  { strcpy(product_code,"ST200");
    strcpy(brand_name,"SONY");
    product_type='L';
    price=10000;
  }
  MARKER(char PC[],char BN[],char PT,float P)
  { strcpy(product_code,PC);
    strcpy(brand_name,BN);
    product_type=PT;
    price=P;
  }
  void readdata()
  { cout<<"Enter Product Code, Brand Name, Price and
                          Product Type: ";
    gets(product_code);
    gets(brand_name);
    cin>>price>>product_type;
    det();
  }
  void dispdata()
  { cout<<"\nProduct Code: "<<product_code;
    cout<<"\nBrand Name: "<<brand_name;
    cout<<"\nPrice: "<<price;
    cout<<"\nProduct Type: "<<product_type;
    cout<<"\nCagegory: "<<category;
  }
};
void main()
{  MARKER M;
   M.readdata();
   M.dispdata();
}
```

4. Define a class Telephone in C++ with following description: 4

Private Members

Name	20 character
Address	50 character
Teleno	8 digit phone number
PreviousMR	Previous Meter Reading
PresentMR	Present Meter Reading
Amount	float

* A member function CALBILL() to calculate and return the amount payable assuming the price of a telephone call is Rs 0.50

Public Members

* A function to provide initial value 0 to PreviousMR and PresentMR .
* A function READINFO() to allow user to enter values the data members and call function CALBILL() to calculate the total amount .

* A function SHOWINFO() to view the content of all the data members.

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
class Telephone
{ char Name[20],Address[50];
  long Teleno,PreviousMR,PresentMR;
  float Amount;
  float CALBILL()
  { float A;
    A=(PresentMR-PreviousMR)*0.50;
    return A;
  }
public:
  Telephone()
   { PreviousMR=0;
     PresentMR=0;
   }
  void READINFO()
  { cout<<"\nEnter the name of the customer: ";
    gets(Name);
    cout<<"\nEnter address of the customer: ";
    gets(Address);
    cout<<"\nEnter Telephone Number: ";
    cin>>Teleno;
    cout<<"\nEnter Previous Meter Reading: ";
    cin>>PreviousMR;
    cout<<"\nEnter Present Meter Reading: ";
    cin>>PresentMR;
    Amount=CALBILL();
  }
  void SHOWINFO()
  { cout<<"\nName of the Customer: "<<Name;
    cout<<"\nAddress of the Customer: "<<Address;
    cout<<"\nTelephone Number: "<<Teleno;
    cout<<"\nPrevious Meter Reading: "<<PreviousMR;
    cout<<"\nPresent Meter Reading: "<<PresentMR;
    cout<<"\nAmount to Pay: "<<Amount;
  }
};
void main()
{  Telephone T;
   T.READINFO();
   T.SHOWINFO();
}
```

5. Define a class CLOTHS in C++ with following descriptions. 4

Private members :

CCode	of type string
CType	of type string
Csize	of type integer
Cfabric	of type string
Cprice	of type float

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

For the value of CFabric "COTTON" ,

CType	CPrice(RS)
TOWEL	120
BEDSHEET	550
CURTAIN	200

For CFabric other than "COTTON", the above mentioned CPrice gets reduced by 15%

Public members:

* A constructor to assign initial values of CCode,CType and CFabric with the a word "NOT ALLOTED" and Gsize and Cprice with 0.
* A function Input ()to the values of the data members CCode, CType,Csize and CFabric and invoke the Assign() function.
* A function Display () which displays the content of all the data members for a garment.

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
#include<string.h>
class CLOTHS
{ char CCode[20],CType[20],CFabric[20];
  int CSize;
  float CPrice;
  void Assign()
  { if(strcmpi(CFabric,"COTTON")==0)
    {  if(strcmpi(CType,"TOWEL")==0)
                CPrice=120;
       else if(strcmpi(CType,"BEDSHEET")==0)
                CPrice=550;
       else if(strcmpi(CType,"CURTAIN")==0)
                CPrice=200;
    }
    else
    {  if(strcmpi(CType,"TOWEL")==0)
                CPrice=120*0.85;
       else if(strcmpi(CType,"BEDSHEET")==0)
                CPrice=550*0.85;
       else if(strcmpi(CType,"CURTAIN")==0)
                CPrice=200*0.85;
    }
  }
public:
  CLOTHS()
  { strcpy(CCode,"NOT ALLOTTED");
    strcpy(CType,"NOT ALLOTTED");
    strcpy(CFabric,"NOT ALLOTTED");
    CSize=0;
    CPrice=0;
  }
  void Input()
  { cout<<"\nEnter CCode: ";
    gets(CCode);
    cout<<"\nEnter CType: ";
    gets(CType);
    cout<<"\nEnter CFabric: ";
    gets(CFabric);
    cout<<"\nEnter Csize: ";
    cin>>CSize;
    Assign();
  }
  void Display()
  { cout<<"\nCCode : "<<CCode;
    cout<<"\nCType : "<<CType;
    cout<<"\nCFabric : "<<CFabric;
    cout<<"\nCsize : "<<CSize;
```

```
   cout<<"\nCPrice : "<<CPrice;
  }
};
void main()
{  CLOTHS C;
  C.Input();
  C.Display();
}
```

6. Declare a class with the following specifications: 4

class name taxpayer

Private members:

long panto stores the personal account number
char name[20] to store the name of a person
floattaxincome to store the total annual taxable income
float tax to store the tax that is calculated

Public members:

* inputdata() to enter the data for a taxpayer , should invoke computetax() function.
* displaydata() to display the data for a taxpayer
* computetax() to compute tax for a taxpayer

The tax is calculated according to the following rules:

Total annual income	Rate of taxation
Upto 60000	0%
60000 to 150000	5%
150000 to 500000	10%
above 500000	15%

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
class taxpayer
{   long pan;
    char name[20];
    float taxincome,tax;
public:
   voidinputdata()
    {   cout<<"\nEnter PAN number: ";
        cin>>pan;
       cout<<"\nEnter name: ";
       gets(name);
       cout<<"\nEnter the income to calculate tax: ";
       cin>>taxincome;
       computetax();
    }
   voiddisplaydata()
  {  cout<<"\n PAN: "<<pan;
     cout<<"\nName: "<<name;
     cout<<"\nIncome to calculate tax: "<<taxincome;
     cout<<"\nTax to pay: "<<tax;
   }
   void computetax()
   {   if(taxincome<=60000)
            tax=0;
      else if(taxincome<=15000)
            tax=0.05*taxincome;
      else if(taxincome<=500000)
            tax=0.10*taxincome;
      else
            tax=0.15*taxincome;
   }
};
void main()
{     taxpayer t;
      t.inputdata();
      t.displaydata();
}
```

7. Define a class JOURNEY in C++ with the following specifications: 2

Private Date Members:

- Busno – to store Bus No
- From – to store Place name of origin
- To – to store place name of destination
- Type – to store Bus Type such as “LUX” for Luxury, “EXP” for Express and “ORD” for Ordinary;
- Distance – to store the Distance in Kilometers
- Fare – to store the Bus Fare

Public Member Functions:

- A constructor function to initialize Type as “ORD” and Fare as 500
- A function CalcFare( ) to calculate Fare as per the following criteria:

TYPE	FARE
“ORD”	15*Distance
“EXP”	20*Distance
“LUX”	24*Distance

- A function Allocate( ) to allow user to enter values for Busno, From, To, Type and Distance. Also, this function should call CalcFare( ) to calculate Fare.
- A function Show( ) to display the content of all the data members on screen.

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
#include<string.h>
class JOURNEY
{  char Busno[10],From[20],To[20],Type[10];
   int Distance;
   float Fare;
public:
   JOURNEY()
   {   strcpy(Type,"ORD");
       Fare=500;
   }
  voidCalcFare()
  { if(strcmpi(Type,"ORD")==0)
       Fare=15*Distance;
    else if(strcmpi(Type,"EXP")==0)
       Fare=20*Distance;
    else if(strcmpi(Type,"LUX")==0)
       Fare=24*Distance;
  }
void Allocate()
{  cout<<"\nEnterBusno: ";
   gets(Busno);
   cout<<"\nEnter Journey beginning place (From): ";
   gets(From);
   cout<<"\nEnter Journey Destination place (To): ";
   gets(To);
   cout<<"\nEnter Bus Type (ORD/EXP/LUX) : ";
   gets(Type);
   cout<<"\nEnter Distance: ";
   cin>>Distance;
```

```
   CalcFare();
  }
 void Show()
 {  cout<<"\nBus Number: "<<Busno;
    cout<<"\nJourney From: "<<From;
    cout<<"\nJourney Destination: "<<To;
    cout<<"\nBus Type: "<<Type;
    cout<<"\nDistance: "<<Distance;
    cout<<"\nFare: "<<Fare;
  }
 };
 void main()
 {    JOURNEY J;
      J.Allocate();
      J.Show();
 }
```

8. Define a class *ELECTION* with the following specifications **4**

Private members :

candidate_name - To store the candidate name
party - To store the party name
vote_received – To store number of votes received

Public members :

* INPUT( ) – to input data
* DISPLAY( ) – to display the details of the winner
* WINNER( ) – To return the details of the winner through the object after comparing the votes received by three candidates .

Write a suitable *main ( )* function to input data in 3 objects of *ELECTION* type and display the details of the following candidate.

ANSWER:

```
 #include<iostream.h>
 #include<stdio.h>
 class ELECTION
 {   charcandidate_name[20];
     char party[20];
     long vote_received;
 public:
    void INPUT()
    {   cout<<"\nEnter Candidate Name: ";
        gets(candidate_name);
        cout<<"\nEnter Party Name: ";
        gets(party);
        cout<<"\nEnter How many Votes Received: ";
        cin>>vote_received;
    }
   void DISPLAY()
   {   cout<<"\nCandidate Name: "<<candidate_name;
       cout<<"\nParty Name: "<<party;
       cout<<"\nNumber of Votes Received: "<<vote_received;
    }
 ELECTION WINNER(ELECTION E1,ELECTION E2,ELECTION E3)
 {   if (E1.vote_received>E2.vote_received)
      {       if(E1.vote_received>E3.vote_received)
                        return E1;
              else
                        return E3;
    }
    else
    {       if (E2.vote_received>E3.vote_received)
                        return E2;
              else
                        return E3;
      }
  }
 };
 void main()
 {  ELECTION ONE,TWO,THREE,WIN;
    ONE.INPUT();
    TWO.INPUT();
    THREE.INPUT();
    WIN=ONE.WINNER(ONE,TWO,THREE);
    cout<<"\nDetails of Winner...\n";
    WIN.DISPLAY( );
 }
```

9. Define a class PhoneBill in C++ with the following descriptions. **4**

Private members:

CustomerName of type character array
PhoneNumber of type long
No_of_units of type int
Rent of type int
Amount of type float.
calculate( ) This member function should calculate the value of amount as Rent+ cost for the units.

Where cost for the units can be calculated according to the following conditions.

No_of_units	Cost
First 50 calls	Free
Next 100 calls	0.80 @ unit
Next 200 calls	1.00 @ unit
Remaining calls	1.20 @ unit

Public members:

* A constructor to assign initial values of CustomerName as “Raju”, PhoneNumber as 259461, No_of_units as 50, Rent as 100, Amount as 100.
* A function accept( ) which allows user to enter CustomerName, PhoneNumber, No_of_units and Rent and should call function calculate( ).
* A function Display( ) to display the values of all the data members on the screen.

ANSWER:

```
class PhoneBill
{ char CustomerName{20];
   long PhoneNumber;
  int No_of_units, Rent;
  float Amount;
  void calculate( );
public:
  PhoneBill( )
  { strcpy(CustomerName,”Raju”);
     PhoneNumber = 259461;
     No_of_units = 50;
     Rent=100;
     Amount=100;
  }
  void accept( );
  void Display( );
};
```

```
void PhoneBill::calculate( )
{  if(No_of_units<=50)
         Amount = Rent;
   else if(No_of_units<=150)
        Amount=(No_of_Units-50)*0.80 + Rent;
   else if (No_of_units<=350)
       Amount=100*0.80+(No_of_units-350)*1.00 + Rent;
   else
        Amount=100*0.80+200*1.00+
                    (No_of_units-350)*1.20 + Rent;
}
void PhoneBill::accept( )
{ cout<<"\nEnter Customer  Name, Phone Number,
                No_of_units and Rent";
   gets(CustomerName);
   cin>>PhoneNumber>>No_of_units>>Rent;
   calculate( );
}
void PhoneBill::Display( )
{  cout<<"\nCustomer Name : "<<CustomerName;
    cout<<"\nPhone Number : "<<PhoneNumber;
    cout<<"\nNumber of Units: "<<No_of_units;
   cout<<"\nRent: "<<Rent;
   cout<<"\nAmount: "<<Amount;
}
```

10. Define a class HOTEL in C++ with following description

Private Members **4**

- FoodCode of type int
- Food of type string
- FType of type string
- Sticker of type string
- Fcost as float
- A member function GetSticker () to assign the following value for Stickeras per the given FType:

FType	Sticker
Vegetarian	GREEN
Contains Egg	YELLOW
Non-Vegetarian	RED

It should also assign the following value for Fcost as per the given FType:

FType	Sticker
Vegetarian	80
Contains Egg	90
Non-Vegetarian	140

Public Members

- A constructor to assign foodcode as 999, food as "food", FType as "Vegetarian" and Sticker as "GREEN"
- A function GetFood () to allow user to enter values for FoodCode.Food, FType and call function GetSticker() to assign Sticker and fcost.
- A function ShowFood() to allow user to view the content of all the data members.

ANSWER:

```
#include<iostream.h>
#include<stdio.h>
#include<string.h>
class HOTEL
{ int FoodCode;
  char Food[20],FType[20],Sticker[20];
  float Fcost;
  void GetSticker( )
  { if(strcmpi(FType,"Vegetarian")==0)
            strcpy(Sticker,"GREEN");
    else if(strcmpi(FType,"Contains Egg")==0)
            strcpy(Sticker,"YELLOW");
    else if(strcmpi(FType,"Non-Vegetarian")==0)
            strcpy(Sticker,"RED");
    if(strcmpi(FType,"Vegetarian")==0)
             Fcost=80;
    else if(strcmpi(FType,"Contains Egg")==0)
             Fcost=90;
    else if(strcmpi(FType,"Non-Vegetarian")==0)
             Fcost=140;
  }
public:
  HOTEL()
  { FoodCode=999;
    strcpy(Food,"food");
    strcpy(FType,"Vegetarian");
    strcpy(Sticker,"GREEN");
  }
  void GetFood()
  { cout<<"Enter FoodCode, Food, FType;";
    cin>>FoodCode;
    gets(Food);
    gets(FType);
    GetSticker();
  }
  void ShowFood( )
  { cout<<"\nFood Code : "<<FoodCode;
    cout<<"\nFood: "<<Food;
    cout<<"\nFood Type: "<<FType;
    cout<<"\nStiker: "<<Sticker;
    cout<<"\nFood Cost: "<<Fcost;
  }
};
void main()
{  HOTEL H;
   H.GetFood();
   H.ShowFood();
}
```

OUTPUT OF A CLASS

1. Write the output of the following: **2**

Note: Assume all required header files are already being included inthe program.

```
class seminar
{          char topic[30];
           int charges;
public:
           seminar()
           {strcpy(topic,"Name");
           charges=4000;
           }
           seminar(char t[])
           {strcpy(topic,t);
            charges=6000;
           }
           seminar(int c)
           {strcpy(topic,"New Name");
           charges=7000-c;
           }
```

```
        void regis(char t[],int c)
        {strcpy(topic,t);
        charges=charges+c;
        }
        void regis(int c=2700)
        { charges=charges - c;
        }
        void subject(char t[],int c)
        {strcpy(topic,t);
        charges=charges+c;
}
void show()
        {cout<<topic<<"#"<<charges-10<<endl;
        }
};
void main()
{seminar s1,s2(1000),s3("SPECIAL"),s4;
s1.show();
s2.show();
s1.subject("COMPUTER",3000);
s1.show();
s2.regis("HACKER",1500);
s2.show();
s3.regis();
s3.show();
s4=s2;
s4.show();
getch();
}
```

Answer:

Name#3990
New Name#5990
COMPUTER#6990
HACKER#7490
SPECIAL#3290
HACKER#7490

2. Find and write the output of the following C++ program code: 2

Note: Assume all required header files are already being included in the program.

```
class Share
{  long int Code;
   float Rate;
   int DD;
public:
   Share()
  {       Code=500;
          Rate=200;
          DD=7;
   }
 void GetCode(long intC,float R)
   {      Code=C;
          Rate=R;
   }
   void Update(intChange,int D)
   {       Rate - =Change;
           DD=D - 20;
    }
     void Status()
     {      cout<<"Date:"<<DD<<endl;
              cout<<Code<<"@"<<Rate<<endl;
     }
};
void main()
{       Share S,T,U;
        S.GetCode(1122,777);
        T.GetCode(1234,333);
        S.Update(27,28);
        U.Update(5,10);
        S.Status();
        T.Status();
        U.Status();
}
```

ANSWER:

Date:8
1122@750
Date:7
1234@333
Date: -10
500@195

3. Observe the following C++ code carefully and obtain the output,which will appear on the screen after execution of it 2

```
#include<iostream.h>
class Aroundus
{   int Place, Humidity, Temp;
public:
    Aroundus(int P=3)
    {  Place=P;
       Humidity=70;
       Temp=15;
     }
    void Hot(int T)
    { Temp  - = T;
    }
    void Humid(int H)
    {  Humidity+=H;
    }
   void JustSee( )
   {    cout<<Place<<"-"<<Temp<<"@"<<
                        Humidity<<"$"<<endl;
    }
};
void main( )
{           Aroundus A,B(7);
            A.Hot(12);
            A.JustSee( );
           B.Humid(77);
           B.Hot(4);
           B.JustSee( );
           A.Humid(5);
           A.JustSee( );
}
```

A)

3-30@70$
7-11@147$
3-3@75$

4. Write the output of the following: 2

```
#include<iostream.h>
        class Counter
        { private:
             unsigned int count;
          public:
            Counter()
```

```
        {    count=10;
         }
         void inc_Count()
        {    count = count + 7;
         }
        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();
    }
```

A)

C1 = 10
C2 = 10
C1 = 17
C2 = 24

5)Find and write the output of the following C++ program code:

Note: Assume all required header files are already being included in the program. (3m)

```
class Share
  {  long int Code;
     float Rate;
     int DD;
public:
     Share()
    {     Code=1000;
          Rate=100;
          DD=1;
    }
   void GetCode(long intC,float R)
   {     Code=C;
          Rate=R;
   }
   void Update(intChange,int D)
   {     Rate+=Change;
          DD=D;
   }
   void Status()
   {     cout<<"Date:"<<DD<<endl;
         cout<<Code<<"#"<<Rate<<endl;
    }
};
void main()
{   Share A,B,C;
    A.GetCode(10,15);
    B.GetCode(20,25);
    A.Update(30,35);
    C.Update(40,45);
    B.Status();
    A.Status();
    C.Status();
 }
```

A)
Date:1
20#25
Date:35
10#45
Date:45
1000#140

SOME THEORY QUESTIONS

1. Explain about different file pointers.

A) There are two file pointers ie get_ pointer (in input mode file) and put_ pointer(in output mode file).

These pointers to attain random access in file. We can directly move to any location in the file using these file pointers.

seekg( ) is a function which allow you to set the get_pointer.

tellg( ) is a function which allow you to know the get_pointer.

seekp( ) is a function which allow you to set the put_pointer.

tellp( ) is a function which allow you to know the put_pointer.

To set the random access of a file, can use the following with the file pointers.

ios::beg //refers to beginning of file
ios::cur //refers to current position in the file
ios::end //refers to end of the file.

Some Examples :

```
ifstream fin;
fin.seekg(10, ios::beg);
fin.seekg(-2,ios::cur);
fin.seekg(0,ios::end);

ofstreamfout;
fout.seekp(5,ios::beg);
```

2) Explain about (a) eof (b)beg (c)cur (d) end related to files. (2m)

A) eof: We can detect when the end of the file is reached by using the member function eof() which has the prototype inteof( );

Ex:
```
while (!fin.eof())
      { ----------;
        ----------;
      }
```

beg, cur and end:

There are two file pointers ie get_ pointer (in input mode file) and put_ pointer (in output mode file)

(THE ABOVE ANSWER WILL COME HERE ALSO)

3) Differentiate between text files and binary files. (2m)

A) A text file stores information in ASCII characters. In text files, each line of text is terminated(delimited) with a special character known as EOF (End of Line) character. In text files some internal translations take place when this EOL character is read and written.

A binary file is just a file that contains information in the same format in which the information is held in memory. In binary file, there is not delimiter for a line. Also no translations occur in binary files. As a result, binary files are faster and easier for a program to read and write than text files.

4. Explain different file modes. (2m)

S. No	Constant	Meaning	Stream Type
1	ios::in	It opens file for reading. Default mode for ifstream objects.	ifstream
2	ios::out	It opens file for writing. Default mode for ofstream objects. It also opens the file in ios::trunk mode by default. This means an existing file is truncated when it is opened.	ofstream
3	ios::ate	This seeks to end of file upon opening of the file. I/O operations can still occur anywhere within the file.	ofstream, ifstream
4	ios::app	This causes all output to that file to be appended to the end.	ofstream
5	ios::trunc	This causes the contents of a pre existing file by the same name to be destroyed and truncates the file to zero length	ofstream
6	ios::nocreate	This causes the open( ) function to fail if the file does not already exist. It will not create a new file with that name	ofstream
7	ios::noreplace	This causes the open( ) function to fail if the file already exists. This is used when you want to create a new file.	ofstream
8	ios::binary	This causes a file to be opened in binary mode. By default, files are opened in text mode.	ofstream, ifstream