

# SC

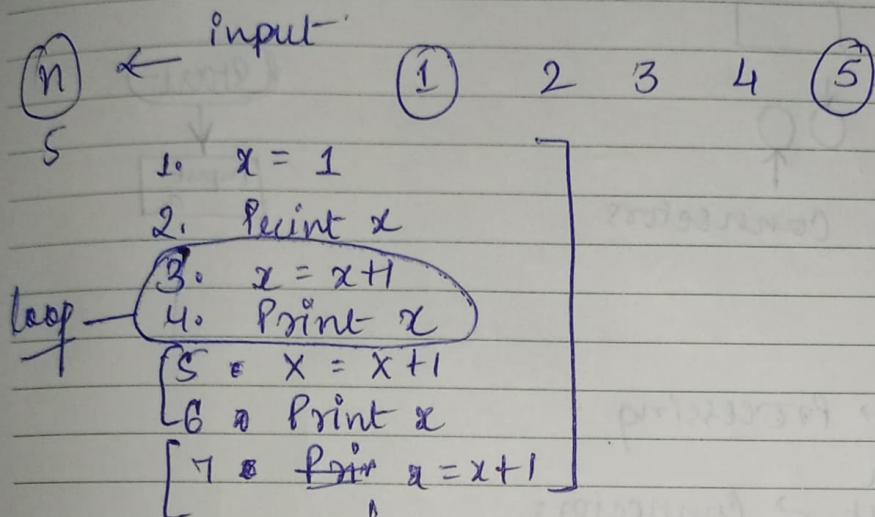
MARCH'12

## Iterative Statements →

An algorithm to print the sequence of N Natural Numbers.

Monday 12

चैत्र बदी ५-२०६८



→ It works in

loop.

like to fill a jug  
Suppose  $\leq$  glass are  
required. we need  
to fill it one by  
one repeatedly  
in a loop.

1g - 2g - 3g - ... - 5g

#program code → [logic building]

1. start

2. Input  $n$

3. Let  $x = 1$

4. Repeat steps 5 & 6 until ( $x \leq 5$ )  $x \neq$  ~~equal to~~  $x = 5$

5. Print  $x$

6.  $x = x + 1$

7. Stop.

if {  
3. Let  $x = n$

4. cond  $x \geq 5$ .

5. Print  $x$

6.  $x = x - 1$

7. Stop.

[Suppose  $n = 5$ ]

$x_1 = 5$   
operator

Tuesday 13

~~$x \neq 5$~~ ,  $x = 5$  [ $x \leq 5$ ].

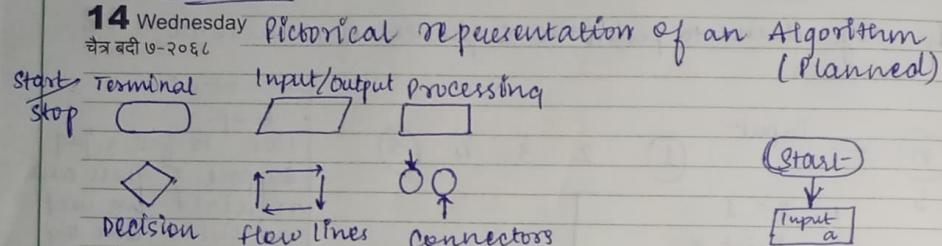
~~else~~ step 7.

5.  $x$  control variable (let  $n = 1$ )

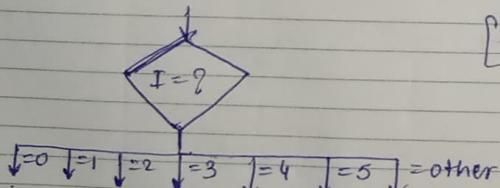
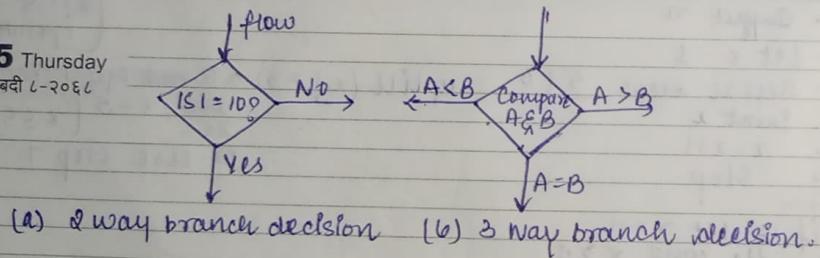
4. repeat steps (which steps)? If cond?? Else ??

( $x \leq n$ )

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Flowchart14 Wednesday  
चैत्र बढ़ी ७-२०६८

Read, Print → Input/Output  
 Execution / Calculative → Processing.  
 Condition → Decision  
 Connecting from big flowchart → Connectors.  
 1 page to 2nd page

Decision box.15 Thursday  
चैत्र बढ़ी ८-२०६८

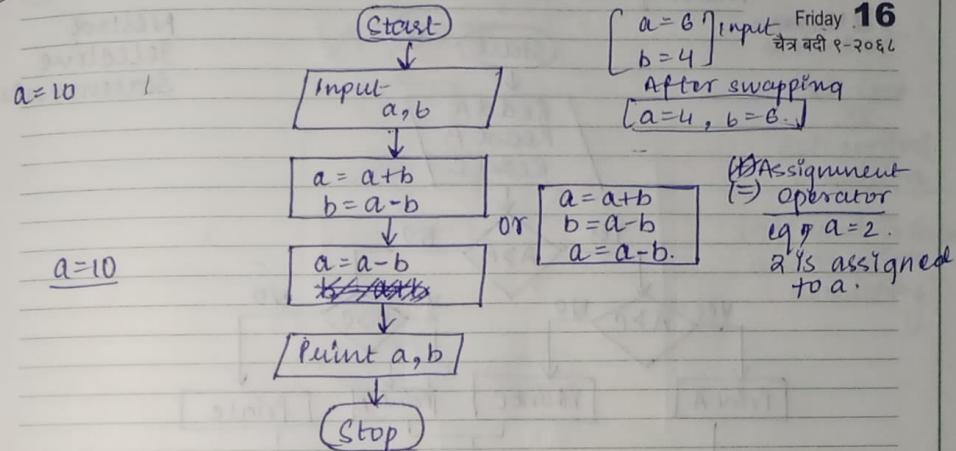
(c) A multiple way branch decision

[req: days in a week]

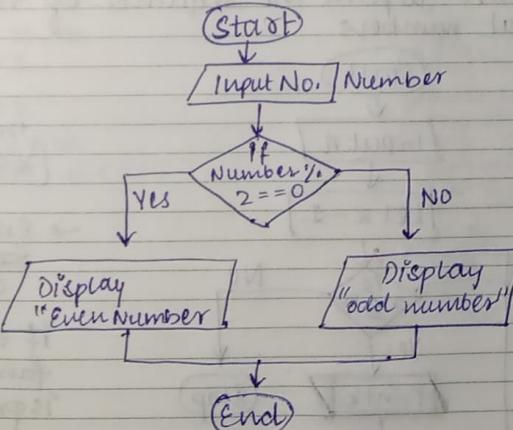
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d Draw a flow chart to swap two numbers.

Selective Statement

e Draw a flowchart to find whether a given number is even or odd.

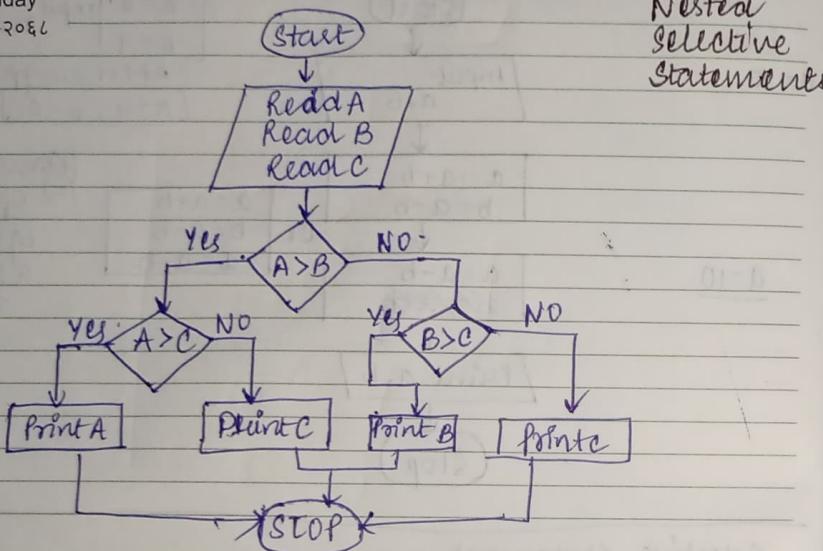
17 Saturday  
चैत्र बढ़ी १०-२०६८ $\% ==$  equals to operator?18 Sunday  
चैत्र बढ़ी ११-२०६८

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Q Draw a flowchart to find out the largest among three given numbers.

19 Monday

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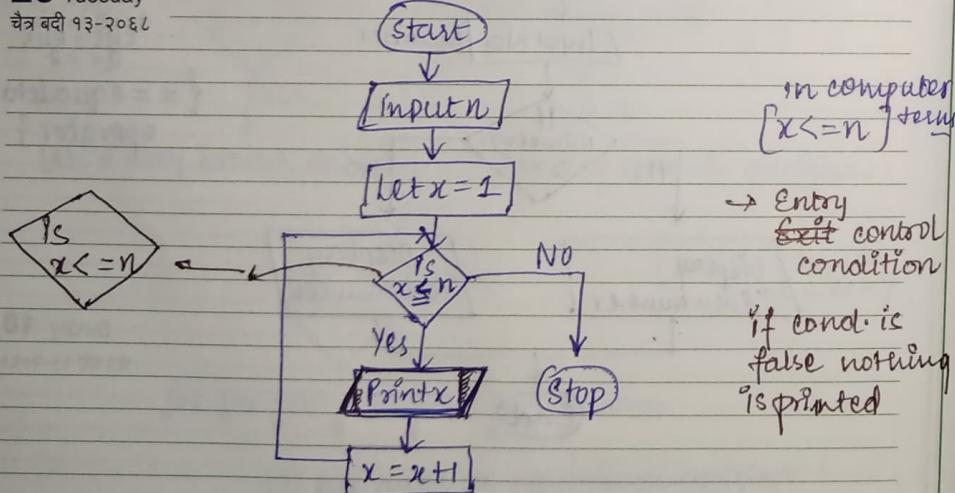


Fact 10:

Draw a flowchart to print the sequence of  $n$  natural numbers.

20 Tuesday

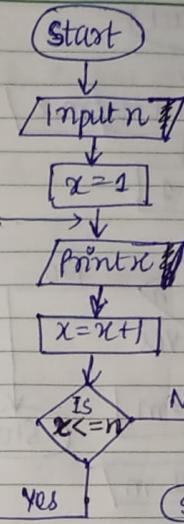
चैत्र बदी १३-२०६८



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sh

DR



Wednesday 21

चैत्र बदी १४-२०६८

Exit loop  
OR

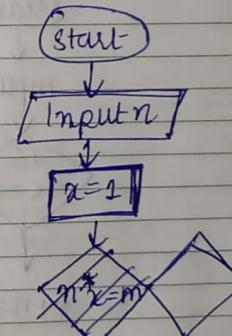
Exit control  
condition

(i) if cond. is false  
also it prints  
something

① Draw a Flowchart to print the table of a given number,

- Start
- Input  $n, m$
- If  $x = 2$
- Print  $x$
- $n * m = 2 * m$
- Stop.  $18 \cdot m \leq 10$

②  $x \cdot 1 = 2$

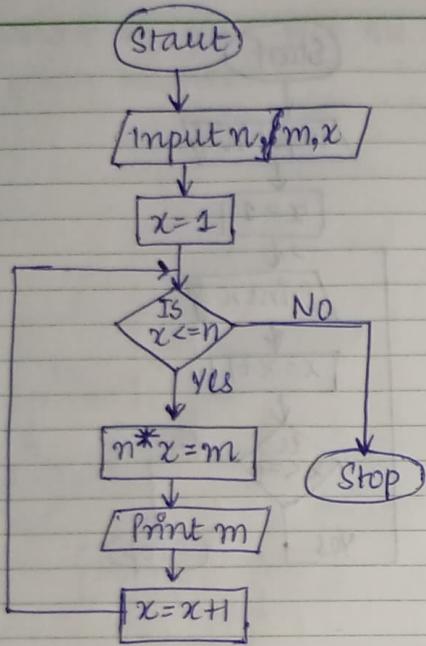


Thursday 22

चैत्र बदी १५-२०६८

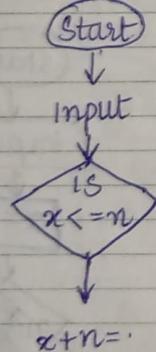
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23 Friday  
चैत्र सुदी १-२०६९



② Draw a flowchart to print the sum of  $n$  natural number.

24 Saturday  
चैत्र सुदी २-२०६९



25 Sunday  
चैत्र सुदी ३-२०६९

sh

sh

[lect 1]

"C-LANGUAGE"

19 Feb  
MARCH'12

+ CHARACTER SETS:

The characters in C are grouped into following categories:

1. Letters [a-z, A-Z]

2. Digits [0-9].

3. Special characters [; : . . . \* - , + ]

4. White Spaces. blank space: ' '

- character  
word  
sentence  
tokens

Monday 26

चैत्र सुदी ४-२०६९

'Every programming lang. has a different syntax semantics'

in 1972's Dennis Ritchie developed / invented it.

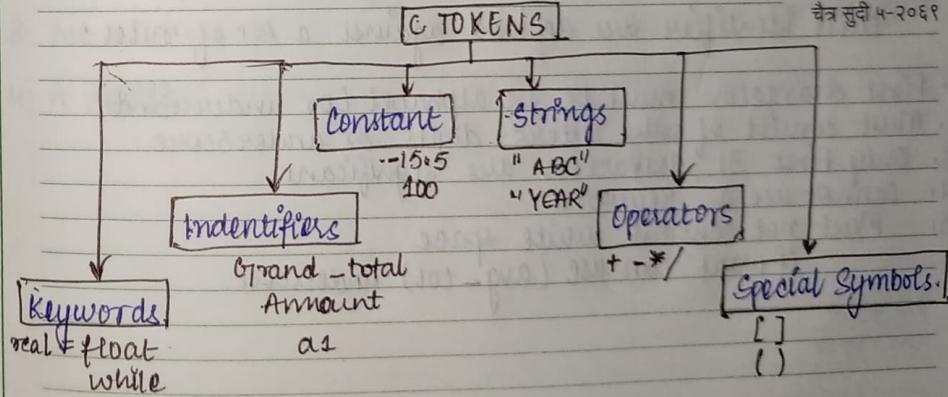
C LANGUAGE It is a structured lang.

- Procedure oriented.
- Core language (hardware)

C TOKENS

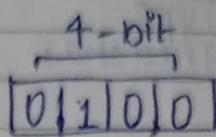
Tuesday 27

चैत्र सुदी ५-२०६९





Integer Data Types -  
2-bit system = 0, 1.  
no.



Monday 09

बैशाख बढ़ी 3-2069

 $2^0, 2^3, 2^4, 2^6$  $\rightarrow 16\text{-bit}, 32\text{ bit}, 64\text{-bit}$ 

word processor

\* one integer value can be stored in a one word in a system processor.

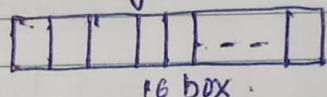
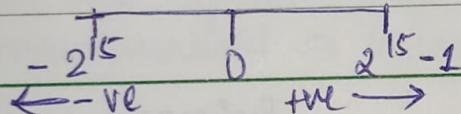
Ex:

size  $\rightarrow$  16-bit storage.

one word

int.  $\rightarrow$  16 bits (2 bytes)

1byte = 8 bits

 $2^{15}$ for magnitude, taken  $2^{15}$ 

(i)

short int  $\leftarrow$  (int)  $\rightarrow$  long intsize - 16 bits  
Tuesday 10

बैशाख बढ़ी 4-2069

1byte 2bytes 4bytes  
(half of int) (twice of int)32 bits - 4bytes  $\rightarrow$  -  $2^{31}$  to 0 to  $2^{31}-1$   
size = 4 byte long int = 8 type

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## Size and range of Data types on a 16 bit machine.

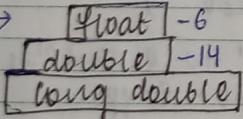
Type	Size(bits)	Range
11 Char or signed char	8	-128 to 127
Wednesday बैशाख बढ़ी ५-२०६९		
unsigned char	8	0 to 255
int or signed int	16	-32,768 to 32,767
unsigned int	16	0 to 65535
short int or signed short int	8	-128 to 127
unsigned short int	8	0 to 255
long int or signed long int	32	-2,147,483,648 to 2,147,483,647.
unsigned long int	32	0 to 4,294,967,295.

## FLOAT DATATYPES -

12 Thursday

बैशाख बढ़ी ६-२०६९

Float allows 6 digit precision  
Double allows 14 digit precision

allows:  
64.786402

Type  
float  
double  
long double

Storage size  
4 byte - 32 bit  
8 byte 64 bit  
10 byte 100 bit  
80

Value range.  
3.4E-38 to 3.4E+38  
1.7E-308 to 1.7E+308  
3.4E-4932 to 1.1E+4932

E = exponential value.

## SI

Declaration →

int a;  
float pi;  
char n;

short int b;

long int c;

signed int d;

unsigned short int e;

syntax of datatype;

① name of datatype + var;  
② datatype var. = 20; बैशाख बढ़ी ८-२०६९  
var. value = 20

double pi;

var. value = 20

★ Two variable at a time.

int a, h; OR float a; float h;

; = termination.

## OPERATORS AND EXPRESSIONS →

✓ An operator is a symbol that tells the computer to perform certain mathematical or logical manipulations.

✓ An expression is a sequence of operands and operators that reduce to a single value.

✓ Operands

✓ Operator

$$x = x + y$$

C operators can be classi

+ → operator  
x,y → operands. Saturday 14  
बैशाख बढ़ी ९-२०६९

Sunday 15

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sh

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## Arithmetic Operators.

operator	expression	Description
+	$x+y$	Perform addition.
-	$x-y$	" Subtraction.
*	$x*y$	" Multiplication.
/	$x/y$	" Division
%	$x \% y$	" Modulus

Binary operators +, -, \*, /, %

## Unary operators.

17 Tuesday • Integer Arithmetic -  $\frac{x}{y} \rightarrow 10/2 = 5$   $x=10$   
 वैशाख बढी १२-२०६९  
 & integer / integer.  $\rightarrow 10/2 = 5$   $y=2$

If  $y=3.5$  it is not consistent as  $y$  is real now.  
 It should be pure integer value.

$$\text{Ex: } \frac{3}{2} = 1 \quad \frac{1.9}{2} = 0.9 \times$$

$$\frac{6}{2} = 3 \quad \frac{3.0}{2} = 1.5 \times$$

## • Real Arithmetic

$$\frac{3.0}{2.0} = \text{real value} \rightarrow 1.5.$$

~~Note~~ % operator does not work w.r.t real Arithmetic

sh

## mixed mode Arithmetic -

$$3/2.0 = \text{real value}$$

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## # Relational Operators:

operator	expression	Description
<	$x < y$	$x$ is less than $y$
$\leq$	$x \leq y$	$x$ is less than or equal to $y$
>	$x > y$	$x$ is greater than $y$
$\geq$	$x \geq y$	$x$ is greater than or equal to $y$ .
$=$	$x = y$	$x$ is equal to $y$ .
$\neq$	$x \neq y$	$x$ is not equal to $y$ .

## # Logical Operators:

operator	expression	Description
$\&$	$x \& y$	Logical AND operator
$\ $	$x \  y$	Logical OR operator
!	$!x$	Logical NOT operator

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वैशाख बढी १४-२०६९

- If both  $x$  and  $y$  are non-zero, will return TRUE, otherwise FALSE
- If both  $x$  and  $y$  are non-zero, will return FALSE, otherwise TRUE
- If  $x$  is non-zero, will return TRUE otherwise FALSE.

$$\text{Ex: } x=0, y=0 \Rightarrow x=0, y \neq 1 \Rightarrow x=1, y=0 \Rightarrow x=1, y \neq 1$$

$x$	$y$	AND CASE	OR CASE
false - 0	0(F)	- False	- False
0(F)	1(T)	- False	- True
true - 1(T)	0(F)	- False	- True
1(T)	1(T)	- True	- True

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(1) NOT operator → 1 condition only. (Unary operator)

20 Friday  
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$\text{if } x > 1 \text{ (F)}$	$\text{if } x = 0 \cdot \begin{cases} x \rightarrow 1 & (\text{T}) \\ x \rightarrow 0 & (\text{F}) \end{cases}$
$x = 1$	$x \rightarrow 0$
(T)	(F)

(2) AND operator &amp; OR operator → 2 conditions (Binary operator)

## # Assignment Operators

Operator	Expression	Description
=	$x = y$	Assigns value to x
+=	$x += y$	$x = x + y$
-=	$x -= y$	$x = x - y$
*=	$x *= y$	$x = x * y$
/=	$x /= y$	$x = x / y$
%=	$x \% y$	$x = x \% y$

Assign value to RHS to LHS.

21 Saturday  
वैशाख बढ़ी ३०-२०६९ Increment operators (Unary) -

Operator	Expression	Description
++	$++x$	Post increment
	$x++$	Post "
--	$--x$	Pre decrement
	$x--$	Post & "

Ques  $x = 5$   
22 Sunday  
वैशाख सुंदी १-२०६९

$y = ++x$   
visible point  
 $\boxed{5+1}$   
6

In prefix +1 &amp; value is stored in

Unary operator apply on a single operand.



②  $x = 5$       1.  $x = 6$   
 $y = x + +$        $y = 5$ .

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वैशाख सुंदी २-२०६९

Postfix = execute. → Value assign  
Postfix. Value assign execute.

# Conditional Operator. [suppose 2 variables n, y]

Operator ? : Expression  
( $x < y$ ) ? True : False

Description  
if  $x$  is less than  $y$ , will return TRUE, otherwise FALSE.  
Eq:  $x < y ? \text{exp}_1 \& \text{exp}_2$   
 $T(6) = 2$   
 $x = x < y ? x : y$   $\boxed{10} = 2$ .  $x = 6, y = 10$

# Bitwise Operator - works on bits.

Operator	expression	Perform bitwise	AND operator
&	$x \& y$	"	" OR "
	$x   y$	"	" NOT "
~	$\sim x$	"	" XOR "
$\wedge$	$x \wedge y$	"	" left shift
$\ll$	$x \ll y$	"	" right shift
$\gg$	$x \gg y$	"	"

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## # Special Operators

**25** Wednesday

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operator  
size of ()  
&  
\*

expression

size of (x)

&x

\*x

Description.

Give the size of x

return the address of var x  
pointer to the variable x.

## Lecture 5

### Program

**26**

Thursday  
बैशाख सुदी ५-२०६९

If Else Statement ...

Syntax:

```
if (test expression)
```

```
{ True block statements; }
```

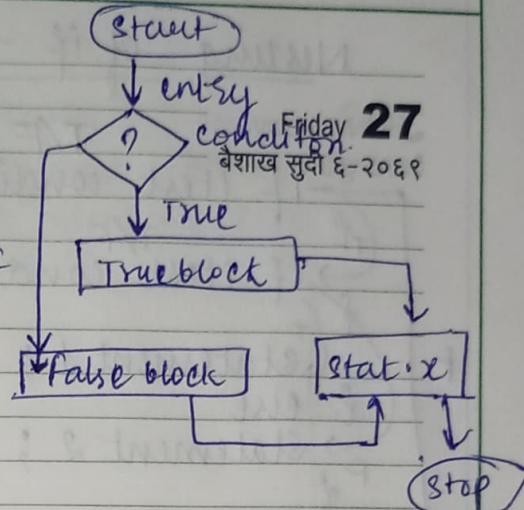
```
{ else
```

```
{
```

```
False block statements;
```

```
{
```

```
Statement X;
```



Eg:

Program to check whether given no. is even or odd.

```
int i;
printf("enter the value of i");
scanf("%d", &i);
```

Output (odd)

enter the value of i.

```
if (i%2 == 0)
```

Odd number  
this is if ... else stat.

```
    printf("even number");
```

```
}
```

```
    printf("odd number");
```

```
printf("this is if... else statement");
```

Example

 $i = 6 \quad 6 \% 2 = 0 \quad 0 \equiv 0 \quad \text{LHS} = \text{RHS}$ 

Sunday 29

बैशाख सुंदी ८-२०६९

Output (even):

enter the value of i : 6.

Even number

this is if... else statement

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SHI

### Nesting of if - else statement →

30 Monday

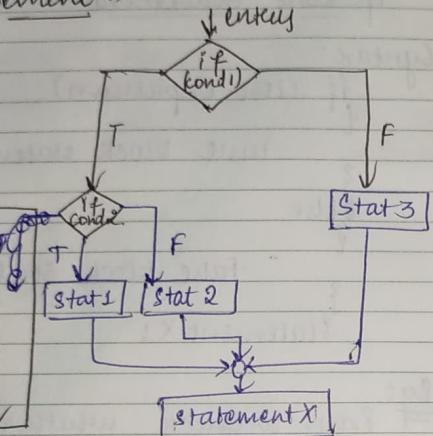
वैशाख सुबो १०-२०६९  
if T test condition 1  
T/F

if test condition 2  
T/F

{  
Statement 1;  
}  
else

{  
Statement 2;  
}  
else

{  
Statement 3;  
}  
Statement X;



Eq: A, B, C → largest?

A = 10, B = 16, C = 13.

if (A > B)

01 Tuesday

वैशाख सुबो १०-२०६९

{  
if (A > C)

  {  
    printf("A");

    use  
      printf ("C");

else if

  {  
    if (B > C)

      printf ("B");

    else  
      printf ("C");

  }

in Nested else if - complexity in understanding if else

so ↓ else "if ladder."

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### # Else If ladder

A multipath decision is a chain of "if" in which the statement is associated with each else is an if and last else if's else part path contain only else.

Wednesday 02

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### Syntax:

```

F/T
if (cond-1)
  Statement-1;
else if (cond-2)
  Statement-2;
elseif (cond-3)
  Statement-3;
elseif (cond-n)
  Statement-n;
else
  Statement-x;
  
```

### Default statement:

Statement-x;

Thursday 03

वैशाख सुबो १२-२०६९

else should be default else statement..

\* eq:- for students grade upload.

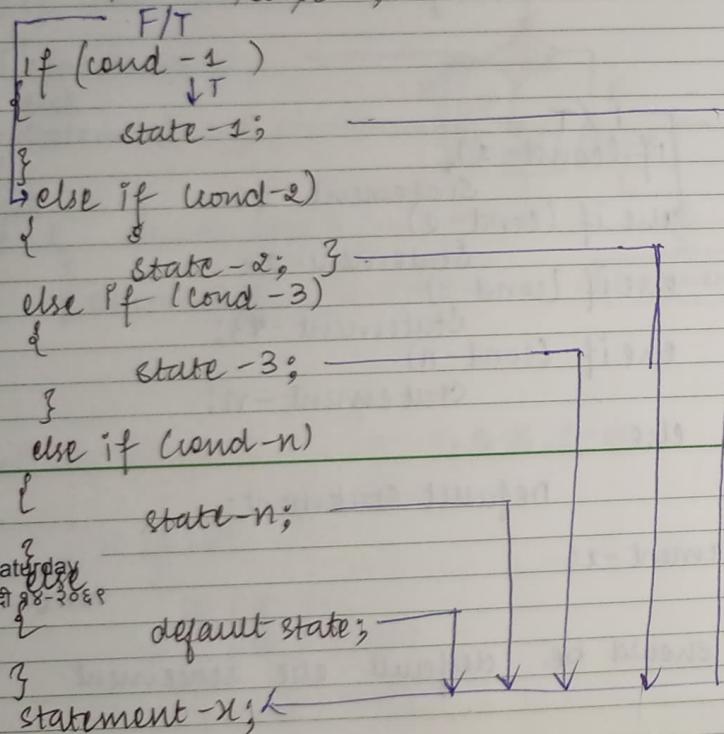
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**04 Friday**  
वैशाख सुबो १३-२०६९

```

if (cond-1)
{
    state - 1;
}
else if (cond-2)
{
    state - 2;
}
else if (cond-3)
{
    state - 3;
}

```



**05 Saturday**  
वैशाख सुबो १४-२०६९

```

else
{
    default state;
}
statement - n;

```

**06 Sunday**

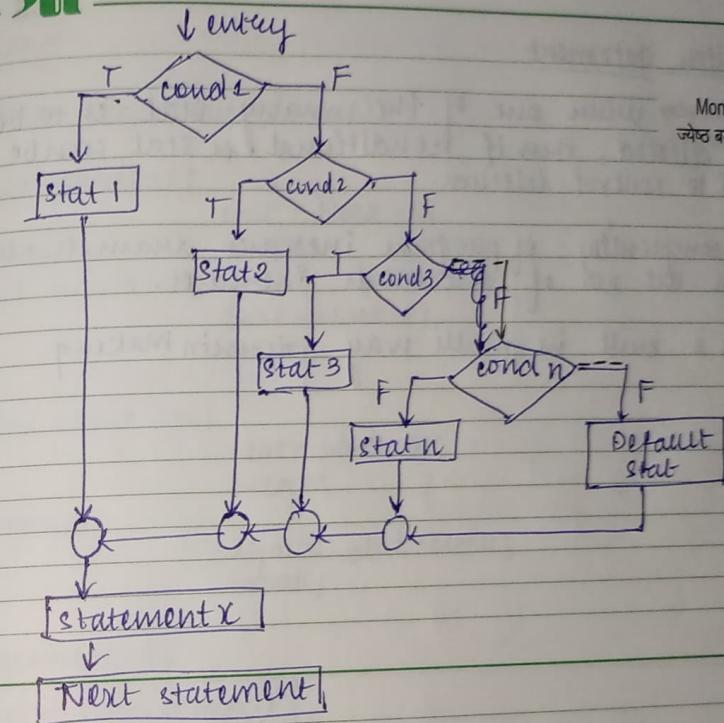
वैशाख सुबो १५-२०६९

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sh  
else if ladder

Monday 07

ज्येष्ठ बदो २-२०६९



Tuesday 08

ज्येष्ठ बदो ३-२०६९

MAY'12

lect 19

## Switch statement

09 Wednesday

ज्येष्ठ बदी ४-२०६९  
when one of the many stat is to be selected, then if conditional if stat can be used to control selection.

The complexity of program increases dramatically when no. of statements increases.

C has a built in multi way decision making

sh

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sh

Syntax:

switch (expression / value)

{ case value-1 :

    stat-block-1;  
    break;

case value-2 :

    stat-block-2;  
    break;

case value-n :

    stat-block-n;  
    break;

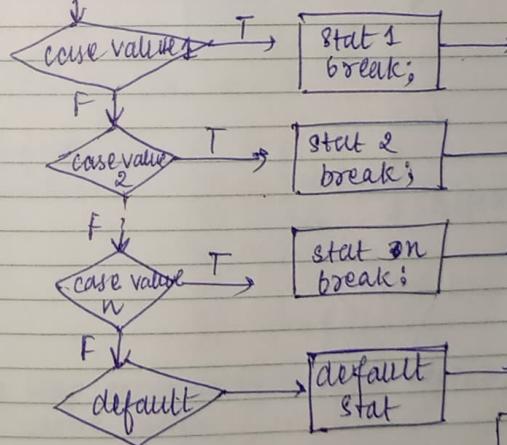
default:

    default stat-block;  
    break;

}

Statement - x;

switch (expr.)



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Friday 11

ज्येष्ठ बदी ६-२०६९

Saturday 12

ज्येष्ठ बदी ७-२०६९

Sunday 13

ज्येष्ठ बदी ८-२०६९

10 Thursday

ज्येष्ठ बदी ५-२०६९

• break; has to be there, it has its utility.

• character value in "

• case values has to be unique always

MAY'12

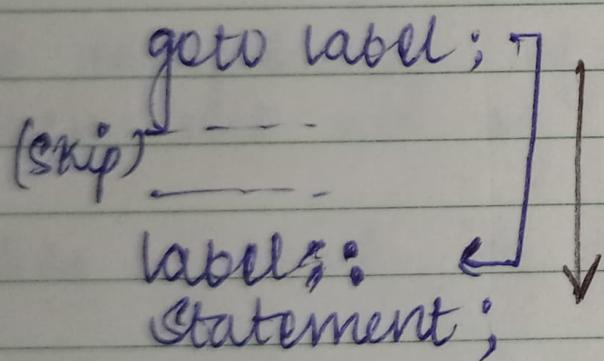
SHI

14 Monday

ज्येष्ठ बढ़ी १-२०६९

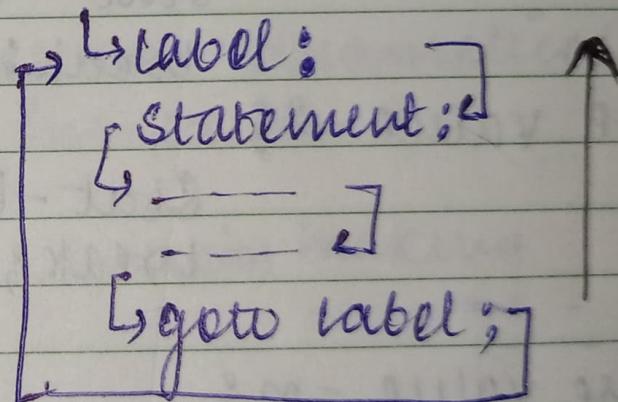
# GO TO statement → conceptual understanding of loop.  
gotō → keyword. ↗ goto label; (as per wish) identifies.

### Forward Jumping



It jumps direct from goto label to label some statements gets skipped.

### Backward Jumping



It execute every stat/step and comes to goto label then again goes back to label and again execute. Hence forms a loop.

## 4 loops:

$i=1$

(1)  $i = 1, 2, 3, \dots, n, 5$

~~①  $i = 1$~~   
~~②  $i = i$~~

- ①  $i = 1$
  - ②  $\text{printf } i;$
  - ③  $i = i + 1$
  - ④  $\text{printf } i;$
  - ⑤  $i = i + 1$
  - ⑥  $\text{printf } i;$
- Repeating statement

Terms loop constructed to avoid repetitive stat. And to make work easier.

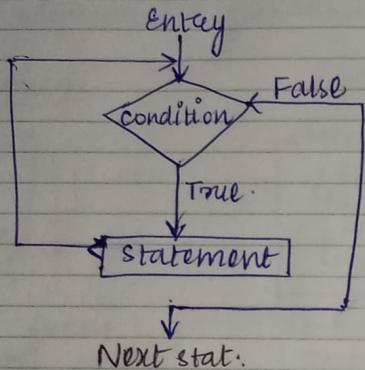
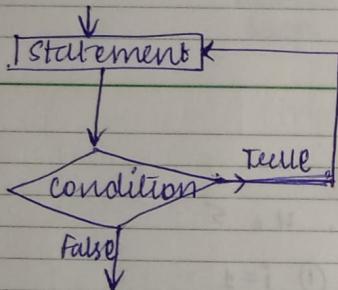
Thursday 17

ज्येष्ठ बदी १२-२०६९

MAY'12

18 Friday

જ્યેષ્ઠ બદી ૧૩-૨૦૬૧

Entry controlled loop -Exit Controlled loop -

19 Saturday

જ્યેષ્ઠ બદી ૧૪-૨૦૬૧

Loops =

Counter controlled loops.  
Sentinel loops

20 Sunday

જ્યેષ્ઠ બદી ૩૦-૨૦૬૧

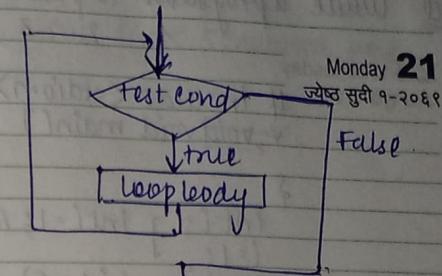
sh

sh

20min → Let 20

MAY'12

while loop

while, → entry  
do while → exit ] loops.  
for → entry

Syntax:

while (cond;) {  
 { } body of loop;  
 { } statements;  
 { } increase/decrease value;  
 { }

Ex: 1, 2, 3, 4, 5 = Print.

- ① i = 1 // initial value assigned  
 ② while (l <= 5)

increment:  
 { } printf("%d", i);  
 { } i = i + 1  
 { }

- Initialise
- condition variable
- increase/decrease value

Tuesday 22  
જ્યેષ્ઠ સૂરી ૧-૨૦૬૧Important points for  
while.

MAY'12

Initial



Q Write a program to print the first five natural no.s.

1 2 3 4 5

23 Wednesday

ज्येष्ठ सुदी २-२०६९

```
#include <stdio.h>
void main()
```

```
{ int i; } int i = 1; // Initialization
{ i = 1;
while (i <= 5) or (i < 6)
{
    printf("%d", i);
    i = i + 1;
}
printf("This is while loop")
```

DO-WHILE LOOP (exit control) [test cond is at exit].

24 Thursday

ज्येष्ठ सुदी ३-२०६९

= syntax: initialization;

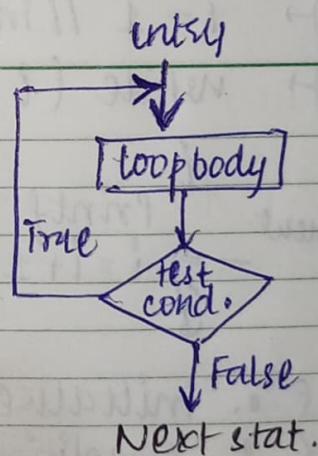
```
do
{
```

body of loop,

statements;

increase/decrease value;

```
} while (cond);
next statement
```



① → Initialization

② → increase / decrease var;

③ → while (cond); ] important pts.

MAY'12



Q Write a program to print first 5 natural no.

Friday 25

ज्येष्ठ सुदी ४-२०६९

```
# include <stdio.h>
void main()
```

```
{ int i=1;
```

```
do {
```

```
    printf ("%d\t", i);
```

```
    i = i+1;
```

```
} while (i<=5);
```

```
printf ("This do while loop statement");
```

```
ff
```

FOR LOOP → entry control loop -

for (initialization; condition; increment/decrease)

{ (body of for) ————— statement ; }

{ next stat ; }

Saturday 26

ज्येष्ठ सुदी ५-२०६९

out of loop <sup>T</sup> condition → stat1 → increase decrease → condition  
 loop continue ← increase decrease stat2 ← next stat;

Sunday 27

ज्येष्ठ सुदी ६-२०६९

MAY'12

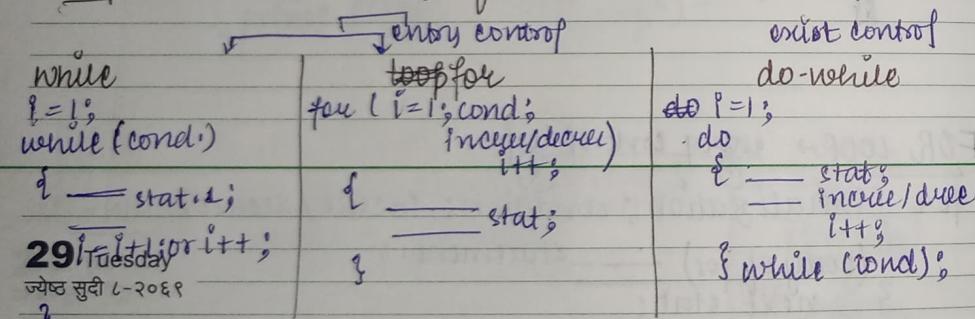
SII

Q Write a prog. to print first five natural no.s.

28 Monday #include <stdio.h>  
ज्येष्ठ सुबी ७-२०६९

```
void main ()
{
    int i; # (only declaration in for)
    for (i=1; i<=5, i=i+1)
    {
        printf ("%d\n", i);
    }
}
```

comparison in while, for & do - while loop



29 Tuesday printf;

ज्येष्ठ सुबी ८-२०६९

}

MAY'12

SII

Q Write a prog. to print the table of a given number.  
 $n * i = m$

#include <stdio.h>  
jyेष्ठ सुबी ९-२०६९

```
void main ()
```

```
int n, i, m;
scanf ("%d", &n);
scanf ("%d", &i);
for (i=1; i<=10; i++)
{
    m = n * i;
    printf ("%d\t", m);
}
```

↳ for loop

g.

while loop

```
#include <stdio.h>
void main ()
```

```
i=1; int n, i, m;
i=1; → scanf ("%d", &n); → scanf ("%d", &i); #if today 31
while (i<=10);
{
    m = n * i;
    printf ("%d\t", m);
    i++;
}
```

ज्येष्ठ सुबी १०-२०६९

JUNE'12

sh

DO-while

**01** Friday  
ज्येष्ठ सुब १७-२०६९

```
#include <stdio.h>
void main () {
    int n, l, m;
    printf("n");
    scanf("%d", &n);
    l = 1;
    do {
        m = n * l;
        printf("%d\n", m);
        l++;
    } while (l <= 10);
}
```

Lect 23 Nested Loops, Type casting.Additional features of for loop-

ज्येष्ठ सुब १८-२०६९

(i) 

```
for (p=1, n=0; n<17; ++n)
```

(ii) 

```
sum=0;
for (i=1; i<20 && sum< 100; ++i)
```

$$\text{Sum} = \text{Sum} + i;$$

```
printf ("%d\n", i, sum);
```

**03** Sunday(i) 

```
for (x=(m+n)/2; x>0; x=x/2)
```

JUNE'12

sh

(i) 

```
for (n=1, m=50; n <= m; n=n+1, m=m-1)
```

$$p = m/n;$$

```
printf ("%d.%d.%d.%d\n", n, m, p);
```

Monday 04

ज्येष्ठ सुब १५-२०६९

(ii) 

```
--
```

$$m=5;$$

```
for ( ; m != 100; )
```

$$\text{printf } ("%d\n", m);$$

$$m=m+5;$$

$$\}$$

Initialization  

```
for ( ; m != 100; )
```

Increment/decrec;  
 $\}$

 $j!=5 \Rightarrow j\neq 5$ NESTED LOOPS -

```
for (i=1; i<10; ++i)
```

$$\}$$

```
for (j=1; j!=5; ++j)
```

$$\}$$

$$\}$$

Inner loop.

Outer loop

Tuesday 05

आशाव बद १५-२०६९

loop runs  
5 times..

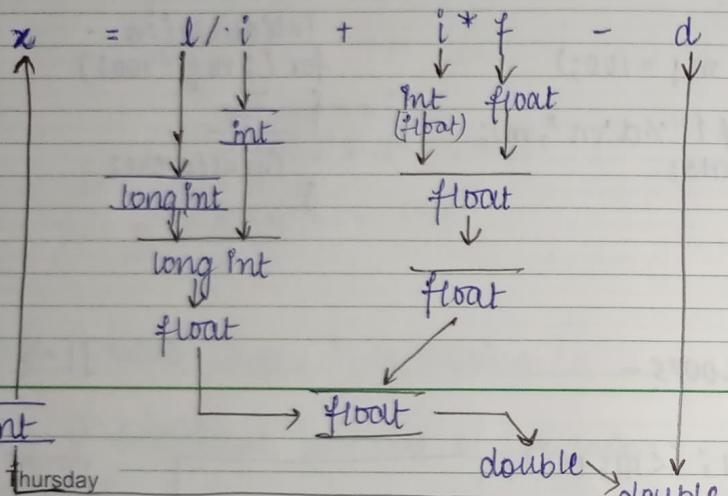
 $i = 1, 2, 3, 4, 5 \text{ for in } i \text{ } 1 \text{ to } 10.$

Implicit type casting -

**06** Wednesday  
आषाढ वर्दी २-२०६९  
int : i, x;  
float : f;  
double : d;  
long int : l;

int = int  
int

float = float  
float

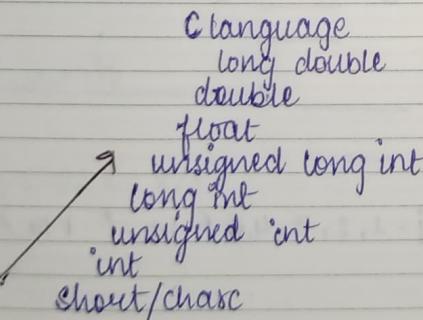


**07** Thursday  
आषाढ वर्दी ३-२०६९

long → float + float - double  
↳ double → int

⇒ Hierarchy chart:

conversion hierarchy.

Explicit type casting -

(type-name) expression  
x = (int) 7.5  
(x=7)

7.5 converted to int by truncation

② a = (int) 21.3 / (int) 6.5  
Evaluated = 21/4 = 5 (int)

③ y = (int)(a+b)  
the result of a+b is converted to int.

④ p = cost ((double)x)  
convert x to double before using it.

Examples

Friday 08

आषाढ वर्दी ५-२०६९

⑤ p = (double) sum/n  
div in floating point mode and then converted to double

⑥ z = (int)(a+b)  
result converted to a+b.  
a is converted to int & then added to b.

→ Div is done in floating point mode.

Implicit conversionExplicit conversion

```
#include <stdio.h>
#include <conio.h>
void main()
{
```

int i = 20;

Saturday 09

आषाढ वर्दी ६-२०६९

Sunday 10

आषाढ वर्दी ७-२०६९

JUNE'12

sh

NUMBER SYSTEM (N.S)

11 Monday

आषाढ बढ़ी ८-२०६९

- ▷ Non-Positional N.S
- ▷ Positional N.S

tens position → 75  
 ↓  
 (o) position matters      ↓ one position

1111 → 4.  
 I, II  
 position doesn't matter.

Positional N.S →

$\rightarrow (10-1 = 9)$

- Decimal N.S (base 10) → 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Binary N.S → 0, 1 (base 2)
- Octal N.S → (base 8) 0, 1, 2, 3, 4, 5, 6, 7 eq:  $(524)_8 \rightarrow 100010100_2$
- Hexadecimal N.S → (base 16)  
 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.  
 $\frac{4}{10} \frac{4}{11} \frac{4}{12} \frac{4}{13} \frac{4}{14} \frac{4}{15}$

\* Base n → numbers can  $n-1$   
 n can not be introduced.

12 Tuesday

आषाढ बढ़ी ९-२०६९

Octal N.S → (0-7)  
Binary 123

Hexadecimal N.S → (0-15) 24

	0	1	2	3	4	5	6	7	8	9	10 → A	11
0	000											
1	001	1										
2	010		2									
3	011			3								
4	100				4							
5	101				5							
6	110				6							
7	111				7							
					8							
					9							
						1001						
							1010					

sh

JUNE'12

Hexadecimal (0-15)

11 → B	1011
12 → C	1100
13 → D	1101
14 → E	1110
15 → F	1111

Wednesday 13  
आषाढ बढ़ी १०-२०६९

converting from another base to decimal base.

step 1: Determine the column (positional) value

Example:  $(10101)_2 \rightarrow (?)_{10}$

$2^2 \ 2^1 \ 2^0$   
 10101  
 $\uparrow \uparrow \uparrow \uparrow \uparrow$

$$\begin{aligned} &= 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\ &= 16 + 0 + 4 + 0 + 1 \\ &= (21)_{10} \end{aligned}$$

$$\begin{aligned} 2057_8 &= 2 \times 8^0 + 5 \times 8^1 + 0 \times 8^2 + 2 \times 8^3 + \\ &\quad 2 \times 8^4 + 0 \times 8^5 + 5 \times 8^6 \\ &= \end{aligned}$$

$$\begin{aligned} &2 \times 8^3 + 0 \times 8^2 + 5 \times 8^1 + 7 \times 8^0 \\ &= 1024 + 0 + 40 + 7 \\ &= (1071)_{10} \end{aligned}$$

$$\begin{aligned} 1AF16 &= 1 \times 16^2 + A \times 16^1 + F \times 16^0 \\ &= 1 \times 16^2 + 10 \times 16 + 15 \times 1 \\ &= 256 + 160 + 15 \\ &= (431)_{10} \end{aligned}$$

Thursday 14

आषाढ बढ़ी १०-२०६९

JUNE'12

Decimal base  $\rightarrow$  Another base. $\rightarrow$  Division Remainder Method

15 Friday

आषाढ बदी १९-२०६९

60  
49  
 $\frac{1}{2}$ 

$(25)_{10} = (?)_2$

sh

$$\begin{array}{r} 25 \\ \hline 2 & 12 \\ 2 & 6 \\ 2 & 3 \\ \hline & 1 \end{array}$$

$(42)_{10} = (?)_2$

$(42)_{10} = (101010)_2$

$(100)_{10} = (?)_5$

$(400)_5$

$$\begin{array}{r} 2 | 42 | 0 \\ 2 | 21 | 1 \\ 2 | 10 | 0 \\ 2 | 5 | 1 \\ 2 | 2 | 0 \\ \hline & 1 \end{array}$$

$$\begin{array}{r} 5 | 100 | 0 \\ 5 | 20 | 0 \\ \hline & 4 \end{array}$$

16 Saturday

आषाढ बदी १२-२०६९

$(428)_{10} = (?)_{16}$

$(1AC)_{16}$

$A = 10$   
 $C = 12$

$\Rightarrow [(1) \rightarrow (A) \rightarrow (C)]_{16}$

$Ex = (545)_{16} = (?)_4$

Step 1:  $(545)_6 = (?)_{10}$  multiplication method

$5 \times 6^2 + 4 \times 6^1 + 5 \times 6^0 = (209)_{10}$

17 Sunday

आषाढ बदी १३-२०६९

Step 2:  $(8)_{10} = (?)_4$  div. method.

$(209)_{10} = (?)_4$

$(209)_{10} = (3101)_4$

$$\begin{array}{r} 4 | 209 | 1 \\ 4 | 52 | 0 \\ \hline 4 | 13 | 1 \\ \hline & 3 \end{array}$$

sh Lect 25 -

JUNE'12

Converting fractional number from another base to decimal base  $\rightarrow$ 

Monday 18

आषाढ बदी १४-२०६९

$(110.101)_2 = (?)_{10} = (6.625)_{10}$

$$\begin{array}{r} 2^{-2} 2^{-1} 2^0 2^1 2^2 2^3 \\ \hline 1 & 1 & 0 & 1 & 0 & 1 \end{array}$$

$\Rightarrow 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 + 1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3}$

$\Rightarrow 4 + 2 + 0.5 + 0.125$

$\Rightarrow (6.625)_{10}$

$(127.54)_8 = (?)_{10} = (87.6875)_{10}$

~~$2^2 \times 1 + 1 \times 8^0 + 0 \times 8^1 + 7 \times 8^2$~~

$\Rightarrow 1 \times 8^2 + 2 \times 8^1 + 7 \times 8^0 + 5 \times 8^{-1} + 4 \times 8^{-2}$

$\Rightarrow (87.6875)_{10}$

Tuesday 19

आषाढ बदी १५-२०६९

Convert fractional number from Decimal base to another base

$(0.375)_{10} = (?)_2$

$0.375 \times 2 = 0.750$

$0.750 \times 2 = 1.50$

$0.50 \times 2 = 1.00$

$0.00 \times 2 = 0.00$

stopping point

$(0.011)_2$

JUNE'12

81

$$\bullet (0.3125)_{10} = (?)_{16} = (0.8)_{16}$$

20 Wednesday

આષાઢ સુદી ૧-૨૦૬૯

$$3125 \times 16 = 0.5 \\ + 0.5 \times 16 = 8.0 \quad \downarrow \quad (0.8)_{16}$$

SHORTCUT METHOD

Binary - decimal, octal  $\rightarrow$  3-bit  
hexa  $\rightarrow$  4-bit

$$(56.8)_8 = (?)_2 \quad (\text{octal} \rightarrow \text{binary})$$

↓  
 010  
 ↓  
 110  
 ↓  
 101

$$= (101110010)_2$$

$$\bullet (11010011)_2 = (?)_{16} \quad 2^4 = 16$$

↓  
 13 = D  
 ↓  
 3 = (0.3)\_{16}

longcut  $\rightarrow$  ① Binary  $\rightarrow$  decimal  
② decimal  $\rightarrow$  hexa

shortcut

• Can only be applied to binary, octal, hexa. not another base.

21 Thursday

આષાઢ સુદી ૨-૨૦૬૯

Binary Arithmetic & So Addition & Subtraction.

$$\begin{array}{r} 101 \\ + 10 \\ \hline 111 = (7). \end{array}$$

$$\begin{array}{r} 10011 \\ + 1001 \\ \hline 11100 \end{array}$$

binary 0 1  
rule  
 $0+0=0$   
 $1+0=1$   
 $0+1=1$   
 $1+1=0$  carry  
bit 1

JUNE'12

81

Binary subtraction -

Rules 2)

$$0-0=0$$

$$0-1=1 \text{ (with borrow)}$$

$$1-0=1$$

$$1-1=0$$

Friday 22

આષાઢ સુદી ૩-૨૦૬૯

$$\begin{array}{r} 10 - 0110 = 2 \\ - 1 \quad - 1 \\ \hline 1 \end{array} \quad \text{① with borrow bit}$$

$$\begin{array}{r} 1011100 \\ - 0111000 \\ \hline 0100100 \end{array}$$

$$\begin{array}{r} 10 = 2^3 \\ 0101101 \\ - 01110 \\ \hline 00111 \end{array}$$

$$\begin{array}{r} 10 = 2^3 \\ 10110 \\ - 01110 \\ \hline 00111 \end{array}$$

Lect 26

Binary subtraction : Using complementary method.

$$\begin{array}{r} 10101 \\ - 01110 \\ \hline 00111 \end{array}$$

$\rightarrow$  Minuend.  
 $\rightarrow$  Subtrahend  
 $\rightarrow$  Difference

Sunday 24

આષાઢ સુદી ૫-૨૦૬૯

JUNE'12

Step 1: Find the complement of substrahend.

25 Monday

आषाढ़ सुदी ६-२०६९

Step 2: Add this substrahend to the minuend.

Step 3: carry bit  
Result: Add carry bit to result

no carry bit

Result: find the complement of the result and put a negative (-) sign.

$$\begin{array}{r} \text{Eq.} \\ \begin{array}{r} M \leftarrow 1011 \\ S \leftarrow -1001 \end{array} \\ \hline \end{array}$$

$$\begin{array}{r} 1011 \\ -1001 \\ \hline 11 \\ 9 \\ (+2) \end{array}$$

Step 1: ~~1110~~ 1001  $\xrightarrow{c.}$

26 Tuesday

आषाढ़ सुदी ७-२०६९

$$\begin{array}{r} 1001 \xrightarrow{\text{once}} 0110 \\ (\text{S}) \xrightarrow{\text{complement}} \end{array}$$

$$\begin{array}{r} 0110 \\ 1001 \\ \hline 1111 \\ (+) 0110 \\ \hline 10001 \\ \text{carry bit} \end{array}$$

$$\begin{array}{r} 0001 \\ + 1 \\ \hline 0010 \end{array}$$

SII

$$\begin{array}{r} 101 \\ \downarrow 1's \text{ or complement} \\ 010 \end{array}$$

SII

$$\begin{array}{r} 010010 - M \\ 100011 - S \end{array}$$

JUNE'12

Wednesday 27

आषाढ़ सुदी ८-२०६९

$$\begin{array}{r} 011100 \\ 100011 \xrightarrow{\text{ones' complement}} 011100 \end{array}$$

$$\begin{array}{r} 010010 \\ (+) 011100 \\ \hline 101110 \end{array}$$

= no carry bit.

$$\begin{array}{r} 101110 \xrightarrow{\text{ones' complement}} (\text{G}) 010001 \end{array}$$

Binary Subtraction: Using Two's Complement -

Step 1: Find the two's complement of substrahend.

Thursday 28

आषाढ़ सुदी ९-२०६९

Step 2: Add this substrahend (comp) to the minuend.

carry bit

Result: Discard this carry bit and rest is result.

no carry bit

Result: Find the two's complement of the result & put a negative (-) sign on the output.

JUN/JUL'12

86

Eq.  $\begin{array}{r} 1011 \\ - 1001 \end{array}$  - M  
29 Friday  $\begin{array}{r} 1011 \\ - 1001 \end{array}$  - S.

आषाढ़ सुदी १०-२०६९

Step 1:  $1001 \xrightarrow{\text{1's complement}} 0110$  ] 2's complement;  
add (+1) to the 1's complement.  
 $\begin{array}{r} 0110 \\ + 1 \\ \hline 0111 \end{array}$  [ 2's complement of subtraction

Step 2:  $\begin{array}{r} 1011 \\ 0111 \\ \hline \text{carry } 10010 \end{array}$   $\boxed{0010}$  Result

Step 3: Discard carry bit

Result = 0010

Eq.  $\begin{array}{r} 010010 \\ - 100011 \end{array}$  - M  
30 Saturday  $\begin{array}{r} 010010 \\ - 100011 \end{array}$  - S

Step 1:  $100011 \xrightarrow{\text{1's complement}} 011100$

01 Sunday

आषाढ़ सुदी १२-२०६९

JULY'12

sh

Array = similar collection  
declare a variable in form of array.

04 Wednesday

आवण बदी १-२०६९

 $r[100]$ like ex:  
excel sheet.

R <sub>1</sub>		1
R <sub>2</sub>		2
R <sub>3</sub>		3
R <sub>4</sub>		4
R <sub>5</sub>		5

 $r = \text{roll no.}$ 

आवण बदी १-२०६९

JULY'12

sh

# Initialization of One-Dimensional Array.

0) Compile Time Initialization  $\rightarrow$  scanf prog Friday 06  
Run Time Initialization  $\rightarrow$  arr[1] = 20; आवण बदी ३-२०६९Input from user inside of prog.  
during run time.let x be  
array.

$$\begin{aligned} arr[0] &= 10; \\ arr[1] &= arr[0] + 5; = 10 + 5 = 15; \\ arr[2] &= x[1] + r[2]; \end{aligned}$$

# Compile Time Initialization-

int number [3] = {<sup>number[0]</sup>0, <sup>number[1]</sup>1, <sup>number[2]</sup>0};  
 $\uparrow \uparrow \uparrow$   
number[1].0) float type data type tot[0] tot[1] tot[2]  
float total [5] = {<sup>tot[0]</sup>0.0, <sup>tot[1]</sup>15.75, <sup>tot[2]</sup>-10.5};tot[3] = 0.0;  
tot[4] = +30.0; if value not given it  
considers by itself.Saturday 07  
आवण बदी ४-२०६९0 int arr[] = {10, 20, 30};  
it consider 3 elements.

'0' = null symbol

1 char arr[6] = {'p', 'o', 'o', 'j', 'a', '!', '0'};  
individual char. to be in ' '.

Sunday 08

आवण बदी ५-२०६९

0 char arr[6] = "Pooja";

JULY'12



int xyz[4] = {10, 20, 30, 40, 50, 60};

09 Monday  
आवण बदी ६-२०६९

X illegal / incorrect statement

Run time initialization

user ← input (scanf)

```
int arr[3];
scanf("y.d %d %d", &arr[0], &arr[1], &arr[2]);
```

OR

```
for(i=0; i<100; i=i+1)
{
    if (i<50)
        sum[i] = 0.0;
    else
        sum[i] = 1.0;
```

10 Tuesday

Output

```
sum[0] = 0.0
sum[1] = 0.0
```

:

```
sum[50] = 1.0
```

:

```
sum[99] = 1.0.
```

JULY'12



SEARCHING -

► Linear Search

► Binary Search

Major (array) → Searching  
appl. → Sorting

→ LINEAR SEARCH -

list of students  
101 →  
आवण बदी ८-२०६९  
ROLLNO. — int

Alphabetical search  
sort →  
Name - char array  
Marks - int / float array

Thursday 12

आवण बदी ९-२०६९

JULY'12

13 Friday

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list → ① array → size      index

② initialization      compile time  
                          run time

③ logic      index → 0/1?

search element → 30

[10 12 15 13 01 25]

arr[0] == search elem  
arr[1] == search elem  
arr[2] == search elem  
arr[3] == search elem  
Yes.

Syntax:

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```
#include<stdio.h>
void main()
```

```
// var declare; [declare all vars ; 1,4, arr[100], ]  
// enter the elements in an array.  
// logic
```

for loop → condition var. (declare)

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sh

sh

found = flag var., as we found the match, we can come out of the prog. JULY'12

#include<stdio.h>

void main()

{

```
int i, elem, found = 0, arr[10];  
printf("enter the elements");  
for(i=1; i<=10; i++)  
scanf("%d", &arr[i]);
```

for i

```
printf("enter the search elem");  
scanf("%d", &elem);  
for(i=1; i<=10; i++)
```

if

```
if(arr[i]==elem)
```

{ found = 1;

break;

}

if (found==1)

```
printf("the element found");
```

else

```
printf("the element not found");
```

}

arr[10] Monday 16

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10

Tuesday 17

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