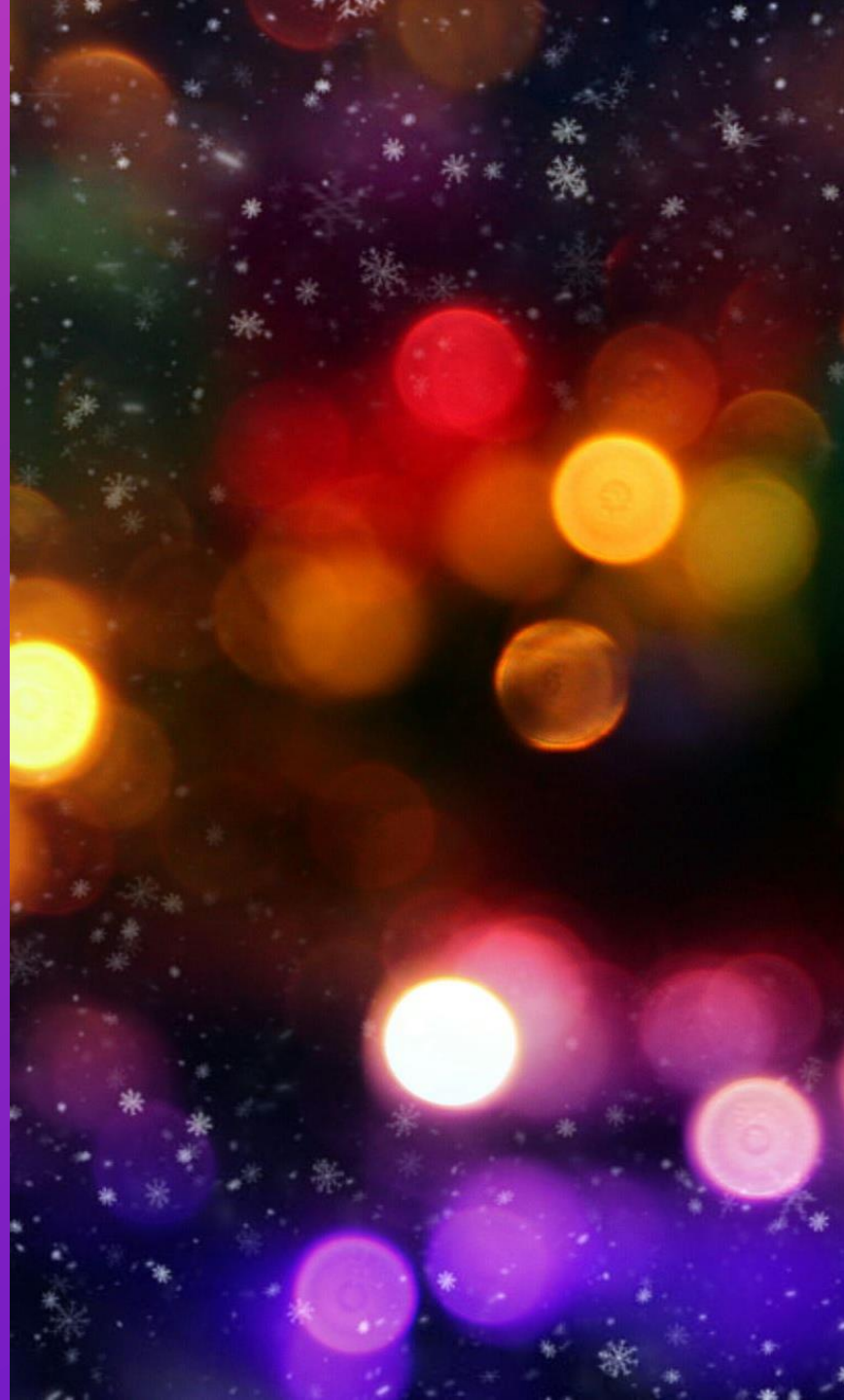
MNNIT COMPUTER CODING CLUB

CLASS-2

BASICS OF C



IO (RECAP)

- For printing any value of variable use ***printf("%X", variableOfXType);***
- *For input of any value of variable use* ***scanf("%X", &variableOfXType);***
- **%X** is format specifier , **&** is address operator
- Points to note:
  - The order in which we require the output, in the same order variables need to be passed. For eg. int a=10,b=20,c=30;

  printf("Values of p = %d, q = %d, r = %d",a,b,c);

  Output: Values of p = 10, q = 20, r = 30

  Similarly, for scanf as well !
  - In scanf **&** is used to specify the address of the variable. Every variable is stored in memory at a particular address of memory, therefore, to take input we need to mention the location where the value will be stored. Whenever you want memory address of some variable, you can use &variablename. Address is usually a 64bit integer. For eg.

  int a=10;

  printf("Memory Address of a = %d , value of a = %d", &a, a);

  Output: Memory Address of a = 470226880, value of a = 10

  Here memory address in output is machine dependent, will be different on your computer and will be different everytime you run the program.

IO (RECAP)

Specifier	Data Type
%d	Integer (Decimal)
%f, %e, %g	Floating
%lf	Long Float(Double)
%c	Character
%u	Unsigned Integer

```c
#include<stdio.h>
int main()
{
    int a;
    float b;
    double c;
    char d;
    scanf("%d", &a);
    scanf("%f", &b);
    scanf("%lf", &c);
    scanf("%c", &d);

    printf("Integer Printing: %d", a);
    printf("Float Printing: %f", b);
    printf("Double Printing: %lf", c);
    printf("Character Printing: %c", d);
}
```

OPERATORS

Arithmetic	+, -, *, /, %
Assignment	=
Increment/Decrement	++, --
Relational	<, >, <=, >=, ==, !=
Logical	&&, ||, !
Conditional	? :
Comma	,
Bitwise	&, |, ~, <<, >>, ^

OPERATORS: Arithmetic, Assignment

Unary Operator: Single Operand

```c
#include<stdio.h>
int main()
{
    int a;
    a = 10;
    printf("Original Value: %d\n", a);
    a = -a;
    printf("After Applying Unary Operator: %d\n", a);
    a = -a;
    printf("After Applying Unary Operator Again: %d\n", a);
}
```

Binary Operator: Two Operand

- Modulo only with integers

```c
#include<stdio.h>
int main()
{
    int a, b, sum, diff, mul, quot, rem;
    scanf("%d %d", &a, &b);
    sum = a + b;
    diff = a - b;
    mul = a * b;
    quot = a / b;
    rem = a % b;
    printf("Sum of %d and %d is %d\n", a, b, sum);
    printf("Difference of %d and %d is %d\n", a, b, diff);
    printf("Multiplication of %d and %d is %d\n", a, b, mul);
    printf("Quotient of %d and %d is %d\n", a, b, quot);
    printf("Remainder of %d and %d is %d\n", a, b, rem);
}
```

INCREMENT/DECREMENT

Prefix: First operate then use

- y=++x;
  - x=x+1;
  - y=x;

- y=--x;
  - x=x-1;
  - y=x;

```c
#include<stdio.h>
int main()
{
    int x=8;
    printf("x = %d\n", x);
    printf("x = %d\n", ++x);
    printf("x = %d\n", x);
    printf("x = %d\n", --x);
}
```

Postfix: First use then operate

- y=x++;
  - y=x;
  - x=x+1;

- y=x--;
  - y=x;
  - x=x-1;

```c
#include<stdio.h>
int main()
{
    int x=8;
    printf("x = %d\n", x);
    printf("x = %d\n", x++);
    printf("x = %d\n", x);
    printf("x = %d\n", x--);
}
```

CONDITIONS(RELATIONAL OP.)

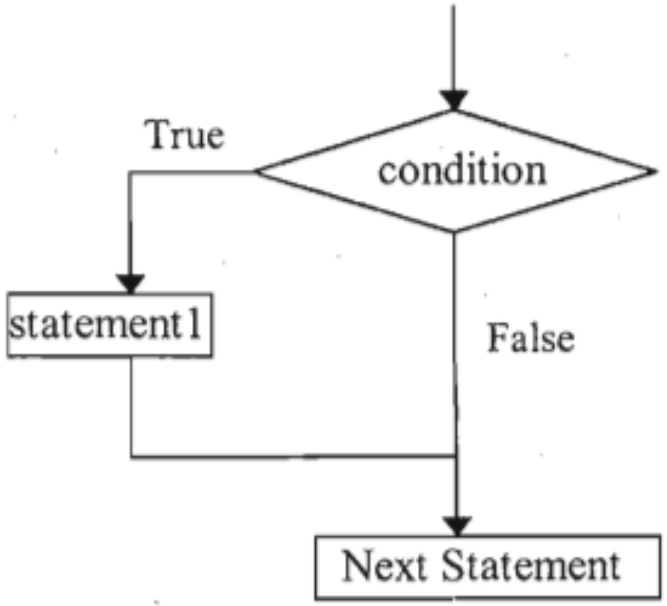
Operator	Meaning
<	less than
<=	less than or equal to
= =	equal to
!=	Not equal to
>	Greater than
>=	Greater than or equal to

Let's take a = 9 and b = 5

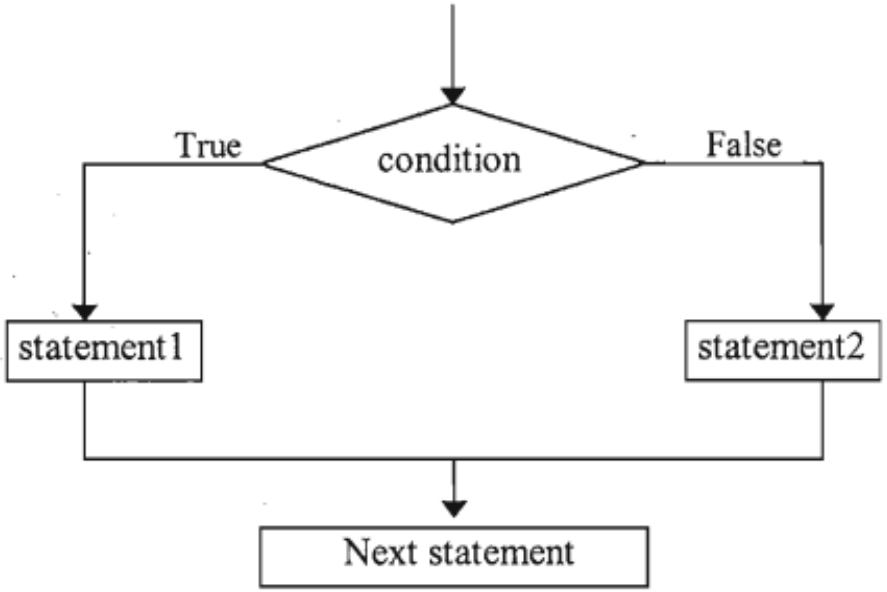
Expression	Relation	Value of Expression
a < b	False	0
a <= b	False	0
a= =b	False	0
a != b	True	1
a > b	True	1
a >= b	True	1
a = = 0	False	0
b!=0	True	1
a>8	True	1
2 > 4	False	0

IF ELSE

Why if else is needed?



Flow chart of if control statement



Flow chart of if…else control statement

```c
#include <stdio.h>
int main()
{
    int num;
    printf( "Enter a number\n");
    scanf("%d",&num);
    if(num<0){
        printf("Number entered is negative");
    }else{
        printf("Number entered is non negative");
    }
    return 0;
}

```

```c
#include <stdio.h>
int main()
{
    int num;
    printf( "Enter a number\n");
    scanf("%d",&num);
    if(num<0){
        printf ("Number entered is negative");
    }
    return 0;
}

```

IF ELSE PROGRAMS

LOGICAL OPERATORS

- When we need to combine two or more conditions

Operator	Meaning
&&	AND
||	OR
!	NOT

AND

Condition1	Condition2	Result
False	False	False
False	True	False
True	False	False
True	True	True

```c
#include <stdio.h>
int main()
{
    int num;
    printf( "Enter a number\n");
    scanf("%d",&num);
    if(num>0 && num%2==0){
        printf("it is positive even");
    }
    return 0;
}
```

OR

Condition1	Condition2	Result
False	False	False
False	True	True
True	False	True
True	True	True

```c
#include <stdio.h>
int main()
{
    int num;
    printf( "Enter a number\n");
    scanf("%d",&num);
    if(num==0 || num > 0){
        printf("it is not negative");
    }
    return 0;
}
```

NOT

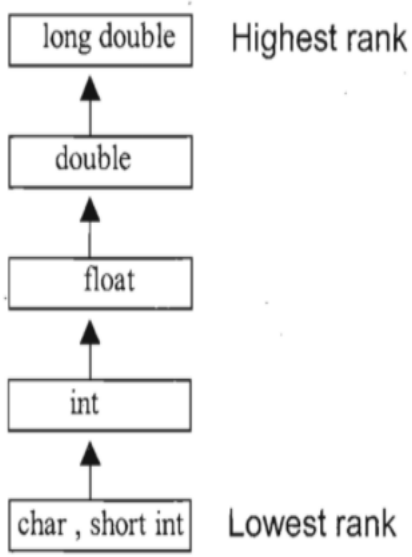
Condition	Result
False	True
True	False

```c
#include <stdio.h>
int main()
{
    int num;
    printf( "Enter a number\n");
    scanf("%d",&num);
    if(!(num==0)){
        printf("it is not 0");
    }
    return 0;
}
```

TYPE CONVERSION

Implicit: Done by C compiler

- In case of operations done between different types of operators, lower rank is automatically converted into higher rank and result is also in higher rank
- In case of assignment LHS operator gets converted into data type of RHS




```c
#include<stdio.h>
int main()
{
    int i1 = 5, i2 = 3;
    float f1 = 2.5, f2 = 3.8;
    i1 = 80.56; //Demotion of LHS into RHS type
    printf("i1 = %d\n", i1);
    f1 = i1 + f2; // i2 promoted to float
    printf("f1 = %f\n", f1);
}
```

Explicit: Done by Programmer

- Also known as type casting or coercion
- Cast operator: Unary Operator
- Syntax: (datatype) expression

```c
#include<stdio.h>
int main()
{
    int x=5, y=2;
    float p, q;
    p = x/y;
    printf("p = %f\n", p);
    q = (float)x/y;
    printf("q = %f\n", q);
}
```

(int)20.3	constant 20.3 converted to integer type and fractional part is lost(Result 20)
(float)20/3	constant 20 converted to float type, and then divided by 3 (Result 6.66)
(float)(20/3)	First 20 divided by 3 and then result of whole expression converted to float type(Result 6.00)
(double)(x +y -z)	Result of expression x+y-z is converted to double
(double)x+y-z	First x is converted to double and then used in expression

PRECEDENCE AND ASSOCIATIVITY

Operator	Description	Precedence level	Associativity
( ) [ ] → .	Function call Array subscript Arrow operator Dot operator	1	Left to Right
+ - ++ - - ! ~ * & (datatype) sizeof	Unary plus Unary minus Increment Decrement Logical NOT One's complement Indirection Address Type cast Size in bytes	2	Right to Left
* / %	Multiplication Division Modulus	3	Left to Right
+ -	Addition Subtraction	4	Left to Right
<< >>	Left shift Right shift	5	Left to Right
< <= > >=	Less than Less than or equal to Greater than Greater than or equal to	6	Left to Right
= = !=	Equal to Not equal to	7	Left to Right
&	Bitwise AND	8	Left to Right
^	Bitwise XOR	9	Left to Right
|	Bitwise OR	10	Left to Right
&&	Logical AND	11	Left to Right
||	Logical OR	12	Left to Right
? :	Conditional operator	13	Right to Left
= *= /= %= += -= &= ^= |= <<= >>=	Assignment operators	14	Right to Left
,	Comma operator	15	Left to Right