DSA

Lecture- 01

—×————————×—

Programming:
A Sequence of steps to Solve a particular problem is called programming

How to Solve a programming problem?

→ Given the problem,
1) Understand the problem ie Add two values
2) Check the given values i-e 2 variables, datatypes
3) Figure out an approach i-e Sum = a +b
4) Code !

Pseudo Code:
A very simple and high level form of computer language that is used in program design is called pseudo code.

Flow Chart:
The diagramatic representation of an approach. This drawns out all the steps of your approach in order is called flowchart

Components:

1) Terminators:
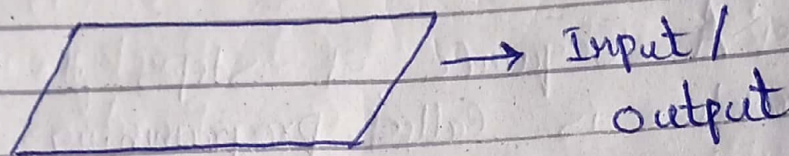Specifies the start & End of the program is called Terminators
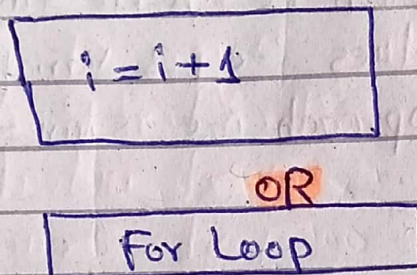
(Start)   OR   (End)

2) Parallelogram:
For using take **inputs** or Showing **output**
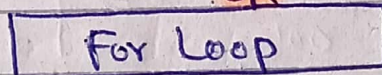
 → Input / output

3) Process:
Used for **operations** and **processes**

$$i = i + 1$$

OR

For Loop

4) Decision Making:

is
$i <= 10$?

True → input(i)

False

End.
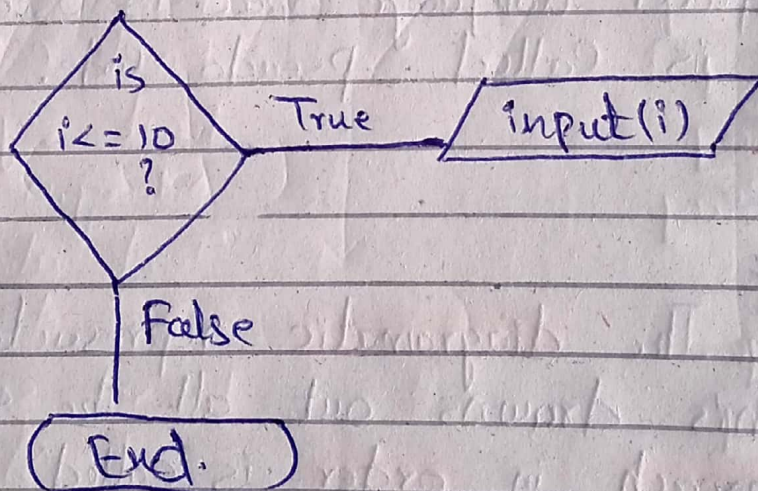
5) Circle: ~~Dotted~~
Connectors used in functions or Methods.
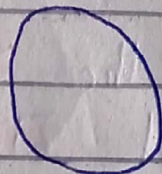
6) Arrows:

used to connect the component & show / tells the flow

↓↑
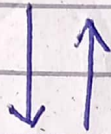
~≪ **Examples** ≫~

1) Flowchart & Pseudo code for adding 2 Numbers?

Flow Chart:

```
    ( Start )
        |
        ↓
  / Read a,b /
        |
        ↓
  [ Sum = a+b ]
        |
        ↓
  / print (Sum) /
        |
        ↓
    ( End )
```
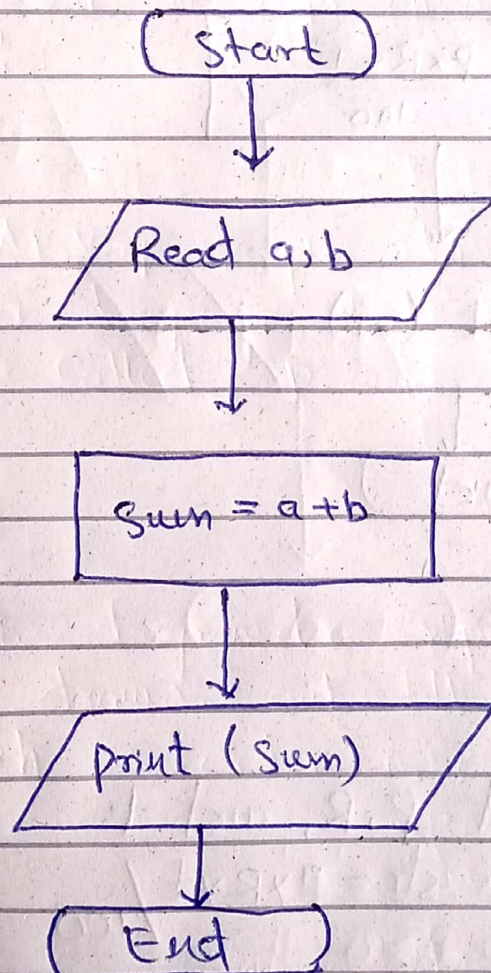
Pseudo code:

→ Input two number a & b
→ let Sum = a+b
→ print Sum

2) Flowchart & Pseudo Code to calculate Simple Interest ?

Formula:- $S \cdot I = \dfrac{P \times R \times T}{100}$

(Principal amount)
(Rate of interest)
(Time)

Flowchart:

Start

Read P, R & T

$SI = \dfrac{P \times R \times T}{100}$

Print (SI)

End

Pseudo Code:

→ Read P, R, and t
→ Make $SI = P \times R \times t / 100$
→ Print SI

3) Determine a<b ?

Flowchart:-

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
                   ┌─────▼──────┐
                   / Read a,b   /
                  └──────┬──────┘
                         │
                      ┌──▼──┐
                      / is   \      False
                     <  a<b   >──────────────┐
                      \      /                │
                       └──┬──┘                ▼
                          │ True      ┌──────────────┐
                          │           / print (No)   /
                   ┌──────▼──────┐    └──────┬───────┘
                   / print (yes) /           │
                  └──────┬──────┘            │
                         │                   │
                      ┌──▼──┐                │
                      │ End │◄───────────────┘
                      └─────┘
```
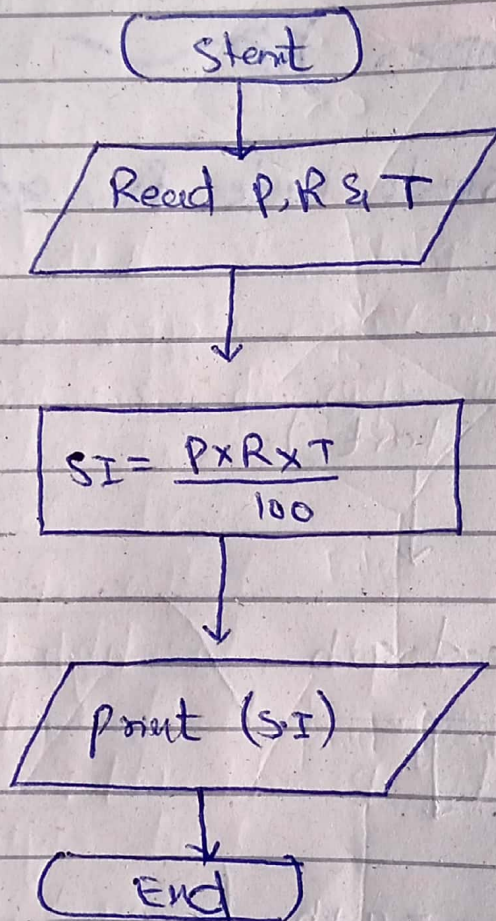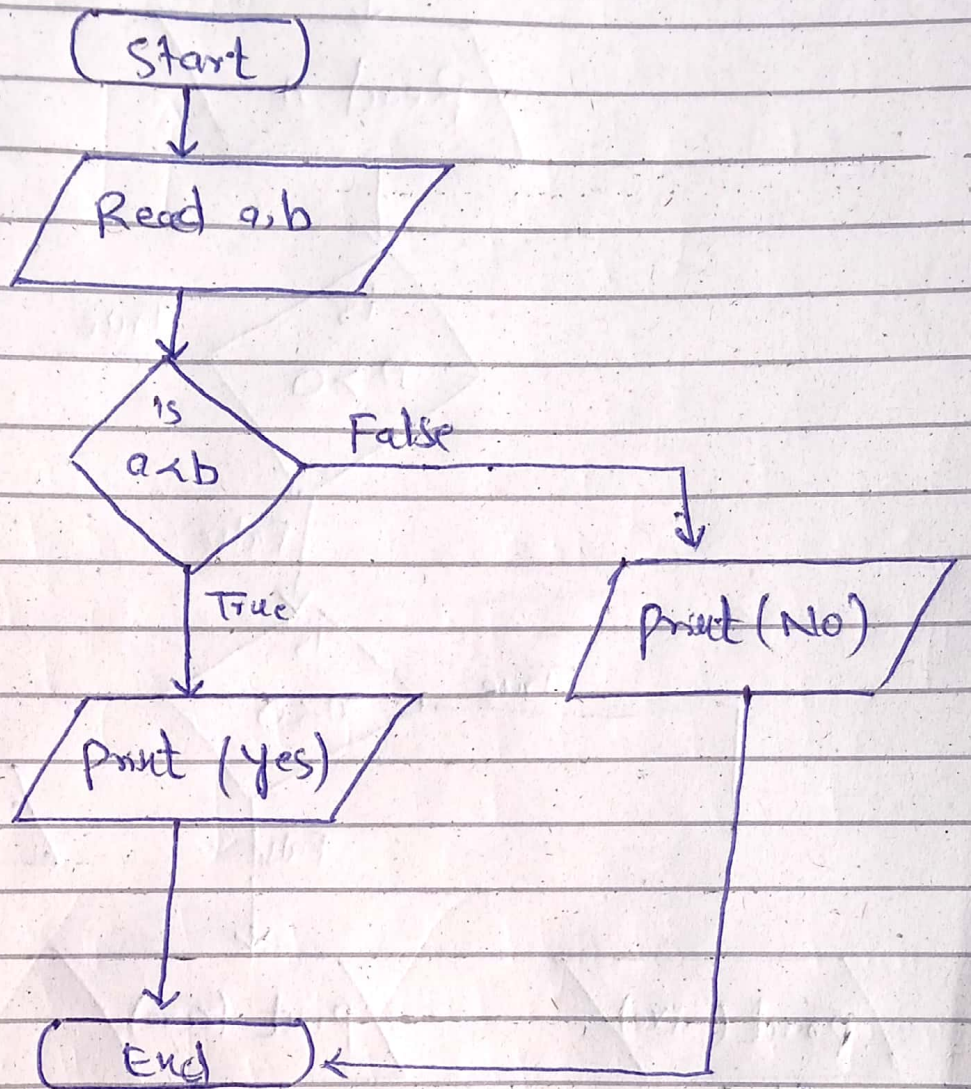
Pseudo Code:

→ Read a & b
→ if (a<b) then
       print "yes"
else
      print "no"

4) Flowchart & Pseudo code for Is n is +ive, -ive or zero?

Given: n

Approach: if the given number is greater than 0 it is +ive or less then 2 it is negative otherwise zero.

Flowchart:

```
                    ( Start )
                       |
                       v
                  / Read n /
                       |
                       v
                    /  is  \        True
                   <  n > 0  >---------------+
                    \      /                 |
                       | False              |
                       v                     |
                    /  is  \                  |
         True      <  n < 0  >                |
     +------------<  \      /                 |
     |               | False                  |
     v               v                        v
 / print(-ive) /  / Print (Zero) /      / Print +ive /
     |               |                        |
     |               v                        |
     +--------->  ( End )  <------------------+
```
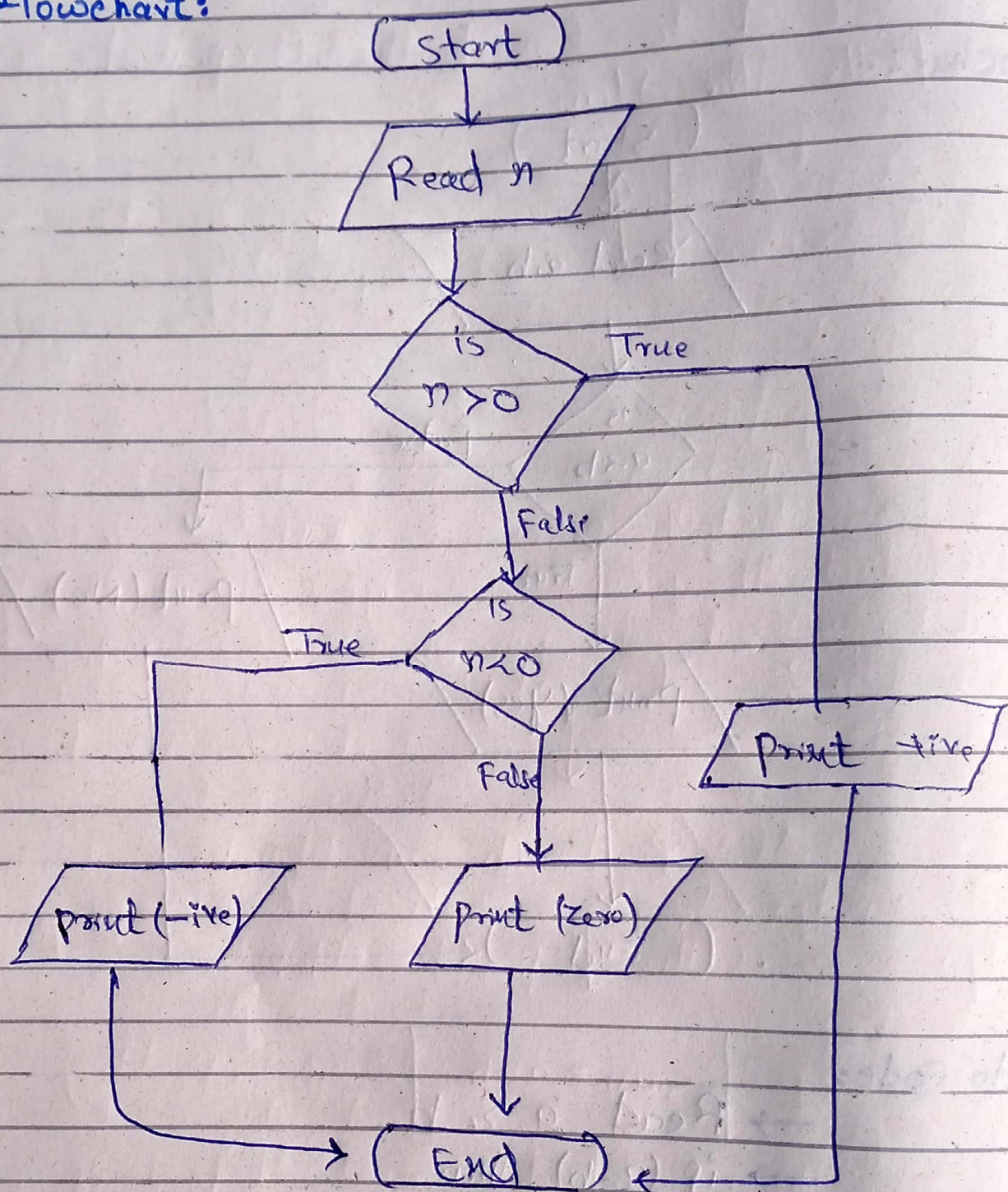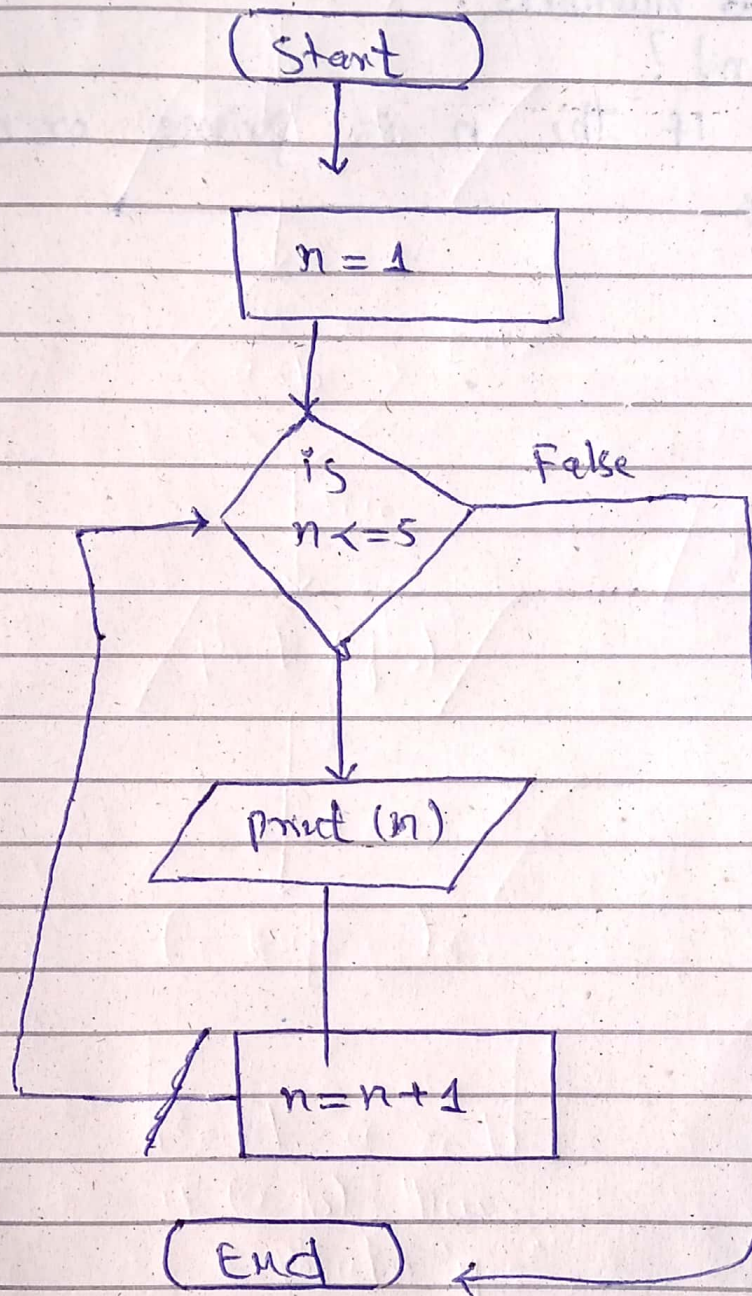
Pseudo code:

→ Read 'n'

→ if ◦ n > 0 then

     Print +ive

else if n < 0 then

     Print -ive

else

     print zero

5) Flowchart & Pseudo code to print number 1 to 5?

Flow chart:

```
        ┌──────────┐
        │  Start   │
        └────┬─────┘
             │
             ▼
        ┌──────────┐
        │  n = 1   │
        └────┬─────┘
             │
             ▼
          ╱  is  ╲        False
         ╱ n <= 5 ╲ ─────────────┐
         ╲        ╱               │
          ╲      ╱                │
             │ True               │
             ▼                    │
        ╱──────────╲              │
       ╱  print (n) ╲             │
       ╲────────────╱             │
             │                    │
             ▼                    │
        ┌──────────┐              │
        │ n = n+1  │              │
        └──────────┘              │
             (loops back to is)   │
                                  │
        ┌──────────┐              │
        │   End    │ ◄────────────┘
        └──────────┘
```

Pseudo code:

→ Set n to 1
→ for (n <= 5 ; i++) then
      print (n)

        OR

→ while (n <= 5) then
      Print (n)
      n = n+1

What is Programming language?

A programming language is a way to Communicate with a computer. It is a formal language which consist of sets of strings that produce various kinds of machine output

E-g: C, C++, Java, Python, R, Go etc.

Syntax:

Every language must be written following some rules called Syntax

→ A computer only understands binary codes of 0's & 1's. A Compiler processes the Statements of a programming language into machine code

Source code → Compiler → binary/Machine code.
(C++)

Computer Executes
(.exe)
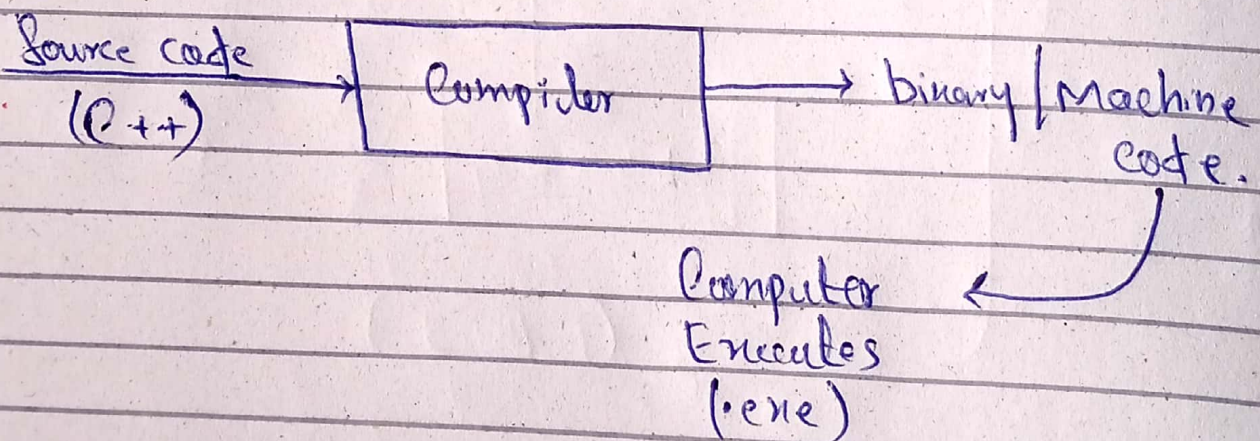
1) Read numbers from 1 to n & print only Even numbers ?

2) Find n! ?

3) Check if the n is prime or not ?