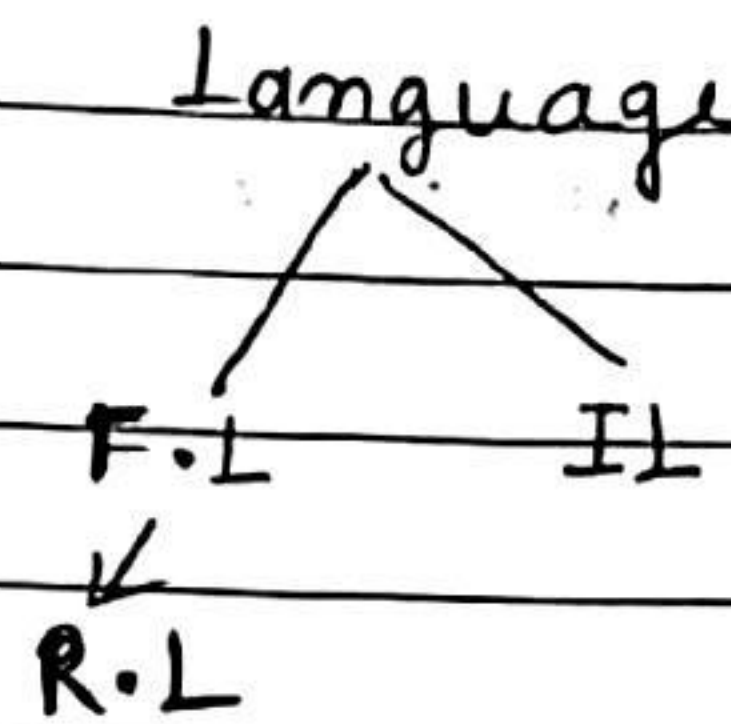


Pumping lemma

→ Pumping lemma is generally used for proving a given grammar is not regular.

**Ex-1** A language is regular or not regular.



$$L \rightarrow FA \rightarrow R.L$$

$$L = \{a^n \mid n \geq 0\}$$

$$P.L \rightarrow \text{pattern } L = \{a^0, a^1, a^2, \dots\}$$

not find pattern

(find pattern)

(Not regular)

(R.L - may or may not)

→ P.L is negativity test.

**Ex-2**

$$L = \{a^n \mid n \text{ is even}\} \quad n = 0, 2, 4, \dots$$

$$\rightarrow L = \{a^0, a^2, a^4, a^6, \dots\} \text{ (A.P.)}$$

∴ given language are R.L (because it has pattern like Arithmetic

Progression)

**Ex-2**  $L = \{a^p \mid p \text{ is prime}\} \quad p = 3, 5, 7, 11, 17, \dots$

$$\rightarrow L = \{a^3, a^5, a^7, a^{11}, a^{17}, \dots\} \text{ (not A.P.)}$$

So given language are not R.L (because it has not contain any follow any pattern or A.P.)



[EX-4]  $L = \{a^n \mid n \text{ is odd}\}$

→  $n = \{1, 3, 5, \dots\}$  A.P.

given language  $L$  is RL.

[EX-5]  $L = \{(ab)^n \mid n \geq 0\}$   $n = 0, 1, 2, 3, \dots$

$L = \{\epsilon, ab, abab, ababab, \dots\}$

given  $L$  is RL.

[EX-6]  $L = \{a^n \mid n = 100^{100}\}$

→  $L$  is Regular language (RL), because it is, finite set of string.