CS & IT ENGINEERING

Theory of Computation

Regular Languages

Lecture No.- 01

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Topics to be Covered

Topic Basics of TOC

Theory of Computation: [8-9M]

Easy

I) Introduction

II) Regular Languages

III) Context Free Languages

5-6M

Take Time

IV) Turing Machine

V) Decidable and undecidable problems

0-4M

Theory of Computation

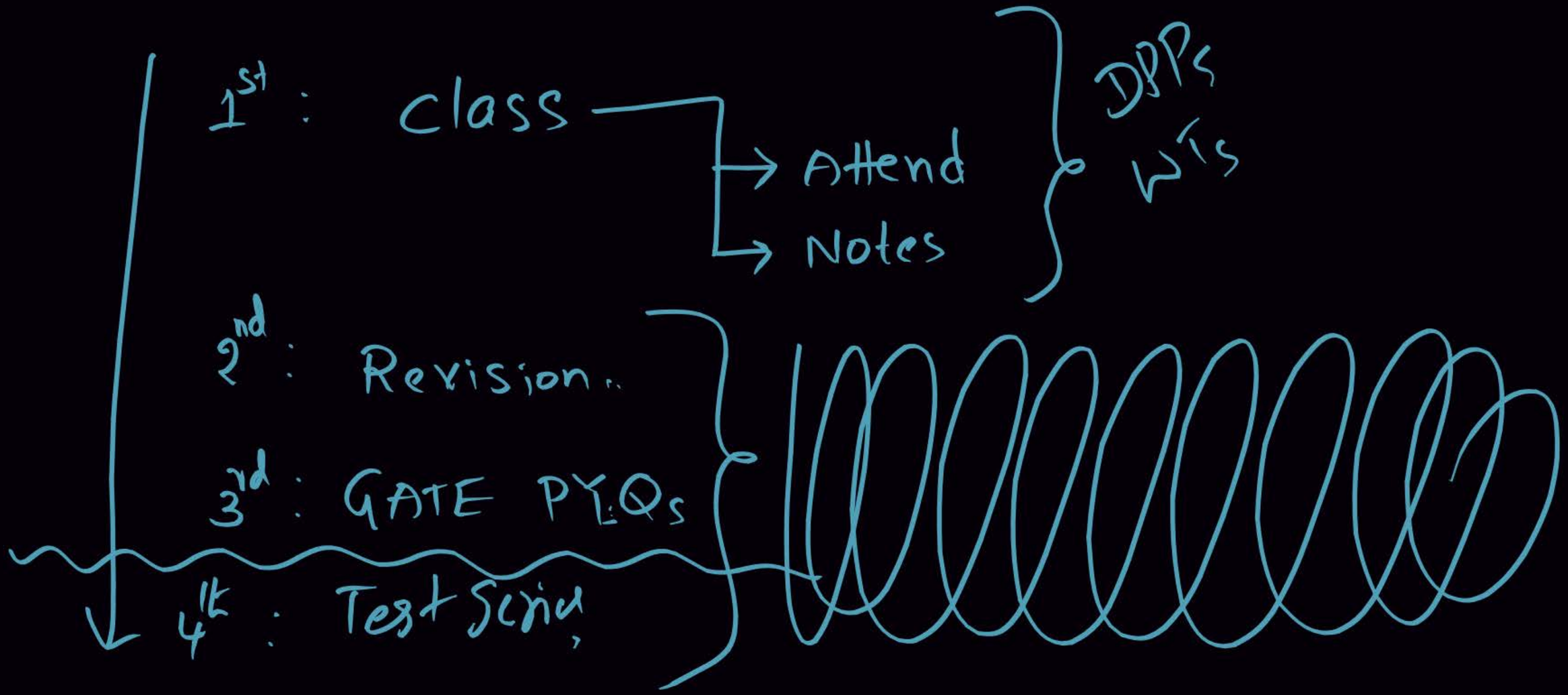
Automata Theory

Formal Languages

TOC

FLAT

How to prepare ?



TOPIC: What is TOC ?

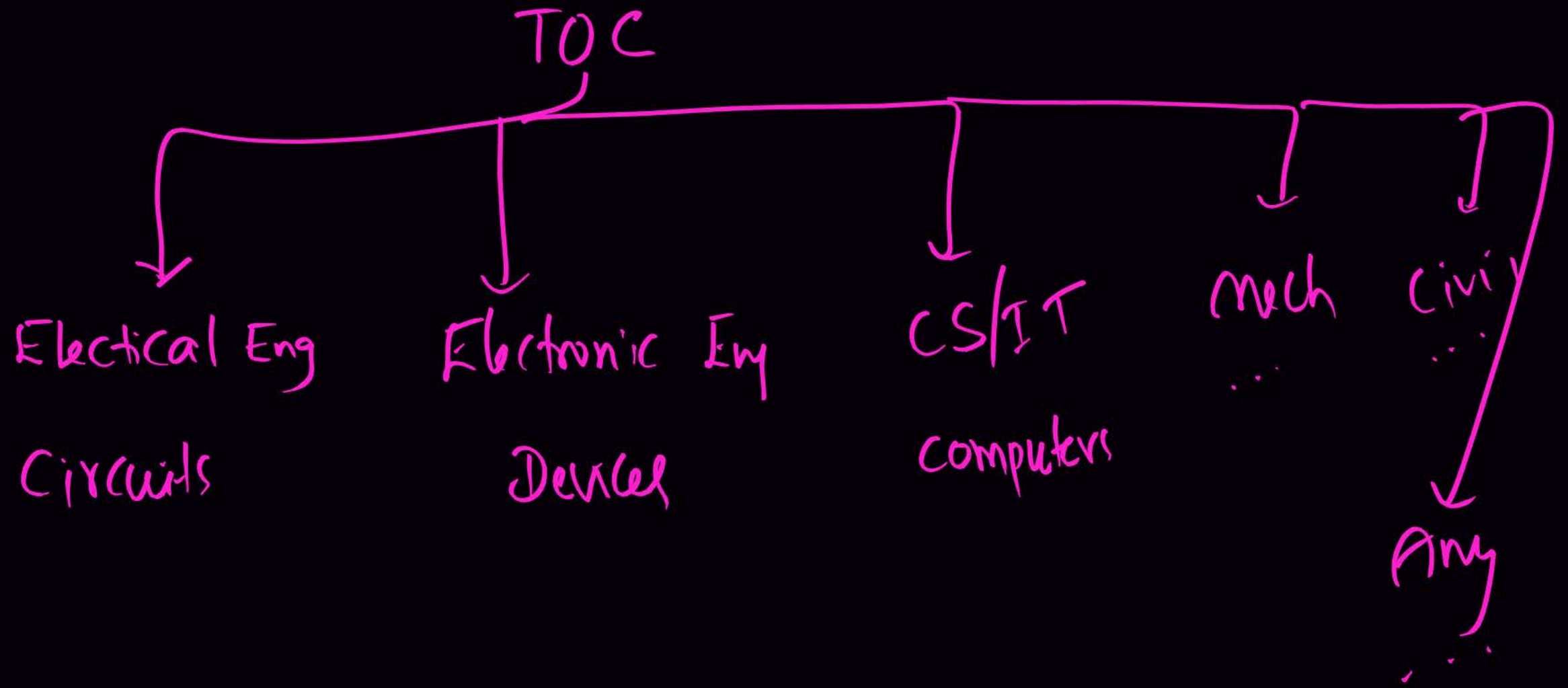
Theory of Computation :

Computable ?

Complexity ?

Problems ?

- Mathematics
- programmatically
- Algorithmically
- Model


TOC
Electical Eng
Circuits
Electronic Eng
Devices
CS/IT
computers
mech
...
civi
...
Any
...

TOPIC:

Problem

⇓

Is even ?

⇓

$\{0, 2, 4, 6, \ldots\}$ = even set

$\{\varepsilon, aa, aaaa, a^6, \ldots\}$ = even language

n%2==0

even

⇓

Computable ?

TOPIC:

What is TOC ?

Problem

⇓

Set (Language)

⇓

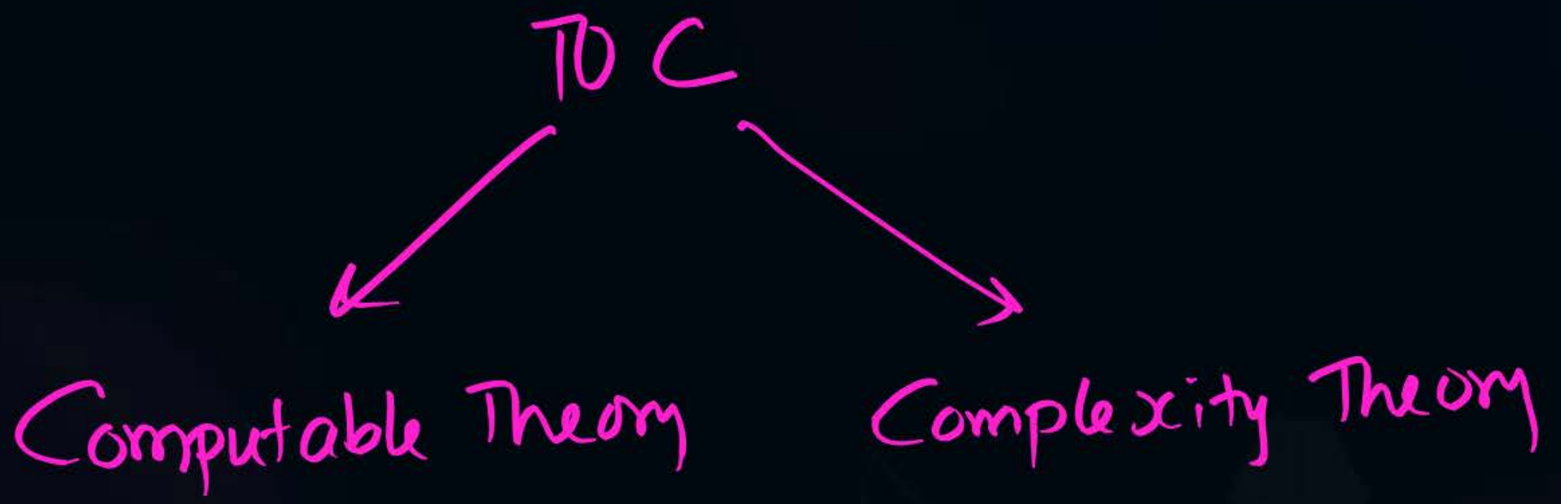
Model

↙ Grammar ↘ Machine

→ It is a Subject which helps to understand "what are the problems computable".

→ It also helps how better Computable

TOPIC:



TOPIC:

Alphabet (Σ)

- It is set
- It is collection of finite no. of Symbols

Σ → Alphabet

a → Symbol

$\Sigma = \{a, b\}$

$\Sigma = \{0, 1, 2\}$

$\Sigma = \{a, b, 2, e\}$

$\Sigma = \{*, (, a, ;\}$

TOPIC:

String over Σ :

(Σ is given)

$\Sigma = \{a, b\}$

- It is finite Sequence of symbols

ababb

5 length string

TOPIC:

Language (set) over Σ :

↳ collection of Strings

$\Sigma = \{a, b\}$

Strings ⇒ $\underbrace{\varepsilon}_{\text{empty}}$, a, b, aa, ab, ba, bb, aaa, ...

Languages ⇒ $\{\}$, $\{\varepsilon\}$ $\{a, \varepsilon\}$, $\{a, b, aa, aba\}$

$\{a, b\} = \{b, a\}$

$ab \neq ba$

Set (unordered): $\{o_1, o_2, o_3\} = \{o_2, o_1, o_3\}$

Sequence (ordered): $o_1 o_1 o_2 \neq o_2 o_1 o_1$

2 mins Summary

- Topic: Strings
- Topic: Languages
- Topic: Chomsky Hierarchy
- Topic: Grammar
- Topic: Automata

Next

Slide

THANK - YOU