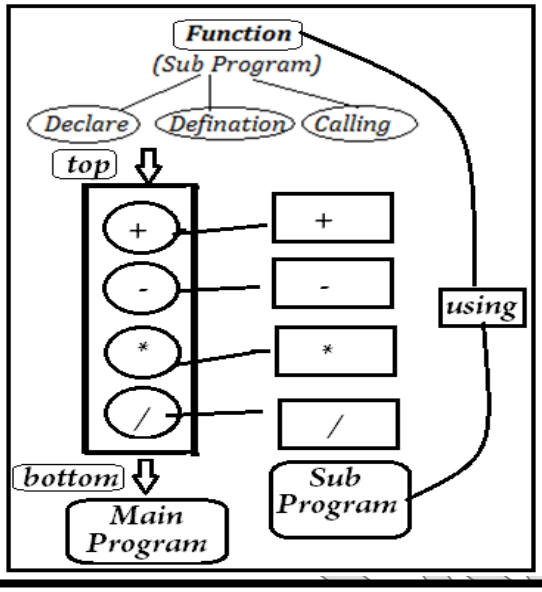
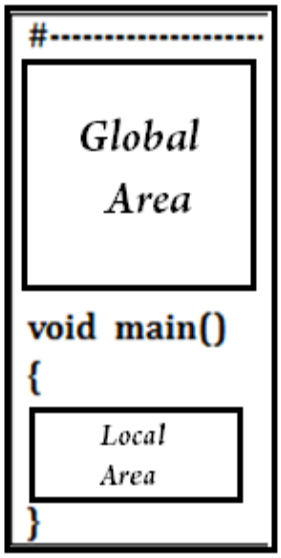
Function

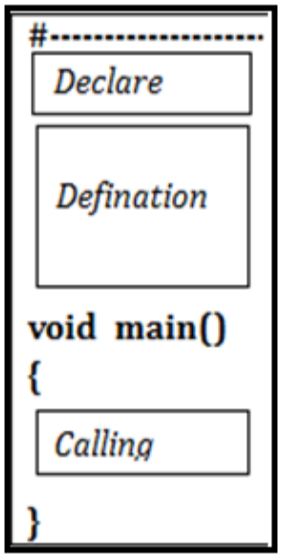
Name given to group of statements that does some specific task and may return a value. Function can be invoked(called) any no. of time and anywhere in the program.

Important Points(topics)

1. *Declare Function*
2. *Define Function*
3. *Call Function*
4. *Default Function*
5. *Parameterize Argument Function*
6. *Global Variable*
7. *Locale Variable*
8. *Global Function*
9. *Locale Function*
10. *Actual Variable*
11. *Formal Variable*
12. *Call By Value Function*
13. *Call By Reference Function*
14. *Default value*
15. *Function Return Type*
16. *Recursive Function*
17. *Function With Pass Default Value*
18. *Function Argument As Array*
19. *Function Argument As Structure Object*
20. *Function Argument As class Object*
21. *Nested function*
22. *Function overloading*







Declaration

Syntex: Return Data Type Function Name (No. of Arguments);

void | int | char | float — xyz — int a,b,c; ✗ — int a, int b, int c; ✓

default | parameterize

Example:

default	parameterize
void x();	void x(int a,int b);

Defination

Syntex: Return Data Type Function Name (No. of Arguments)

```
{
//Program /Syntex/Loop/If Statement etc.
}
```

Example:

default	parameterize
void x()	void x(int a,int b)
{	
//statements.....	
}	

Calling: Function name(no. of Values);

Example: x();//Default

int a1,b1;

a1=5,b1=7; | cin>>a1>>b1

x(a1,b1);

Static Dynamic

Default

```
#include<iostream.h>
#include<conio.h>
void x();          // Declaration
void x()           // Defination
{
cout<< "Dafault Function";
}
void main()
{
x();               // Calling
}
```

Parameterize

```
#include<iostream.h>
#include<conio.h>
void x(int a, int b);
void x(int a, int b)
{
int c=a+b;
cout<< " Parameterize Function"<<c;
}
void main()
{
int a1,b1;
a1=4,b1=8; //cin>>a1>>b1
x(a1,b1);
}
```

Functions in C++ are of two basic types :

a) User Defined : written by a programmer as per his/her requirement domain.

b) Library Function : already available with C++ compiler and stored as Library, from where they can be called and used in any C++ program.

Function prototypes-Function declaration that specifies the function name, return type and parameter list of the function.

syntax:

return_type function_name(type var1,type …..);

Actual Parameters

Variables associated with function name during function call statement.

Formal Parameters

Variables which contains copy of actual parameters inside the function definition.

Local variables

- Declared inside the function only and its scope and lifetime is function only and hence accessible only inside function.

Global variables

- Declared outside the function and its scope and lifetime is whole program and hence accessible to all function in the program from point declaration.

Example :

```
#include <iostream.h>
int a=20; // global
void main()
{
int b=10; // local
cout<<a<<b;
}
```

Passing value to function- **• Passing by value-** In this method separate memory created for formal arguments and if any changes done on formal variables , it will not affect the actual variables.So actual variables are preserved in this case

- **Passing by address/reference-** In this method no separate memory created for formal variables i.e formal variables share the same location of actual variables and hence any change on formal variables automatically reflected back to actual variables.

Example :

```
void sample( int a, int &b)
{a=a+100;
b=b+200;
cout<<a<<b;
}void main()
{int a=50, b=40;
cout<<a<<b; // output 50 40
sample(a,b) // output 150 240
cout<<a<<b; // output 50 240}
```

Function overloading

- Processing of two or more functions having same name but different list of parameters

Function recursion

- Function that call itself either directly or indirectly.

Libery Functions and Header Files

stdio.h	1) setw()	6) read()	7) tan()	6) strlwr()	1) isupper()		
1) gets()	2) setprecision()	7) cin	8) log()	**stdlib.h**	2) is lower()		
2) getchar()	**process.h**	8) cout	9) exp()	1) calloc()	3) isdigit()		
3) scanf()	1) exit()	**math.h**	10) atof()	2) malloc()	4) isalphanum()		
4) printf()	**iostream.h**	1) abs()	**string.h**	3) random()	5) tolower()		
5) getc()	1) open()	2) pow()	1) strcpy()	4) free()	6) toupper()		
conio.h	2) close()	3) ceil()	2) strcmp()	5) atoi()	7) toascii()		
6) clrscr()	3) get()	4) floor()	3) strcat()	6) atof()			
7) getch()	4) getline()	5) cos()	4) strlen()	7) atol()			
iomanip.h	5) write()	6) sin()	5) strupr()	**ctype.h**			

A function in C++ :

- is smaller section of code of bigger module/program.
- is re-usable piece of code.
- is very specific in nature as it performs a specific task.
- is often called many times in a program.

Thus a C++ function have all the advantages which a module has in a software.

Function Declaration :

<return type> function_name(<parameter list>) ;

where :

Return type := is the value which the function returns , if function does not returns anyvalue then we may write there void.

Function_name := any valid C++ identifier name

Parameter list := declaration of variables of different data types separated by commathese values are inputs passed from outside to the function.

Functions in C++ are of two basic types :

a) User Defined : written by a programmer as per his/her requirement domain.
b) Library Function : already available with C++ compiler and stored as Library, from where they can be called and used in any C++ program.

Library Functions :

Following are some important Header files and useful functions within them :

1. stdio.h (standard I/O function) : gets( ) , puts( )
2. ctype.h (character type function) : isalnum( ) , isalpha( ),isdigit ( ), islower ( ),isupper ( ), tolower ( ),toupper( )
3. string.h (string related function) : strcpy ( ), strcat ( )strlen( ), strcmp( ) , strcmpi( ) , strrev( ),strupr( ) , strlwr( )
4. math.h (mathematical function) : fabs ( ), pow ( ), sqrt ( ), sin ( ), cos ( ),abs ( )
5. stdlib.h : randomize ( ), random ( ), itoa( ) , atoi().

The above list is just few of the header files and functions available under them , but actually there aremany more. If you want to learn their use go to the help menu of your turbo C++ compiler and searchout function list and learn its prototype.

1. Global Variable/ Locale Variable

```
#include<iostream.h>
#include<conio.h>
int a=10;// Global Variable
void main()
{
int a=7;// Locale Variable
cout<<a<<::a;
 }
```

2. Global Function/ Locale Function

```
#include<iostream.h>
#include<conio.h>
void x();/Global Function (Dec)
void x()//Global Function (Def)
{
cout<< "Dafault  Function x";
}
void main()
{
 void  y();Locale Function(Dec)
 void y()Locale Function(Def)
 {
 cout<< "Dafault  Function x";
 }
      x();//Global Function (Calling)
      y();//Locale Function(Calling)
}
```

3. Actual Variable/ Formal Variable

```
#include<iostream.h>
#include<conio.h>
void x(int a, int b);//formal Variable
void x(int a, int b);
{
int c=a+b;
cout<< " Parameterize
Function"<<c;}
void main()
{
int a1,b1;
a1=4,b1=8; //cin>>a1>>b1
x(a1,b1);//ActualVariable
}
```

4. Call By Value Function/Call By Reference Function

Call By Value Function (No Change in original Value)

```
#include<iostream.h>
#include<conio.h>
void x(int a, int b);
void x(int a, int b)
{
a+=2;
b+=5;
cout<<a<< ","<<b;
}
void main()
{
int a1,b1;
a1=4,b1=8;
cout<<a1<<b1
x(a1,b1);
cout<<a1<<b1
}
```

Output:
4,8
6,13
4,8

Call By Reference Function (Change in original Value)

```
#include<iostream.h>
#include<conio.h>
void x(int&a, int&b);
void x(int&a, int&b)
{
a+=2;
b+=5;
cout<<a<< ","<<b;
}
void main()
{
int a1,b1;
a1=4,b1=8;
cout<<a1<<b1
x(a1,b1);
cout<<a1<<b1
}
```

Output:
4,8
6,13
6,13

5. Function with Return Type

```
#include<iostream.h>
#include<conio.h>
int x(int a, int b);
int x(int a, int b);
{
int c=a+b;
return c;
}
void main()
{
int a1,b1;
a1=4,b1=8;
cout<<a1<<b1
int r=x(a1,b1);
cout<<r
}
```

Output:
4,8
12

4. Recursive Function

(a function call itself again and again)

```
void x()
{
.....
.....
.....
x();
}
```

5. Function With Pass Default Value

```
#include<iostream.h>
#include<conio.h>
void x(int a, int b=9)
{
cout<<a<< ","<<b;
}
void main()
{
int a1,b1;
a1=4,b1=8;
cout<<a1<<b1
x(a1,b1);
x(a1);
x(b1);
x(b1,a1);}
```

Output:

a) 4,8
b) 4,8
c) 4,9
d) 8,9
e) 8,4

6. Function Argument As Array

a. Actual Variable

i.No size

ii.No [ ]

iii.Only Array variable

b. Formal Variable

i.No size

ii.Variable name with [ ]

Ex:

```
#include<iostream.h>
#include<conio.h>
void x(intB[], int n)
{
for(int i=0;i<n;i++)
{
cout<<B[i];}
void main()
{
intA[10],n=10;
for(int i=0;i<n;i++){
cin>>A[i];}
X(A,n);}
```

***7.* Function With String** *Same as Array argument*

8. Nested function

```
#include<iostream.h>
#include<conio.h>
void x()
{
cout< "Function X";
}
void y()
{
cout< "Function Y";
x();}
void Z()
{
cout< "Function Z";
y();}
void main()
{
z();}
```

Output:

Function Z
Function Y
Function X

9. Function overloading

(Function with same name different arguments)

void x();
void x(int a);
void x(inta,int b);
void x(int a, char b);
void x(char a, char b);

INLINE FUNCTION:

Instead of transferring the control to and from the function code segment(prototype, calling statement, definition), inline function copies the function body andsubstituted directly for the function call.

An Inline function comparatively takes less time to execute.When we should make a function inline and why? Ans. (1) The function is small and not returning any value.(2) The function does contain a loop, switch or a goto.(3) It is not containing static variables and not recursive.

Programs

1. WAP to Mul. 3 numbers.
2. WAP to avg 5 numbers.
3. WAP to calculate simple intrest
4. WAP to find no. is –ve or +ve
5. WAP to find grater no in x and y
6. WAP to factorial of a given no.
7. WAP to no is prime or not
8. WAP to display number from 1 to N.
9. WAP to Display result X^N.
10. WAP to Display result $(X+1)^N$.
11. WAP to display number from N to M.
12. WAP to Display Even and Odd numbers from 1 to N.
13. WAP to Count Even and Odd numbers from 1 to N.
14. WAP to Display table of a given numbers.
15. WAP to Display reverse of a given numbers.
16. WAP to check given number is palindrome or not.
17. WAP to check given number is Armstrom or not.
18. WAP to check given numbers is perfect no or not
19. Write a menu drivin program to calculate :
    1. Area of circle[$A=\pi r^2$]
    2. Area of squire [A=a*a]
    3. Area of rectangle[A=l*b]
20. Write a menu drivin program to calculate :
    A. Volume of cube[$V=s^3$]
    B. Volume of sphere[$V=\frac{4}{3}\pi r^3$]
    C. Volume of cuboid[V=l*b*h]
21. WAP a menu drivin program thet output the result of the following evaluation based on natural number entered by the user:
    1. Natural logarithm of a number.
    2. Absolute value of a number.
    3. Squire Root of a number.
    4. Random number between 0 to number.
22. Write a menu drivin program to calculate :
    '+' for Add two numbers.
    '-' for subtract two numbers
    '*' for two numbers

Solve problem:

```
#include<iostream.h>
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 3: 30%41
52%60[1/2 mark for each value in the above order]
40%25[deduct ½ mark for not putting '%' in between values]

Give The Output Of The Following Program

Set 1

```
Q1.void s(int a, int b)
{a+=2;b*=5;
cout<<a<<":"<<b<<"\n";}
void main()
{int x,y;
x=4,y=8;
clrscr();
cout<<x<<":"<<y<<"\n";
s(x,y);
cout<<x<< ":"<<y<<"\n";
getch();}
Q2.void S(int a, int &b)
{a+=3;b*=4;
cout<<a<<":"<<b<<"\n";}
void main()
{int x,y;
x=3,y=8;
clrscr();
cout<<x<<":"<<y<<"\n";
S(x,y);
cout<<x<< ":"<<y<<"\n";
getch();}
Q3.void S(int &a, int &b)
{a+=1;b-=2;
cout<<a<<":"<<b<<"\n";}
void main(){
int x,y;
x=41,y=28;
clrscr();
cout<<x<<":"<<y<<"\n";
S(x,y);
cout<<x<< ":"<<y<<"\n";
getch();}
Q4.void S(int &a, int b=7)
{a-=4;b-=7;
cout<<a<<":"<<b<<"\n";}
void main()
{int x,y;
x=24,y=18;
clrscr();
cout<<x<<":"<<y<<"\n";
S(x,y);
cout<<x<< ":"<<y<<"\n";
getch();}
Q5.int S(int a=16, int b=6)
{
a+=4;b+=7;
cout<<a<<":"<<b<<"\n";
return a;}
void main()
{int x,y;
x=24,y=18;
clrscr();
cout<<x<<":"<<y<<"\n";
x=S(x,y);
cout<<x<< ":"<<y<<"\n";
getch();}
Q6.int S(int a=6, int b=7)
{
a+=14;
b-=5;
cout<<a<<":"<<b<<"\n";
return b;}
void main()
{
int x,y;
x=5,y=6;
clrscr();
cout<<x<<":"<<y<<"\n";
x=S(x,y);cout<<x<< ":"<<y<<"\n"
x=S(y);cout<<x<< ":"<<y<<"\n";
getch();}
Q7int S(int a=7, int b=8)
{
a+=5;b+=6;
cout<<a<<":"<<b<<"\n";
return b;}
void main()
{
int x,y;
x=15,y=26;
clrscr();
cout<<x<<":"<<y<<"\n";
x=S(x,y);cout<<x<< ":"<<y<<"\n";
```

Q1.
4:8
6:40
4:8

Q2.
3:8
6:32
3:32

Q3.
41:28
42:26
42:26

Q4.
24:18
20:11
20:18

Q5.
24:18
28:25
28:18

Q6.
5:6
19:1
1:6
20:2
2:6

Q7
15:26
20:32
32:26
31:14
14:26
31:20
14:20

```
x=S(y);cout<<x<< ":"<<y<<"\n";
y=S(y,x);
```

1.
```
#include<iostream.h>
#include<conio.h>
int global=10;
voidfunc(int& x, int y)
{
x=x-y;
y=x*10;
cout<<x<<":"<<y<<"\n";
}
void main( )
{
int global=7;
clrscr();
func(:: global, global);
cout<<global<< ":"<<::global<<"\n";
func(global, ::global);
cout<<global<< ":"<<::global<<"\n";
getch();
}
```

2.
```
#include<iostream.h>
#include<conio.h>
int global=10;
voidfunc(int& x, int&y)
{
x=x-y; y=x*10;
cout<<x<<":"<<y<<"\n";
}
void main( )
{
int global=7;
clrscr();
func(:: global, global);
cout<<global<< ":"<<::global<<"\n";
func(global, ::global);
cout<<global<< ":"<<::global<<"\n";
getch();  }
```

3.
```
#include<iostream.h>
#include<conio.h>
intfunc(int&x, int y=10)
{
if(x%y==0)
return ++x;
else
return y--;}
void main( )
{
int p=20,q=23;
clrscr();
q=func(p,q);
cout<<p<<","<<q<<endl;
p=func(q);
cout<<p<<","<<q<<endl;
cout<<x<< ":"<<y<<"\n";
getch();}
```

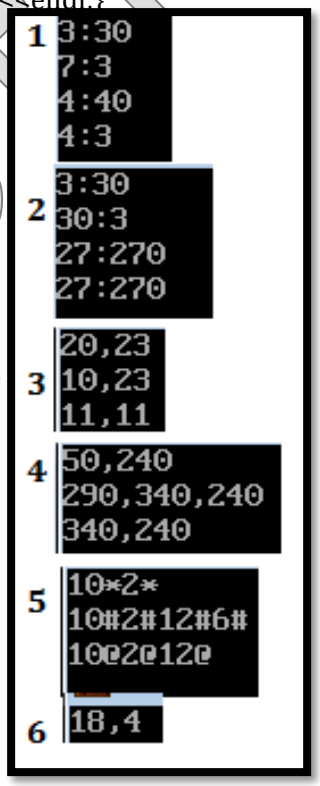
Set 2

```
q=func(p);
cout<<p<<","<<q<<endl;
getch();
}
```

4.
```
#include<iostream.h>
#include<conio.h>
void execute(int& x, int y=200)
{
int temp=x+y;
x+=temp;
if(y!=200)
cout<<temp<<","<<x<<","<<y<<endl;}
void main( )
{
int a =50, b=20;
clrscr();
execute(b);
cout<<a<<","<<b<<endl;
execute(a,b);
cout<<a<<","<<b<<endl;
getch();
}
```

5.
```
#include<iostream.h>
#include<conio.h>
intcalc(int u)
{
if(u%2==0)
return u+10;
else
return u*2;}
void pattern(char M, int B=2)
{
for(intcnt=0;cnt<B;cnt++)
cout<<calc(cnt)<<M;
cout<<endl;}
void main()
{
clrscr();
pattern('*');
pattern('#',4);
pattern('@',3);
getch();}
```

6.
```
void fun (int&A, int&B)
{
A = A + B;
B = A - B;
A = A - B;}
void main ( )
{int a = 4, b = 18;
clrscr();
fun (a, b);cout<< a << "," << b;getch();}
```



Random Function

Random( ) and randomize( ) (stdlib.h)

Random ( ) generates random numbers within range 0 to n-1. e.g.random(10)
Will generate random numbers within range 0 - 9. To generate random numbers within a specific range (L to U) through random( ). You need to change the use of random ( ) to: random (U – L + 1) + L
That is , to generate random numbers within range 40 – 60 , you will write :
random(60 -40 +1) + 40
i.e random (21)+ 40
randomize( ) initializes / seeds the random number generator with a random number

randomize ( ), random ( ), itoa( ) , atoi(): The above functions belongs to header file stdlib.h . Let us observe the use of these functions :

randomize( ) : This function provides the seed value and an algorithm to help random( ) function in generating random numbers. The seed value may be taken from current system'stime.

random(<int>) : This function accepts an integer parameter say x and then generates a randomvalue between 0 to x-1
for example : random(7) will generate numbers between 0 to 6.
To generate random numbers between a lower and upper limit we can use following formula :
random(U – L +1) + L
where U and L are the Upper limit and Lower limit values between which we want to find out randomvalues.
For example : If we want to find random numbers between 10 to 100 then we have to write code as :
random(100 -10 +1) + 10 ; // generates random number between 10 to 100

Q1. 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?

```
void main()
{ intN,Guessnum;
randomize();
cin>>N;
Guessnum=random(N-10)+10;
cout<<Guessnum<<endl;
}
```

Q2. 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)?

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

(i) A B B C (ii) A C B A(iii) B C DA (iv) C A B D

Q3. Observe the following program RANDNUM.CPP carefully. If the value of VAL entered by the user is 5, choose the correct possible output(s) from the options from i) to iv) and justify your option.

```
void main()
{ randomize( );
  int VAL, Rnd; int n=1;
  cin>>VAL;
  Rnd=8 + random(VAL) * 1;
  while(n<=Rnd) {
  cout<<n<< "\t";
  n++; } }
```

Output options:

i) 1 2 3 4 5 6 7 8 9 10 11 12 13 ii) 0 1 2 3 iii) 1 2 3 4 5 iv) 1 2 3 4 5 6 7 8

Q4. Observe the following program carefully &choose the correct possible output from the options (i) to (iv) justifying your answer.

```
void main( )
{clrscr( );
randomize( );
int RN;
RN=random(4)+5;
for(int i=1;i<=RN;i++)
cout<<i<<' ';
getch();}
```

Output options: i) 0 1 2 ii) 1 2 3 4 5 6 7 8
iii) 4 5 6 7 8 9 iv) 5 6 7 8 9 10 11 12

Q5. In the following C++ program what is the expected value of Myscore from Options (i) to (iv) given below. Justify your answer.

```
void main( )
{randomize();
int Score[ ] = {25,20,34,56, 72, 63}, Myscore;
Myscore = Score[2 + random(2)];
cout<<Myscore<<endl; }
```

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

Q6. In the following C++ program what is the expected value of MyMarks from Options (i) to (iv) given below. Justify answer.

```
void main ()
{randomize ();
int Marks [ ]= {99, 92, 94, 96, 93, 95};
intMyMarks;
MyMarks = Marks [1 + random (2) ];
cout<<MyMarks<<endl;}
```

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

Q7. Observe the following program TEST.CPP carefully, if the value of Disp entered by the user is 22, choose the correct possible output(s) from the options from (i) to (iv), and justify your option.

```
void main( )
{ randomize( );
intDisp,Rnd;
Cin>>Disp;
Rnd=random(Disp)+15;
for(int N=1,i=3;i<=Rnd; i+=4,N++)
cout<<N<<" "; }
```

Output Options:

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

Q8. In the following program, if the value of N given by the user is 37, what maximum and minimum values the program could possibly display?

```
void main()
{ intN,Guessnum;
randomize();
cin>>N;
Guessnum=random(N-8)+38;
cout<<Guessnum<<endl; }
```

Q9. In the following program, find the correct possible output(s) from the options:

```
void main( )
{ randomize();
char city [ ] [10] = {"DEL", "CHN", "KOL", "BOM", "BNG"}
int Fly ;
for (int I = 0 ; I < 3 ; I++)
{
Fly = random (2) + 1 ;
cout « City[Fly] « ":"}
```

Outputs: *(i)* DEL: CHN : KOL : *(ii)* CHN : KOL : CHN :*(iii)* KOL : BOM : BNG : *(iv)* KOL : CHN : KOL :

Q10. In the following program, find the correct possible output(s) from the options:

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

Outputs:

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

Q11. Observe the following program Game.Cpp carefully, if the value of Num entered by the user is 13. Write the correct possible output :

```
void main()
{
randomize();
intNum, RndNum;
cin>>Num;
RndNum = random(Num) +13;
for(int N=1;N<=RndNum;N++)
cout<<N<<" "; }
```

Q12. In the following C++ program , what will the maximum and minimum value of r generated with the help of random function.

```
void main()
{
    int r;
    randomize();
      r=random(20)+random(2);
    cout<<r;
}
```

Q13. In the following C++ program, fill in the blanks for the statement1 with the help of random function, if the number generated by the random number is supposed to be between the range of 20-2000.

```
#include<iostream.h>
#include<stdlib.h>
void main()
{
    int r;
    randomize();
    r=_____//statement 1
    cout<<r;        }
```

Q14. In the following C++ program, fill in the blanks for the statement1 with the help of random function, if the number generated by the random number is supposed to be between the range of 25-2025.

```
#include<iostream.h>
#include<stdlib.h>
void main()
{
    int r;
    randomize();
    r=_____//statement 1
    cout<<r;        }
```

Q15. 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 four choice 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>
#include<stdlib.h>
Constint low=25;
void main()
{   randomize();
    int point =5, number ;
    for ( int i=1; i<=4 ; i++)
    {
    Number=low + random(point);
    Cout<<number;
    Point--; }}
```

i. 29: 26:25 :28 : ii 24: 28:25 :26 : iii. 29: 26:24 :28 :iv.29: 26:25 :26 :

Q16. Study the following program and select the possible output from it:. Also justify your answer.

```
#include<iostream.h>
#include<stdlib.h>
constint Max=3;
void main( )
{randomize( );
        intDiv;
        Div=1+random(Max);
        for(int N=1;N<5;N++)
        {
        cout<<100%Div<<"#";
        } }
```

i. 0#0#0#0# ii.1#1#1#1# iii.2#2#2#2# iv.3#3#3#3#

Q17. Study the following program and select the correct option(s) out of the four choices given below as the possible set of such numbers generated from the program code. Justify your answer.

```
        #include<iostream.h>
#include<stdlib.h>
constint MIN = 25 ;
void main( )
{
        randomize ( );
        int SCORE = 10 , Num;
        for (int i = 1 ; i <= 4 ; i ++ )
        {       Num = MIN + random (SCORE );
                cout<<Num<< ":";
                SCORE – –;              }       }
```

i.34:31:30:33:ii29:33:30:31:ii.34:31:30:31:iv34:31:29:33:

Q18. Study the following program and select the possible output from it:

```
constint 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#

Q19. Read the program carefully and select the possible output(s) from it:

```
#include<iostream.h>
#include<stdlib.h>
constint MAX = 3;
void main( )
{randomize ( );
int digit;
digit =80 + random (MAX );
for ( int R = digit ; R >= 80 ; R ––)
cout<< R << "$" ;
cout<<endl;}
```

(i) 83$82$81$80$(ii) 80$81$82$(iii) 80$81$ (iv) 81$80$

Q20.

```
#include<stdlib.h>
void main( ){
randomize( );
int p=99,q=999;
int x=random(3)+4;
int y=random(2)+2;
for(int i=0;i<x;i++)
cout<<'#';
cout<<p<<'-';
for(i=0;i<y;i++)
cout<<'@';
cout<<q<<endl;}
```

1. ##99-@999 2. ##99-@@999
3. ######99-@@999 4. ####99-@@@

Q21.

```
#inlude<iostream.h>
#include<conio.h>
#include<stdlib.h>
constint LIMIT = 4;
void main( ){
randomize( );
int Points;
Points = 100 + random(LIMIT);
for ( int p = Points; p>=100; p-)
cout<<p<<"#";
cout<<endl;}
```

i. 103#102#101#100# ii. 100#101#102#103#
iii. 100#101#102#103#104#iv. 104#103#102#101#100#

Q22 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>
#include <stdlib.h>
void main()
{
intN,Guessnum;
randomize();
cin>>N;
Guessnum=random(N-10)+10;
cout<<Guessnum<<endl;}
```

Q23

```
# include <iostream.h>
#include <stdlib.h>
void main ( )
{randomize ();
int Guess, High=4 ;
Guess=random (High) +50;
for (int C=guess ; C<=55 ; C++)
cout<<C<<"#";}
```

(i) 50 # 51 # 52 # 53 # 54 # 55 #
(ii) 52 # 53 # 54 # 55 #(iii) 53 # 54 # (iv) 51 # 52 # 53 # 54 # 55

Q24.

```
#include <iostream.h>
#include <stdio.h>
constint LOW = 15 ;
void main( )
{
randomize( ) ;
int POINT =5, Number ;
for (int I = 1 ; I <= 4 ; I ++)
{
Number = LOW + random(POINT) ;
cout<< Number << ":" ;
```

POINT-- ;}}

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

Q25. #include<iostream.h>
#include<stdlib.h>
#include<conio.h>
void main( )
{clrscr( );
randomize( );
intMynum,Max=4;
Mynum=20+random(Max);
for(int N=Mynum;N<=25;N++)
cout<<N<<"*";}

a. 20*21*22*23*24*25* b. 22*23*24*25*
c. 23*24* d. 21*22*23*24*25

Q26. In the following C++ program what is the expected value of Myscore from Options (i) to (iv) given below. Justify your answer.

```
#include<stdlib.h>
#include<iostream.h>
void main( )
{
randomize();
int Score[] = {25,20,34,56, 72, 63}, Myscore;
int n=2;
Myscore = Score[1 + random(n)]+4;
cout<<Myscore<<endl; }
```

(i) 25 (ii) 72 (iii) 24 (iv) None of the above

Q27. Observe the following program carefully & choose the correct possible output from the options (i) to (iv) justifying your answer.

```
# include <iostream.h>
# include <conio.h>
# include <stdlib.h>
void main ()
{
  char serial[] = {'E', 'X', 'A', 'M'};
  int number[] = { 69, 66, 67, 68};
  clrscr();
  randomize();
  cout << number[random(3)];
  for (int i = 0; i < 4; i++)
    cout << serial[2+ random(2) - 1 ];
  getch();}
```

outputs:

(i)66AAXA (ii)67AAAM (iii)67XXAX (iv)69AXXA

Q28. Observe the following program RANDNUM.CPP carefully. Choose the correct possible output(s) from the options from i) to iv) and justify your option.

```
#include<iostream.h>
#include<stdlib.h>
void main()
{
randomize();
char p[][4]={"Computer","Mouse","Keyboard","Pen Drive"};
int i;
for(i=1;i<=3;i++)
cout<<p[random(i)]<<" ";}
```

output options:

i. Mouse Keyboard Pen drive ii. Computer Computer Keyboard iii. Computer Computer Mouse iv) None of the above

Q29. In the following program, find the correct possible output(s) from the options: [2]

```
void main ()
{  char serial[] = {'A', 'B', 'C', 'D'};
  int number[] = { 2, 6, 7, 3};
  clrscr();
  randomize();
  cout << " The winner is : ";
  cout << serial [random(3)];
  for (int i = 0; i < 4; i++)
 cout << number[sizeof(int) + random(2) - 1 ];
  getch();}
```

Outputs:

1. **The winner is : A2776**
2. **The winner is : D6766**
3. **The winner is : B6767**
4. **The winner is : C3672**

Q30. Observe the following program GAME.CPP carefully, if the value of Nu entered by the user is 5, choose the correct possible output(s) from the options i to iv and justify your answer:

```
#include<stdlib.h>
#include<iostream.h>
void main()
{randomize( );
int Nu, Rndnum;
cin>>Nu;
Rndnum=random(Nu)+5;
For(int n=1; n<=Rndnum;n++)
Cout<<n<<" ";}
```

i) 1234ii) 123456789 iii) 12 iv) 123

Q31. 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>
#include<stdlib.h>
void main( )
{ randomize( );
int Arr[ ]={9,6},N;
int Chance=random(2)+10;
for(int I=0; I<2;I++) {
N=random(2);
 cout<<Arr[N]+Chance<<"*"; } }
```

Possible Output

i. 9*6* ii. 19*17*
iii. 19*16* iv. 20*16*

Q32. Study the following program and select the possible output from it :

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

```
void main()
{  randomize();
char A[]="WELCOME";
int ToGo;
for(int I=0;I<strlen(A);I++)
{   ToGo=random (sizeof (ToGo)*2) +1;
 cout<<A[ToGo]<<":";  }}
```

a)W: E: L: C: O: M: E:b)E: C: E: E: C: C: E:
c)E: C: E: E: C: C: O: d)C: C: C: E: E: C: C:

33. Observe the following C++ code and find out , which out of the given options i) to iv) are the expected correct output.Also assign the maximum and minimum value that can be assigned to the variable 'Go'. 2

```
void main()
{ int X [4] ={100,75,10,125};
int Go = random(2)+2;
for (int i = Go; i< 4; i++)
cout<<X[i]<<"$$";}
```

i. 100$$75 ii. 75$$10$$125$$ iii. 75$$10$$ iv.10$$125$

Ans : iv is the correct option.
Minimum value of Go = 2, Maximum value of Go = 3
[½ mark each for Minimum and Maximum value]
[1 mark for correct option]

Output

1. 10,19	**8.** 38,66	**15.** iv	**22.** i	**29.** iii
2. i	**9.** ii,iv	**16.** i,ii	**23.** i	**30.** ii
3. iv	**10.** i,iv	**17.** ii,iii	**24.** d	**31.** iii
4. ii	**11.** 13,25	**18.** ii	**25.** a,b	**32.** b,c,d
5. ii	**12.** 0,20	**19.** ii	**26.** ii	**33.** iv
6. ii	**13.** random(1981)+20	**20.** iii	**27.** I,iii,iv	
7. ii	**14.** random(2001)+25	**21.** i	**28.** ii,iii	

Possible Output (Random) – 2M Solve

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

```
#include<iostream.h>
#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? II. Mention the minimum and the maximum value assigned to the variable ch?

A) I. M.Tech will never be displayed in the output.
MCA will always be displayed at first in the output.
II. Minimum value of ch=1 Maximum value of ch=3

2)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.

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

```
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; } }
```

A)

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

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

3) Study the following program and select the possible output(s) from the option (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable VAL.

Note:-Assume all required header files are already being included in the program.
-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	EFGH FGHI
BCDEFGH	CDEFGH	EFGH FGHI	EFGH FGHI

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

4) 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:

```
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 = 3Minimum Value = 2

5) 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( )
{ 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

(6) 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>
#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

(7) 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 least value and highest value, which can be assigned to the variable Guess.

```
#include <iostream.h>
#include <stdlib.h>
void main ( )
{ randomize ( ) ;
int Guess, High=4;
Guess=random{High)+ 50 ;
for{int C=Guess ; C<=55 ; C++)
cout<<C<<"#" ;
}
```

(i) 50 # 51 # 52 # 53 # 54 # 55 #

(ii) 52 # 53 # 54 # 55 (iii) 53 # 54 #

(iv) 51 # 52 # 53 # 54 # 55

Ans: (i) 50 # 51 # 52 # 53 # 54 # 55 #

Least value 50 Highest value 53

(8) 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>
#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

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

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

(i)19:16:15:18: (ii) 14:18:15:16:

(iii) 19:16:14:18 (iv)19:16:15:16:

Ans.(iv) 19:16:15:16:

10) 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>
#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:

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

```
#include <iostream.h>
#include <stdlib.h>
const int LIMIT = 4 ;
void main ( )
{ randomize( ) ;
int Points;
Points = 100 + random(LIMIT) ;
for (int P=Points ; P>=100 ; P– –)
cout<<P<<"#" ;
cout<<endl;}
```

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

Ans 103#102#101#100#

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

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

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

Ans (iv) 51#50#

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

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

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

Outputs:

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

Ans)Since random(2) gives either 0 or 1, Fly value will be either1 or 2. (random(n) gives you any number between 0 to n-1) City[1] is "CHN". City[2] is "KOL". Since I value from 0 to 2 (ie<3), 3 iterations will takes place. So the possible output consists 3 strings separated by :, each of them may be either "CHN" or "KOL". So the possible output will be

(ii) CHN : KOL : CHN: (iv) KOL :CHN : KOL:

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

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

(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 :

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

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

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

Ans: Output: **(ii) 94**

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

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

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

Ans: Expected Output: **(i) None of the above.**

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

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

Output Options:

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

Ans: Expected Output: (iii) 1 2 3 4 5 6 7 8 9

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

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

Answer: Maximum Value:19 Minimum Value:10

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)?

```
#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

(22) 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>
#include <stdlib.h>
void main()
{
int N,Guessnum;
randomize();
cin>>N;
Guessnum=random(N-10)+10;
cout<<Guessnum<<endl;
}
```

A) Maximum Value: 19 Minimum Value: 10