C++

SHORT NOTES.

HEADER FILES

(1). <iostream.h> → cout
→ cin

(2). <conio.h> → getch();
→ clrscr();

(3). <math.h> → pow(n, m)
↳ power

(4). <iomanip.h> → setw(10);
→ setprecision(n);

Characters	ASCII Range
0-9	48-57
A-Z	65-90
a-z	97-122
other characters	0-255 excluding the above.

- **Switch Statement.**

Syntax:-
```
switch (exp)
{ case constant-1 : st-1;
                    break;
  case constant-2 : st-2;
                    break;
  :    :    :
  default : st-n;
}
```

where
* switch, case, & default are keywords.
* break - break statement is a statement which is used to sent the control out of switch statement.
* exp - expression is an integer or character variable:
* constant-1, 2, ... n are any integer constant or character constant.
* statement - are executable part which executes when exp. matches with constant.

- **While**

Syntax: while (condition)
statement;

where "condition" is any boolean expression whose result may be true or false & statement may be simple or compound statement.

- **Do-While Statement:-** In this statement, first of all, we execute the loop statement & then condition is checked.

* In do-while statement, if condition is falsed for the very first time even then the statements will execute once.

Syntax:-
```
do { st;
} while (condition);
```

- **For Statement**

For statement is used to initialise the counter variable, check the condition & also increment or decrement the counter variable & execute the loop statement until the condition is true.

Syntax:- for (exp-1 ; exp-2; exp-3)
statement;

- **Nested For Statement.**

Syntax:-
```
for (exp-1 ; exp-2 ; exp-3)
{ for (exp-4 ; exp-5 ; exp-6)
    statement;
}
```

- **goto statement**

Syntax :- goto (row, column);

Ex:-
```
int i=1;
A: cout << "JSMV" <<endl;
if (i<=10)
    i=i+1;
    goto A;
```
or `goto -;`

- **break Statement:-** Syntax:- break;

★ STANDARD LIBRARY FUNCTIONS. ★ use <string.h> header file.

- **STRING HANDLING FUNCTIONS.**

(1). strlen ();→ This function is used to cal. the length of string.

SYNTAX:- n = strlen (st);

st → string variable or constant.
n → integer variable.

Ex:- char s[] = "Welcome";
int n = strlen (s);
cout << n; → 7.
n = strlen ("C++ Subject")
cout << n; → 11

(2). strcpy ():→ used to copy the string into string variable.

SYNTAX:- strcpy (st1, st2);
↓ string var. ↳ string var. or constant.

★ The value of st2 will be copied into var. st1.

Eg:→ char s1[20], s2[20] = "C++";
strcpy (s1, s2);
cout << s1; → C++
strcpy (s1, "Hello");
cout << s1; → Hello.

(3). Strcmp ():→ used to compare 2 string. If both the strings are equal it will return zero (0), if the first string is greater, it will return +ive value (+1) otherwise it will return -ive value (-1).

SYNTAX:→ int n = strcmp (st1, st2);

Eg:→ int n = strcmp ("Abc", "abc");
if (n == 0)
cout << "Both strings are equal";
else cout << " " " not " ";

or

if (strcmp ("Abc", "abc") == 0)
cout << "equal";
else cout << "Not equal";

~~Q. WA~~

(4). strcat ():→ used to concate (add) two strings.

SYNTAX:- strcat (st1, st2);
↓ st. var. ↓ st. var. or constant

★ value of st2 is concated by value of st1 & stored in variable st1;

Eg:→ char n[20], m[20];
strcpy (n, "Computer");
strcpy (m, "science");
strcat (n, m);
cout << n; → Computer Science
cout << m; → Science.

★ CHARACTER FUNCTIONS. ★ use <ctype.h> header file.

(1). islower ()

SYNTAX:- n = (int) islower (ch);

This func's returns 1 if char. is in lower case otherwise 0.

(2). isupper ()

SYNTAX:- n = isupper (ch);

(3). isalpha () → alphabet or not.

SYNTAX:- n = isalpha (ch);

(4). isdigit () → digit or not

n = isdigit (ch);

(5). toupper ():→ convert its argument into uppercase if it is in lower case.

SYNTAX:- ch1 = toupper (ch2);

(6). tolower()

ch1 = tolower(ch2);

★ CONSOLE INPUT-OUTPUT FUNCTIONS. use <stdio.h>

(i). getchar() used to read a character from the keyword & store it in variable.

SYNTAX:- var = getchar();

Eg:-
```
char ch;
ch = getchar();
cout << ch;
```

(ii). Putchar() used to display a single character on the screen.

SYNTAX:- putchar(ch);

Eg:-
```
char ch = 'a';
Putchar(ch); → a
putchar('A'); → A.
```

(iii). gets() used to input a string of characters.

SYNTAX:- gets(st);

(iv). Puts() used to display the string value on screen. It ends with a newline character.

SYNTAX:- puts(st);

★ INPUT-OUTPUT STREAM FUNCTION. use <iostream.h>

(i). get():- used to input a single character.

SYNTAX:- cin.get(ch);

(ii). put():- used to display a single character.

SYNTAX:- cout.put(ch);

(iii). getline():- used to input a string with spaces & it ends with a new line character.

SYNTAX:- cin.getline(st, size);

eg:-
```
char n[20];
cin.getline(n, 20);
```

(iv). write():- used to display the string.

SYNTAX:- cout.write(st, size);

eg:- cout.write("welcome", 4);

★ STRUCTURES.

SYNTAX:-
```
struct structure name
{member 1;
 member 2;
 .
 .
 .
};
```

(I). Eg:-
```
struct student
{int r;
 char n[20];
 float p;
};
```

★ To access the members of a structure, we req. a structure variable.

student s1, s2, s3;

(II).
```
struct
{int r;
 char n[20];
 float p;
}s;
```

Q. W.A.P to input even nos. upto an inputed no..

```
#include <iostream.h>
#include <conio.h>
  void main ()
{ clrscr();
   int n, i;
   cout << " Enter the no.";
    cin >> n;
      i=2;
    while (i<=n)
      { cout << i << endl;
          i=i+2;
       }
   getch();
}
```

Q. W.A.P to input n random nos. & find out the sum of those random nos..

```
#include <iostream.h>
#include <conio.h>
  void main ()
  { clrscr();
     int n, i, a, s;
         s=0;
       cout << " Enter the no.";
         cin >> n;
           i=1;
         while (i<=n)
           { cout << " Enter any no.";
               cin >> a;
               s = s+a;
               i++;
           }
       cout << " Sum = " << s;
         getch();
  }
```

Q. W.A.P to input any no. & reverse that no. { Palindrome } 121 → 121

```
#include <iostream.h>
#include <conio.h>
  void main ()
  { clrscr();
     int n, r=0, a;
     cout << " Enter the no.";
       cin >> n;
       while (n>0)
        { a = n % 10;
          n = n / 10;
          r = r*10+a;
        }
       cout << " Reverse no. = " << r;
       getch();
  }
```

Ex:→ 723

n = 72·3 = 72, a=3, r=3

n = 7·2 = 7, a=2, r=32

n = 0, a=7, r=327

Q. W.A.P to input any no. & check whether the no. is palindrome.

```
#include <iostream.h>
#include <conio.h>
  void main ()
  { clrscr();
    int n, m, p, r=0;
     cout << " Enter any no.";
       cin >> n;
       m=n;
     while (n>0)
     { a = n % 10;
       n = n/10;
       r = r*10+a;
     }
   if (r==m)
     cout << " Palindrome";
```

```
    else
        cout <<" Not a palindrome";
    getch();
}
```

Q. W.A.P to input any no. & find out the sum of individual digits of that no. Ex:→ if n is 723 then output be 12. 7+2+3

```
#include <iostream.h>
#include <conio.h>
void main()
{ clrscr();
  int n, s=0;
  int a;
  cout << "Enter any no.";
  cin >>n
  while (n>0)
   { a= n % 10;
     n= n /10;
     s = s+a;
   }
  cout << "Sum =" <<s;
  getch();
}
```

Q. W.A.P to check whether the inputed no. is prime or not.

```
#include <iostream.h>
#include <conio.h>
void main()
{ clrscr();
  int n, i, m=0, flag=0;
  cout <<" Enter the No. to check Prime";
  cin >>n
  m= n/2;
  for (i=2; i<=m; i++)
  {if (n % i==0)
    { cout<<" No. is not Prime" <<endl;
      flag=1;
      break;
    }
  }
  if (flag==0)
    cout <<" No. is Prime" <<endl;
  getch();
}
```

Q. W.A.P to find out the area of square, rectangle & circle depending upon the user choice.

```
include
#<iostream.h>
#include <conio.h>
void main()
{ clrscr();
  int a,b;
  float r;
  char ch;
  do { clrscr();
       cout << "\t\t Main Menu \n";
       cout << " Press S for square area \n";
       cout << " Press C for circle area \n";
       cout<< " Press R for rectangle area \n";
       cout << " Press Q for Quit \n";
    cout <<"Enter Your choice";
     cin >>ch;
  switch (ch)
    { case 's':
      case 'S': cout<<" Enter the Side";
                cin >>a;
```

```
        r= a * a;
        cout << " Area of square = " << r;
        break;

case 'r';
case 'R': cout << " Enter the length and then breadth";
          cin >> a >>b;
          r= a *b;
          cout << " area of Rectangle = " << r;
          break;

case 'c':
case 'C':   cout << " Enter the radius";
            cin >> a;
            r= 3.14 * a *a;
            cout <<" area of circle = " << r;
            break;

case 'q':
case 'Q':   cout << " Thank You";
            break;
default   :  cout << " Wrong choice";
}
getch();
} while (ch != 'Q' && ch != 'q');
}
```

Q. W.A.P to input any no. & find out the factorial of that no.;

```
# include <iostream.h>
# include <conio.h>
  void main ()
  { clrscr ();
    int  n, i, f=1;
    cout << " Enter the no.";
    cin >> n;
   for (i=1; i<=n; i++)
      { f= f *i; }
    cout << " Factorial = " << f;
   getch();
  }
```

Q. W.A.P to display n terms of fibbonacci series;

0 1 1 2 3 5 . . . . .

```
# include <iostream.h>
# include <conio.h>
  void main ()
  { clrscr();
    int n, i,a=0 , b=1, c;
    cout << " Enter any no.";
    cin >> n;
    cout << a   << endl;
    cout  << b << endl;
   for  (i= 3 ; i<=n ;++i)
        { c= a+b;
          cout << c<<endl;
          a=b;
          b=c;
        }
   getch();
  }
```

Q. WAP to find out the sum of following series :-

$$\frac{x}{2^2} + \frac{x}{3^2} + \frac{x}{4^2} + \dots + \frac{x}{n^2}.$$

```
# include <iostream.h>
# include <conio.h>
# include <math.h>
  void main ()
  { clrscr();
     int x, n, i;
     float s=0;
      float t;
    cout << "Enter the value x & n";
     cin >> x >>n;
     for (i= 2 ; i <=n  ; i++)
      {    t =  x / Pow (i, 2);
           s= s+t;
      }
    cout <<" Sum of series = " << s;
  getch();
  }
```

Q. W.A.P to find out the sum of following series :-

$$\frac{x}{2} + \frac{x^2}{3} + \frac{x^3}{4} + \dots + \frac{x^n}{n+1}.$$

```
void main ()
{ clrscr ();
   int  x, n, i;
   float s=0 , t;
   cout << " Enter  x & n;
    cin >> x >>n;
   for (i=2; i<=n; i++)
   { t = Pow(x , i-1) / i ;
        s= s+t;
   }
cout <<" Sum = " <<s;
getch ();
}
```

or

```
for(i=1; i<=n ; ++i)
{ t = Pow(x, i)/(i+1);
  s =s+t ;
}
```

Q. WAP to find the sum of following series :

$$\frac{x}{2} - \frac{x^2}{3} + \frac{x^3}{4} - \frac{x^4}{5} - \dots \frac{x^n}{n+1}.$$

only logic

```
void main ()
{ int x, n, i
   float t ,s=0 ;
    int p=1;
  cout <<" Enter x & n;
    cin >> x >>n;
  for ( i=1 ; i<=n ; i++)
    {  t=  Pow (x, i)/ i+1 ;
       t= t * p ;
        if (p==1)
            p= -1 ;
        else
            p=1;
       s = s+t;
    }
 cout <<" sum =" << s;
getch ();
}
```

Q. W.A.P to find out the sum of following series:-

$\frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots\ldots + \frac{1}{n!}$.

```
void main ()
{ clrscr ();
  int n , i, j, f, s=0, t;
   cout << " Enter n";
    cin >>n;
    for (i=2 ; i<=n ; ++i)
        { f=1;
          for (j=1 ; j<=i ; ++j)
              { f= f* j;
              }
              t= 1/f;
              s= s+t;
          }
      cout << " Sum = " <<s;
     getch ();
  }
```

Q. W AP to find out the sum of series:-

$(2^2) + (2^2+4^2) + (2^2+4^2+6^2) + \ldots\ldots (2^2+\ldots n^2)$

```
void main ()
  { clrscr ();
    int n, i, j, s=0, f, t,a;
   cout <<" Enter n" ;
      cin >>n
    for (i= 1 ; i<=n ; ++i)
        { for (j=0;j<=i;++j)   f= 2 ; t=0;
```

```
          for (j=1 ; j<=i; ++j)
              { a= f*f;
                t= t+a;
                f= f+2;
              }
            s= s+t;
          }
        cout << " sum =" <<s;
      getch ();
    }.
```

Q. WAP to input the value of n & display the output as shown:- Ex:→ If value of n is 5 then output will be

```
*
* *
* * *
* * * *
* * * * *
```

```
void main ()
{ clrscr ();
   int n, i, j ;
     cout <<" Enter n " ;
      cin >>n
     for (i=1 ; j<=n ; ++i)
         { for (j=1 ; j<=i ; ++j)
             {cout << " * ";
              cout << endl;
             }
         }
   getch ();
}
```

★ output :→

```
* * * * *
* * * *
* * *
* *
*
```

logic :→

```
for (i=n ; i>=1 ; --i)
  { for(J=n; J>=1; --J)
     {cout<<" * ";
      cout<<endl;
     }
  }
```

Q. WAP to input the no. of rows & display output in the given format;

```
{ clrscr();
  int i, j, k, n;
      cout << " Enter no. of rows";
        cin >> n;
     for (i = n; i >= 1; i--)
        { for (j = i+1; j <= n; ++j)
            {cout << " _ "; }
              for (k = i; k >= 1; k--)
                { cout << k; // cout << i; }
                cout << endl;
        }
      getch();
  }
```

```
5 4 3 2 1
_ 4 3 2 1
_ _ 3 2 1
_ _ _ 2 1
_ _ _ _ 1
```

⇒ result:-

```
5 5 5 5 5
4 4 4 4
3 3 3
2 2
1
```

★ Result:-

```
_ A B C D E
_ _ A B C D
_ _ _ A B C
_ _ _ _ A B
_ _ _ _ _ A
```

```
{ clrscr();
  int i, j, n, K;
     char ch;
     cout << " Enter n ";
        cin >> n;
     for (i=1; i <= n; ++i)
        { for (j=1; j <= i; ++j)
            cout << " _ ";
            ch = 'A';
          for (K=1; K >= 1; k--)
            { cout << ch;
              ch++;
            cout << endl;
        }
     getch();
}
```

Q. result:-

```
_ _ _ _ _ 1
_ _ _ _ 2 1 2
_ _ _ 3 2 1 2 3
_ _ 4 3 2 1 2 3 4
_ 5 4 3 2 1 2 3 4 5
```

```
{ clrscr();
  int i, j, K, J, z=1, l=1;
    for (i=1; i <= 5; i++)
      { for (j=5; j >= i; j--)
          { cout << " _ ";
          }
        for (K=i; K >= 1; --K)
          {cout << K; }
        for (J=2; J <= i; ++J)
          {cout << j;
          }
        cout << " endl;
      }
  getch();
}.
```

Q result :→

```
    A
  B A B
C B A B C
D C B A B C D
E D C B A B C D E
```

```
{
  int i, j, J, K, n;
    char ch = 'A';
    cout << "Enter n";
      cin >> n;
  for (i=1 ; i<=n ; ++i)
    { for (j=n ; j>=i ; j--)
        { cout << " ";

        ch = ch + i;
        for (K=i ; K>=1 ; --K)
          {cout << --ch;
          }
        for (J=2; J<=i ; ++J)
          {cout << ++ch;
          }
        ch='A'
        cout << endl;
    }
  getch();
}
```

Q. WAP to input any password, check & display whether the password is correct or not. If the password is correct INDIA.

```
#include <iostream.h>
#include <conio.h>
#include <string.h>
void main()
{ clrscr();
  char a[20];
  cout<<" Enter the Password";
  cin >> a;
  if (strcmp (a, "INDIA") == 0)
        cout <<" Password is correct";
  else
        cout<<" Incorrect ";
  getch();
}
```

Q. What will be the output of given segment :-

```
char S[] = "COMPUTER_Sc.2017";
for (int i=0; S[i] != '\0'; ++i)
  {if (!isalpha(S[i]))
      S[i] = '@';
   else if (isupper(S[i]))
      S[i] = s[i++];
   else S[i] = S[i] +1; }
cout << S;
```

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	o	m	P	U	T	e	R	_	S	c	.	2	0	1	7

output :→ o p n U T e t _ @ c d @ @ @ @ @

∴ output :→ opnUTet_@cd@@@@@

Q. WAP to enter a line. count & display total no. of words in that line.

```
#include <iostream.h>
#  "    <conio.h>
#  "    <stdio.h>

Voidmain()
{clrscr();
    char l[80];
     int w=1, i;
     cout<<"Enter any line";
      gets(l);
      for(i=0 ; l[i]!='\0' ; i++)
          if(l[i]==' ')
              w++;
          cout<<"No. of words =" <<w;
         getch();
}
```

Q. W.A.P to input 10 elements in an array and display them.

```
#include <iostream.h>
#include <conio.h>
void main()
{int a[10], i;
 for(i=0 ; i<=9; i++)
   { cout<<"Enter 10 elements";
     cin>> a[i];
   }
 for(i=0; i<=9;i++)
    cout<< a[i] <<endl;
   getch();
}
```

Q. W.A.P to input 10 no. in an array & find out the sum of even elements.

```
#include <iostream.h>
#include <conio.h>
void main()
{ int a[10], i, s=0;
  for(i=0 ; i<=9;++i)
    { cout<<" Enter 10 nos.";
      cin>>a[i];
    }
  for(i=0; i<10;++i)
    { if(a[i]%2==0)
        s=s+a[i];
    }
   cout<<"sum =" <<s;
  getch();
}
```

Q. WAP to input 10 nos. in an array and find out the largest no. in the array.

```
#include <iostream.h>
#include <conio.h>
 void main()
{ int i, a[10], l;
  for(i=0 ; i<=9;++i)
   { cout<<" Enter 10 nos.";
     cin >>a[i];
   } l= a[0];
 for(i=0 ; i<=9; ++i)
   { if(l<a[i])
       l= a[i];
   }
  cout<<" largest No.=" <<l;
getch();
}
```

Q. WAP to input 10 nos. in an array & search for a no. whether it is present or not in the array.

```
#include <iostream.h>
#include <conio.h>
void main()
{ int a[10], i, f=0, n;
  for (i=0; i<=9; ++i)
     { cout<<" Enter 10 nos.";
       cin >> a[i];
     }     cout<<"Enter no. to be searched "; cin>>n;
  for (i=0; i<=9; ++i)
    { if (a[i]==n)
        {cout<<" No. is found";
         f=1; }
    }
  if (f==0)
    cout<<" No. is not found";
  getch();
}
```

Q. WAP to input an array & display the reversed of that array.

```
#include <iostream.h>
#include <conio.h>
void main()
{ int a[20], i, m, n, J, t;
  cout<<"size of array"; cin>>m;
  for (i=0; i<m; ++i)
     { cout<<" Enter an array";
       cin >> a[i];
     }
  J=n-1;
  for (i=0; i<m/2; ++i)
     {t=a[i];
      a[i]=a[J];
      a[J]=t;
      J--;
     }
  cout<<" Reversed array";
  for (i=0; i<m; ++i)
       { cout<<a[i];
       }
  getch();
}
```

Q. WAP to input an array & interchange first half array element with second half.

```
void main()
{ int i, J, n, a[20], t;
  cout<<" Enter size of array not more than 20";
       cin>>n;
  for (i=0; i<n; ++i)
       { cout<<" Enter array";
         cin >> a[i].
       }
  J=n/2;
  for (i=0; i<n/2; ++i)
       { t=a[i];
         a[i]=a[J];
         a[J]= t;
         J++;
       }
  cout<<" Reversed array:";
  for (i=0; i<n; ++i)
       { cout<<a[i];
       }
  getch();
}
```

Q. WAP to input an array & sort them in ascending order:-

```
void main()
{ int a[20], n, i, J, t
  cout << " Enter size";
  cin >> n;
  for (i=0 ; i<n ; ++i)
     { cout << " Enter array";
       cin >> a[i];
     }
  for (i=0 ; i<n ; ++i)
     { for (J=0 ; J<n-1 ; ++J)
        { if (a[J] > a[J+1])
           { t= a[J];
             a[J] = a[J+1];
             a[J+1] = t;
           }
        }
     }
  cout << " Sorted array" << endl;
     for (i=0; i<n ; ++i)
        cout << a[i] << endl;
  getch();
}
```

Q. WAP to input elements in 2D array of size 3x3 & display them in matrix form.

```
#include <iostream.h>
#include <conio.h>
#include <iomanip.h>
void main()
{ int a[3][3] , i, j;
  for(i=0 ; i<3 ; ++i)
     for(j=0 ; J<3 ; ++J)
        { cout << " Enter any no.";
```

```
            cin>>a[i][j];
        }
clrscr();
        cout<<"Matrix :"<<endl;
        for(i=0 ; i<3 ;++i)
          { for(j=0 ; j<3;++j)
              cout<<setw(5)<<a[i][j];
              cout<<endl;
          }
        getch();
}
```

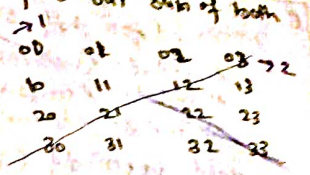
Q. W.A.P to input elements in 2-D array (4×4) & find out the sum of elements whose one's value is 2.

```
#include<iostream.h>
#include<conio.h>
#include<iomanip.h>
void main()
{ int i,j, a[4][4], s=0
    for(i=0; i<4 ;++i)
      for(j=0; j<4; ++j
        { cout<<"Enter anyno.";
          cin>>a[i][j]; }

for(i,j=0;i,j<4; ++i,++j)
    if (a[i][j] % 10 == 2)
          s= s+ a[i][j];

    clrscr();
    cout<<"Sum = "<< s;
getch();
}
```

Q. WAP to input 2-D array (4×4) & find out sum of both diagonals.




```
void main()
{ int a[4][4], i,j, s1=0, s2=0
  for(i=0 ; i<4 ;++i)
    for(j=0 ; j<4 ;++j)
      { cout<<"Enter array";
        cin>>a[i][j];
      }
    for(i=0 ; j<4 ;++i)
      for(j=0; j<4;++j)
        { if (i=j)
            s1= s1+a[i][j];
          if (i+j=3)
            s2= s2+a[i][j];
        }
    cout<<"sum of d1 ="<<s1;
    cout<<"sum of d2 ="<<s2;
getch();
}
```

Q. WAP to find sum of only boundary elements in array nxn.

Logic

```
for(i=0 ; i<n ;++i)
  {for(j=0 ;j<n ;++j)
    cout<< if (i==0 || j==0 || j=n-1 || i=n-1)
          s= s+ a[i][j]
  }
```

Q. WAP to input 2D array of 4×4 & display the upper half matrix. (upper half DIE)

00	01	02	03
	11	12	13
		22	23
			31

```
#include <iostream.h>
#include <conio.h>
#include <iomanip.h>
void upperhalf (int a[4][4])
  { int i, j;
      for (i=0; i<n; i++)
        { for (j=0; j<n;++j)
            if (j>= i)
              cout << setw(5)<<a[i][j];
            else
              cout << setw(5) << ' ';
              cout << endl;
        }
void main ()
  { int a[4][4], i,j;
      for (i=0; i<4;++i)
        for(j=0; j<4;++j)
          { cout << "Enter ";
            cin>>a[i][j];
          }
        upperhalf (a);
    getch();
  }
```

Q. W.A.P to input name, Roll no., & Percentage of 10 students. Count & display the records of those student-s. who secures 80% or above using structures.

```
#include <iostream.h>
#include <conio.h>
struct student;
  { char n[20];
    int r;
    float p;
  };
  void main()
  { student s[10];
    int c=0; int i;
      for(i=0;i<10;++i)
        { cout<<" Enter the name";
          cin>>s[i].n;
          cout<<" Enter Roll no.";
          cin>>s[i].r;
          cout<<"Enter Percentage";
          cin>>s[i].p;
        }
    for(i=0;i<10;++i)
      if (s[i].p>=80)
        { cout<<s[i].n<<s[i].r<<s[i].p;
          c=c++; }
        cout<<" Total No. of students
                above 80%"<<c;
      getch();
  }
```

CHAPTER-7.

DATA FILE HANDLING.

The main purpose of using file is to store our data in secondary storage device memory of computer. Normally we store our data in RAM which is temporary storage. So whatever we store in RAM will wash out as we switch off the computer. So, to store data permanently in secondary storage device, the file handling program is used.

Before reading or writing the record from the file, the very first step is to open the file. There are three classes available to open the file.

1. ofstream
2. ifstream
3. fstream.

These classes are declared within <fstream.h> header file. So, in every file handling program, <fstream.h> header file must be included. This header file itself includes <iostream.h> header file. So, there is no need to include <iostream.h> in file handling program.

Ofstream

To open the new file in output (writing mode), ofstream class is used.
If file is already existing then the existing records of that file will be erased & new one will be created.

SYNTAX:→ ofstream filevar ("External file name");

→ filevar is an internal file name & can be any user define word having the reference of the buffer alloted for the current file. So, data is stored in this buffer (area) prior to store in the secondary storage device. & external file name is the data file name created on the disk to store the records of the file.

Ex→ ofstream fi ("abc.txt");

Q. WAP to store students record by creating a data file student.dat

```
#include <fstream.h>
#include <conio.h>
void main()
{ char n[20];
  int o;
  float p;
  ofstream f("student.dat");
  char ch;
  do { cout<<"Enter name, rollno, & percentage";
       cin>>n>>o>>p;
       f<<n<<o<<p;
       cout<<"Want to enter more records";
       cin>>ch;
  }while(ch=='y');
  f.close();
  getch();
}
```

IFSTREAM

To open the existing data files to reading the records ifstream class is used.

SYNTAX:- ifstream filevariable("external file name");

Q. WAP to read students record's from the file student.dat.

```
#include <fstream.h>
#include <conio.h>
void main()
{ char n[20];
  int r;
  float p;
  ifstream f("student.dat");
  while(f.eof()==0)
  { f>>n>>r>>p;
  cout<<"Name = "<<n<<endl;
  cout<<"Roll no. = "<<r<<endl;
  cout<<"Percentage = "<<p<<endl;
  }
  f.close();
getch();
}
```

(eof() is end of file function)

Q. Write a function to read a content from a text file abc.txt. Count & display the no. of capital letters in it.

```
void count()
{ ifstream f("abc.txt");
  int c=0;
  char ch;
  while(f.eof()==0)
  { f.get(ch);
    if(ch>=65 && ch<=90)
      c++;
  }
  f.close();
  cout<<"No. of capital letters="<<c;
  getch();
}
```

Q. WAF to read the content from a text file xyz.txt Count & display no. of digits, no. of capital letter, no of small letter, special characters.

```
void count()
{ ifstream f("xyz.txt");
  int d=0, c=0, s=0, sp=0;
  char ch;
  while(f)
  { f.get(ch);
    if(isdigit(ch))
      d++;
    else if(isupper(ch))
      c++;
    else if(islower(ch))
      s++;
    else
      sp++;
  }
  f.close();
  getch();
}
```

Q. Write a function to read a content from the file lower.txt & create another file upper.txt after converting each small letter into capital letters.

```
void convert()
{ ifstream f1("Lower.txt");
  fstream f2("Upper.txt");
  char ch;
  while (f1)
  { f1.get(ch);
    if (ch >= 97 && ch <= 122)
      ch = ch - 32;
    f2.put(ch);
  }
  f1.close();
  f2.close();
  getch();
}
```

Q. WAP to count & display no of lines started with character A. from a file xyz.txt

```
void count()
{ ifstream f1("xyz.txt"); int c=0;
  char ch[30];
  while (f1)
  { f1.getline(ch);
    if (ch[0] == 'A')
      c++;
  }
  f1.close();
  cout << "No. of lines started with A=" << c;
  getch();
}
```

Q. WAP to read a content from a file, story.txt Count & display the occurrence of 'is' in the file story.txt;

```
void convert()
{ ifstream f1("story.txt");
  int c=0;
  char ch;
  while (f1)
  { f1.get(ch);
    if (ch == ' ')
    { f1.get(ch);
      if (ch == 'i')
      { f1.get(ch);
        if (ch == 's')
        { f1.get(ch);
          if (ch == ' ')
            c++;
        }
      }
    }
  }
  f1.close();
  cout << "No. of 'is'=" << c;
  getch();
}
```

10th →

```
char ch, s[3];
while (f1)
{ f1.get(ch);
  if (ch == ' ')
  { f1.gets(s);
    if (strcmp(s,"is")==0)
      c++;
  }
}
f1.close();
cout<<c;
getch();
```

Q. WAF to read the content from a file para1.txt Copy the content into the file para2.txt after replacing each 'M' into 'S'.

```
void convert()
{
  ifstream f1("para1.txt");
  ofstream f2("para2.txt");
  char ch;
  while(f1)
  {
    f1.get(ch);
    if(ch=='M')
      ch='S';
    f2.put(ch);
  }
  f1.close();
  f2.close();
  getch();
}
```

Q. WAF to read the content from a file note.txt. Copy the content into the file new-notes.txt after replacing no. of consecutive blank spaces with single space.

```
void copy()
{
  ifstream f1("note.txt");
  ofstream f2("newnotes.txt");
  int c=0;
  char ch;
  while(f1)
  {
    f1.get(ch);
    if(ch==' ')
      c++;
    else
      c=0;
    if(c<=1)
      f2.put(ch);
  }
  f1.close();
  f2.close();
  getch();
}
```

c=0, c=-1, c>=0

-1 ≠ 0

fstream Class

By fstream class, we just declare the file variable.

SYNATX:- fstream filevar;

OPEN FUNCTION.

To open the file in different modes, open function is used.

SYNATX:-> filevar.open("External file name", ios::mode);

where ios stands for input output stream.

MODE

(1). ios::out

To open a new file for writing the records

(2). ios::in

To open existing data file for reading the records.

(3) ios::app
To open the existing data file for appending (adding) the records.

(4) ios::trunk
To open the existing data file & delete all the records.

(5) ios::ate
It is used to open the existing data file & set the file pointer at last record.

(6) ios::bg
It is used to open the file pointer at the begining of the records.

(7) ios::binary
It is used to open the data file in binary form.

(8) ios::nocreate
This causes to open function fail if the file doest not already exist it will not create a new file with that name.

Note:- More than 1 mode can be used with single open function.

e.g:-
```
fstream fi;
fi.open("student.dat", ios::out|ios::binary);
```

() CLOSE FUNCTION.
After completing input or output operation in the file, finally the file will be close by using close();

SYNTAX:- filevar.close();

INPUT OUTPUT OPERATION.

(1) Write()
To transfer the content of record from buffer to disk data file, write() is used.

SYNTAX:- filevar.write((char *) & record, sizeof(record));

where record is group variable which can be structure variable or class object.
& sizeof() will return the size of variable in terms of memory bytes.

e.g:-
```
struct st
{ char n[20];      -> 1x20
  int x;           -> 2
  float p;         -> 4
};                 ↓
cout << sizeof(s); --> 26.
```

Where char * is the cast operator

Q. WAP to create a datafile emp.dat which stores name, code & basic pay of an employe.

```
#include <fstream.h>
#include <conio.h>
Struct emp
{ char n[20];
  int code;
  float basic pay bp;
};
void main ()
{ emp e;
  fstream f;
  f.open ("emp.dat", ios::out | ios::binary);
  char ch;
do { cout << "Enter name, code & basic pay";
     cin >> e.n >> e.c >> e.bp;
     f.write ((char *) & e, sizeof (e));
     cout << " Want to enter more records";
     cin >> ch;
} while (ch == 'y');
f.close ();
getch ();
}
```

(2) Read ()

To read the record from existing data file & transfer it into buffer for processing, read() is used.

SYNTAX:- filevar.read ((char *) & record, sizeof (record));

(3) eof () : (end of file)

To check whether the file pointer is at end of file marker or not, eof() is used. This function returns 1 (true), if end of file mark encounter otherwise it will return 0 (false).

SYNTAX:- filevar.eof ();

Q. WAP to read the content or records of emp by from the file emp.dat.

```
#include <fstream.h>
#include <conio.h>
 struct emp
 {char n[20];
   int c;
   float bp;
 };
 void main ()
 {emp e;
   fstream f;
   f.open ("emp.dat", ios::in, ios::binary);
   f.read ((char *) & e, sizeof (e));
   while (f.eof() == 0)
     { cout << "Name =" << e.n;
       cout << "Code =" << e.c;
       cout << "Basic pay=" << e.bp;
```

```
    f.read((char*)&e, sizeof(e));
  }
  f.close();
  getch();
}
```

Q. WAP to perform all the over operations on the emp file.

```
#include <fstream.h>
#include <conio.h>
#include <string.h>
#include <dos.h>
class emp
{ char n[20];
  int c;
  float bp;
public:
void input()
{ cout<<"Enter name, code & basic pay";
  cin>>n>>c>>bp;
}
void output()
{ cout<<"Name is:" <<n <<"code is:" << c <<
  "basic pay:" <<bp;
}
int return code()
{ return c;
}
};
```

```
void main()
{ clrscr();
  emp e;
  fstream f;
  char ch, ch1;
  int n;
do {cout<<" Main menu" <<endl;
  cout<<" Press C for creation" <<endl;
  cout<<" Press A for accessing" <<endl;
  cout<<" Press S for searching" <<endl;
  cout<<" Press M for modification" <<endl;
  cout<<" Press D for deletion" <<endl;
  cout<<" Press U for updating the record" <<endl;
  cout<<" Press X for exit" <<endl;
  cout<<" Enter your choice" <<endl;
  cin>>ch;
switch(ch)
  { case 'c':
    case 'C':
      f.open("emp.dat", ios::out | ios::binary);
      do {e.input();
        f.write((char*)&e, sizeof(e));
      cout<<" Want to enter more records";
      cin>>ch1;
    } while(ch1=='y');
    f.close();
    break;
  case 'a':
  case 'A': f.open("emp.dat", ios::in | ios::binary);
      f.read((char*)&e, sizeof(e));
      while(f.eof()==0)
```

```
{ e.output ();
  f.read ((char *)&e, sizeof(e));
  while (f.eof
}
  f.close ();
    break;
case 's':
case 'S':
    f.open ("emp.dat", ios::in|ios::binary);
    cout << "Enter code to be searched";
    cin >> m;
    f.read ((char *) &e, size of (e));
    while (f.eof()==0)
    { if (m == e.returncode ())
          e.output ();
        f.read ((char *) &e, size of (e));
    }
    f.close ();
        break;
```

```
case 'm':
case 'M':
f.open ("emp.dat" ios::in|ios::out|ios::binary);
cout << "Enter code to be modified";
      cin >> m;
f.read ((char *) &e, sizeof (e));
    int c1 = 0;
while (f.eof () == 0)
{ c1++;
  if (m == e.returncode ())
  { cout << "Enter new records";
        e.input ();
      f.seekp ((c1-1) * sizeof(e));  f.seekp(-1*sizeof(e), ios::cur);
      f.write ((char*) &e, sizeof (e));
  }
    f.read ((char*) &e, size of (e));
}
  f.close ();
break;
case 'd':
case 'D':        temporary file
  fstream t;
  f.open ("emp.dat" ios::in|ios::binary);
    t.open("temp.dat" ios::out|ios::binary);
    cout << "Enter code to be deleted";
    cin >> m;
  f.read ((char*) &e, sizeof (e));
      while (f.eof () == 0)
      { if (m != e.returncode ())
          t.write ((char*) &e, sizeof (e));
        f.read ((char*) &e, sizeof (e));
      }
```

```
        f.close();
        t.close();
        remove("emp.dat");
        rename("emp.dat", "temp.dat");
        break;
    case '4':
    case 'U':
        f.open("emp.dat", ios::app | ios::binary);
        do {e.input();
            f.write((char *)&e, sizeof(e));
            cout << "Do you want to enter more records";
            cin>>ch;
        } while (ch == 'y');
            f.close();
        break;
    case 'x':
    case 'X':
        cout << "Thank You";
        break;
    }
}
while (ch != 'x');
getch();
}
```

RANDOM ACCESSING:

Every file maintains two pointers called get pointer & put pointer which tells the current position in the file where writing & or reading take place. These pointers help in performing random accessing in files that means moving directly to any location in the file instead of moving through it sequentially.

In C++, random accessing can be performed with the help of following four functions:

(i) tellp() (ii) tellg() (iii) seekp() (iv) seekg()

(writing) put (reading) get

Tellp() & Tellg()

Tell() will return the current position of file pointer in terms of bytes.

SYNTAX:→ filevar.tellp() / filevar.tellg();

eg:→
```
int p = f.tellg();
cout << p;
```

The value of p is the byte no. of file pointer which tells that from this byte no., we can read the record.

The working of tellp() / tellg() are same with fstream object

for writing for reading.

seekp() & seekg()

seekp() & seekg() are used to set the file pointer at particular byte no.

filevar.seekp() or seekg() (n);

where n is the byte no. where we want to set the file pointer

Seek() can be used in two ways:

(1) By absolute position

e.g:→ f.seekg(30);

It will move the get file pointer to byte no. 30.

(2) By relative position.

It can be used by 3 ways:-

(i) ios::beg

e.g:→ f.seekg(20, ios::beg);

It will move the file pointer from the 20 byte no. refers to the beginning from the file.

beginning से 20 byte पर.

(ii) ios::cur

It refers from the current position from the file.

e.g:→ f.seekg(10, ios::cur);
(forward)

It will move the file pointer, 10 bytes from the current location.

e.g:→ f.seekg(-10, ios::cur);
(backward)

(iii) ios::end

It refers to the end of the file.

e.g:→ f.seekg(-5, ios::end);

Q. W.A.P to count the no of words present in a Textfile named: Para.txt. Assume that each word is separated by a single space & no blank space in the beginning & e.o.f.