RRB JE | SSE 2023

Foundation Batch

Analog Electronics

Day-2

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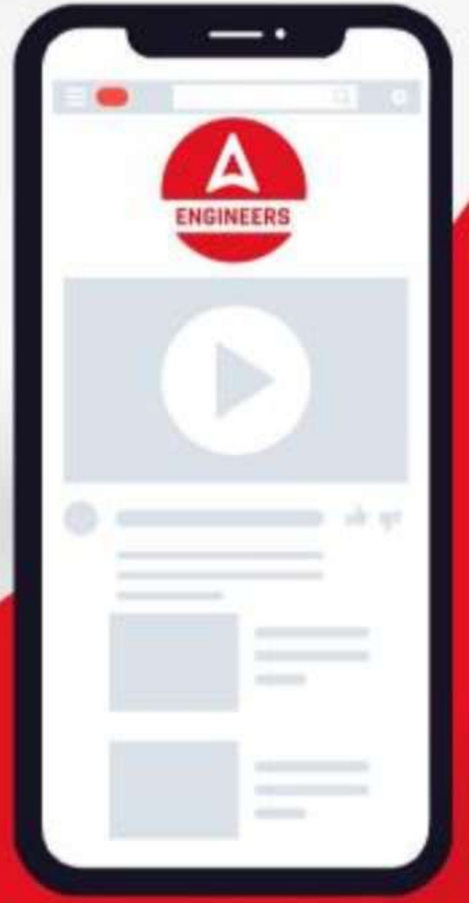

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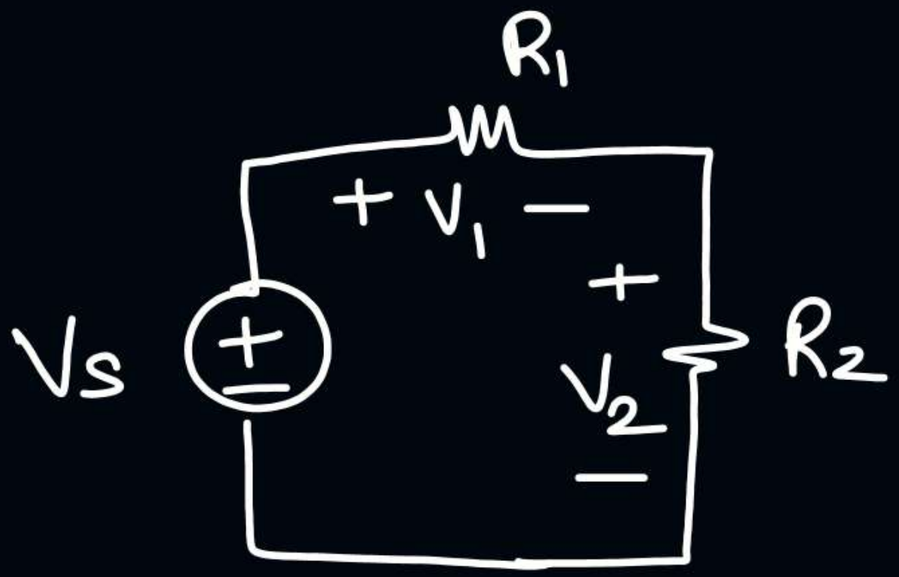
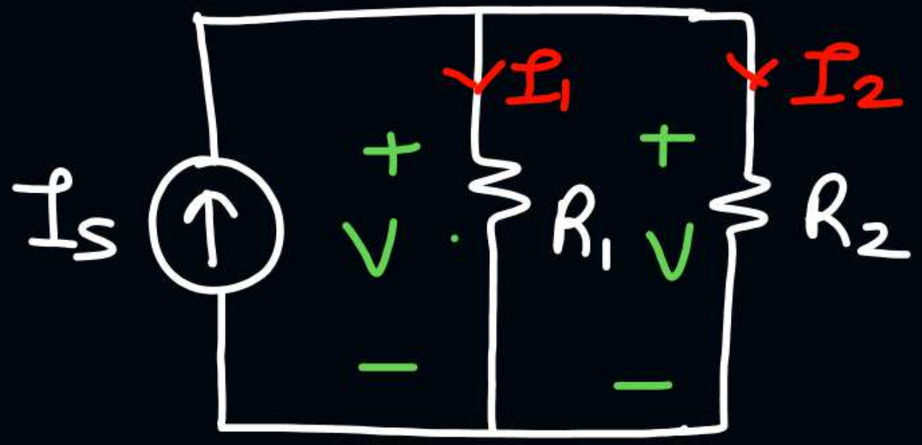




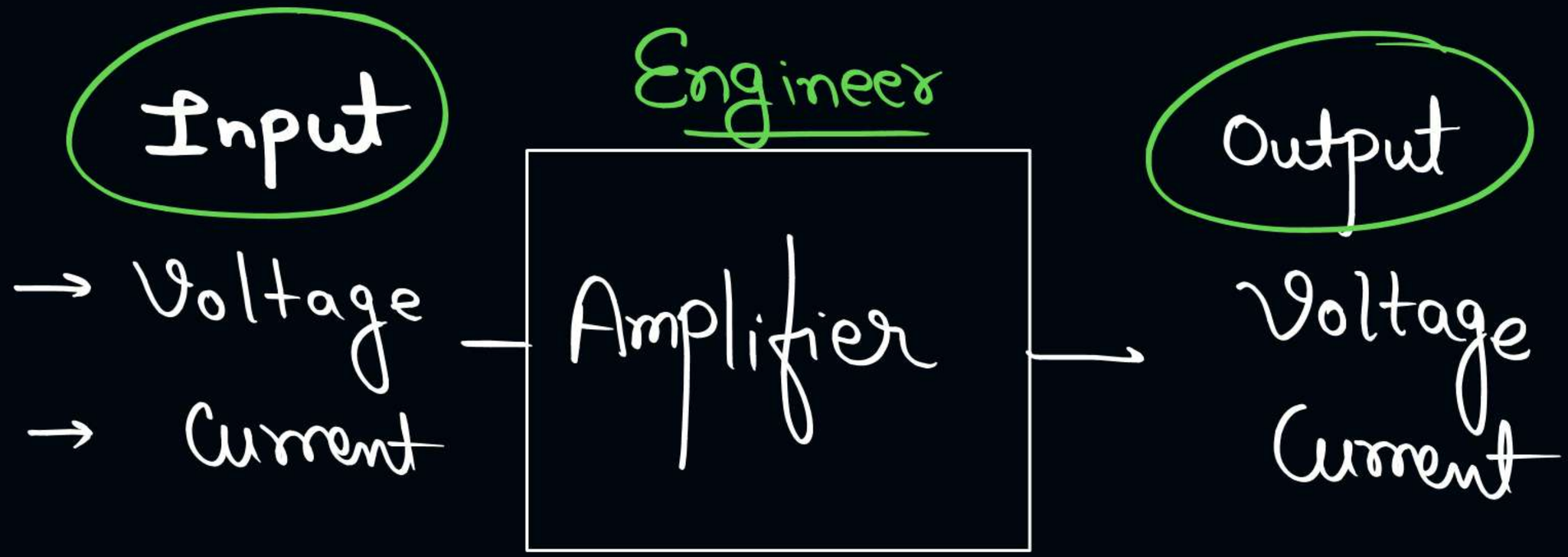
$$V_2 = \frac{R_2}{R_1+R_2} \cdot V_s$$

$$V_1 = \frac{R_1}{R_1+R_2} \cdot V_s$$

$$I_1 = \frac{R_2}{R_1+R_2} \cdot I_s$$

$$I_2 = \frac{R_1}{R_1+R_2} \cdot I_s$$

Type of Amplifier:



(1)

Input → Voltage

Output → Voltage

① Voltage Amplifier

$$\text{Gain} = \frac{\text{Output}}{\text{Input}} = \frac{V_o}{V_i} \quad \frac{\text{volt}}{\text{volt}}$$

$$\text{Gain} = \frac{V_o}{V_i} \text{ (unit less)}$$

Input → Current

Output → Voltage

$$\text{Gain} = \frac{\text{Output}}{\text{Input}}$$

$$\text{Gain} = \frac{V_o}{I_i} \quad \frac{\text{volt}}{\text{amp}} \quad \text{or} \quad \Omega \rightarrow \text{Resistor}$$

Gain

$$R_m = \frac{V_o}{I_i} \ \Omega$$

$\rightarrow$ Transresistor Amplifier

(3): Input = Voltage

Output = Current

$$\text{Gain} = \frac{\text{Output}}{\text{Input}}$$

$$\text{Gain} = \frac{I_o}{v_i} \quad \frac{\text{amp}}{\text{volt}} \quad \text{or} \quad \upsilon \rightarrow \text{Conductance}$$

$$G = \frac{1}{R}$$

$$G_m = \frac{I_o}{v_i} \upsilon \rightarrow$$

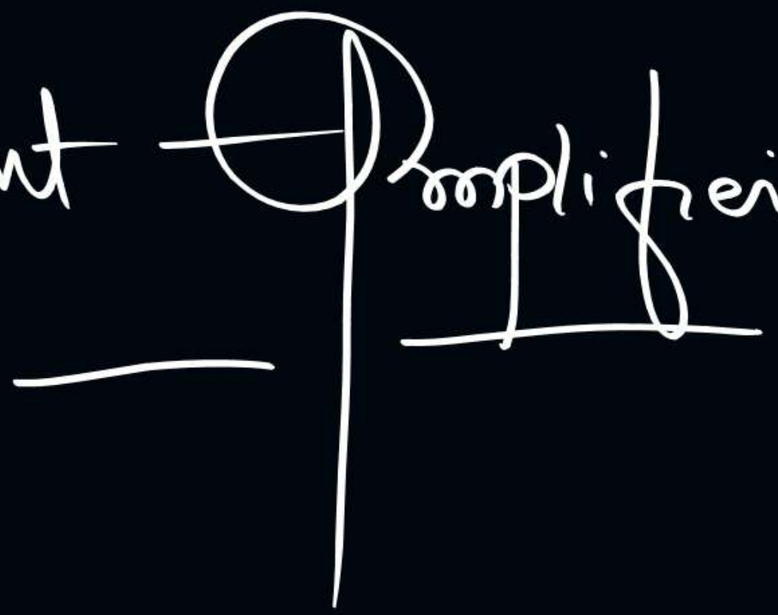
Transconductance Amplifier

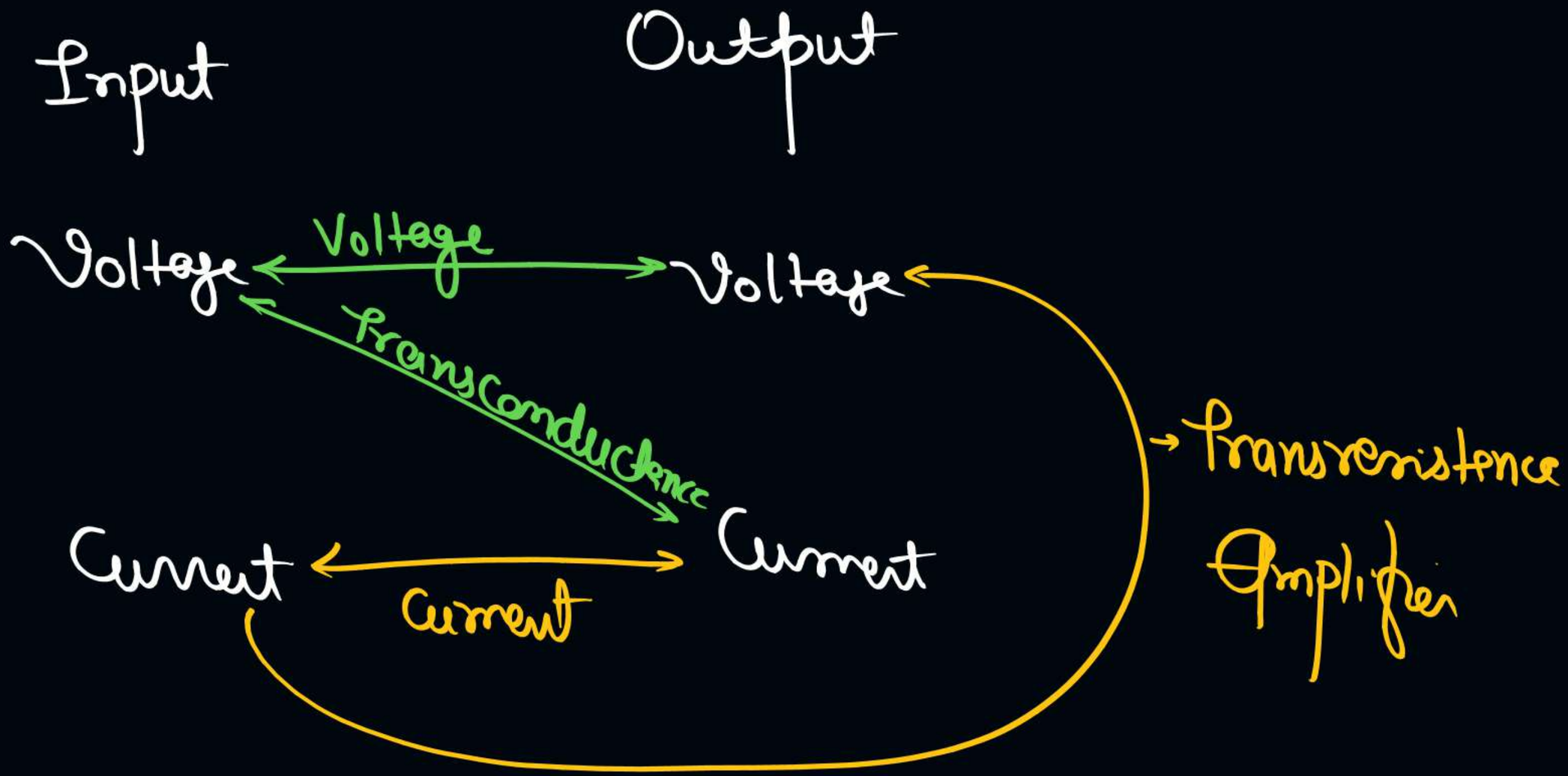
Input → current

Output → current

$$\text{Gain} = \frac{I_o}{I_i} \quad \frac{\text{amp}}{\text{amp}} \quad \text{(unit less)}$$

$\therefore$ Current Amplifier





Amplifier	Input	Output	Gain
Voltage	v_i	v_o	$\frac{v_o}{v_i}$ (unit less)
Transconductance $G_1 = (\mho)$	v_i	I_o	$\frac{I_o}{v_i}$ $(\mho)$
Transresistance $R\ (\Omega)$	I_i	v_o	$\frac{v_o}{I_i}$ (Ω)
Current	I_i	I_o	$\frac{I_o}{I_i}$ (unit less)

Q: The unit of Transconductance Amplifier is

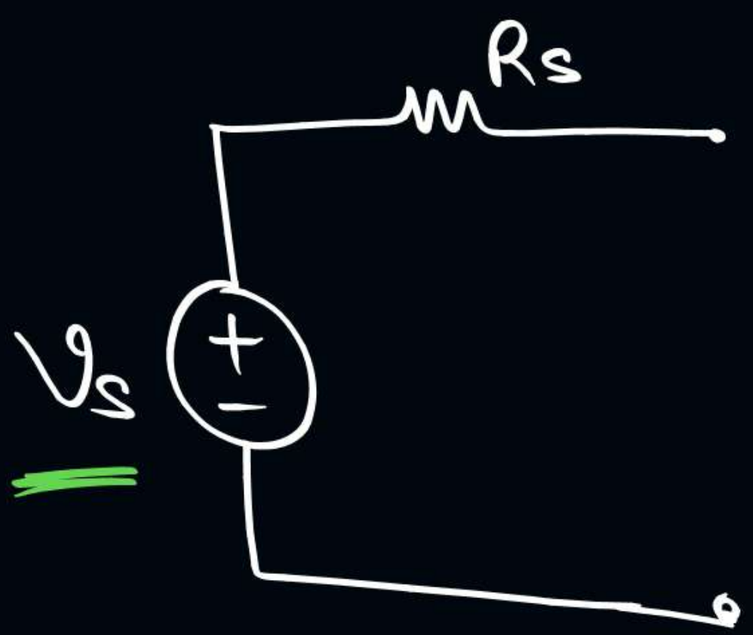
a) Ω (ohm)

b) unit less

c) ℧ (mho)

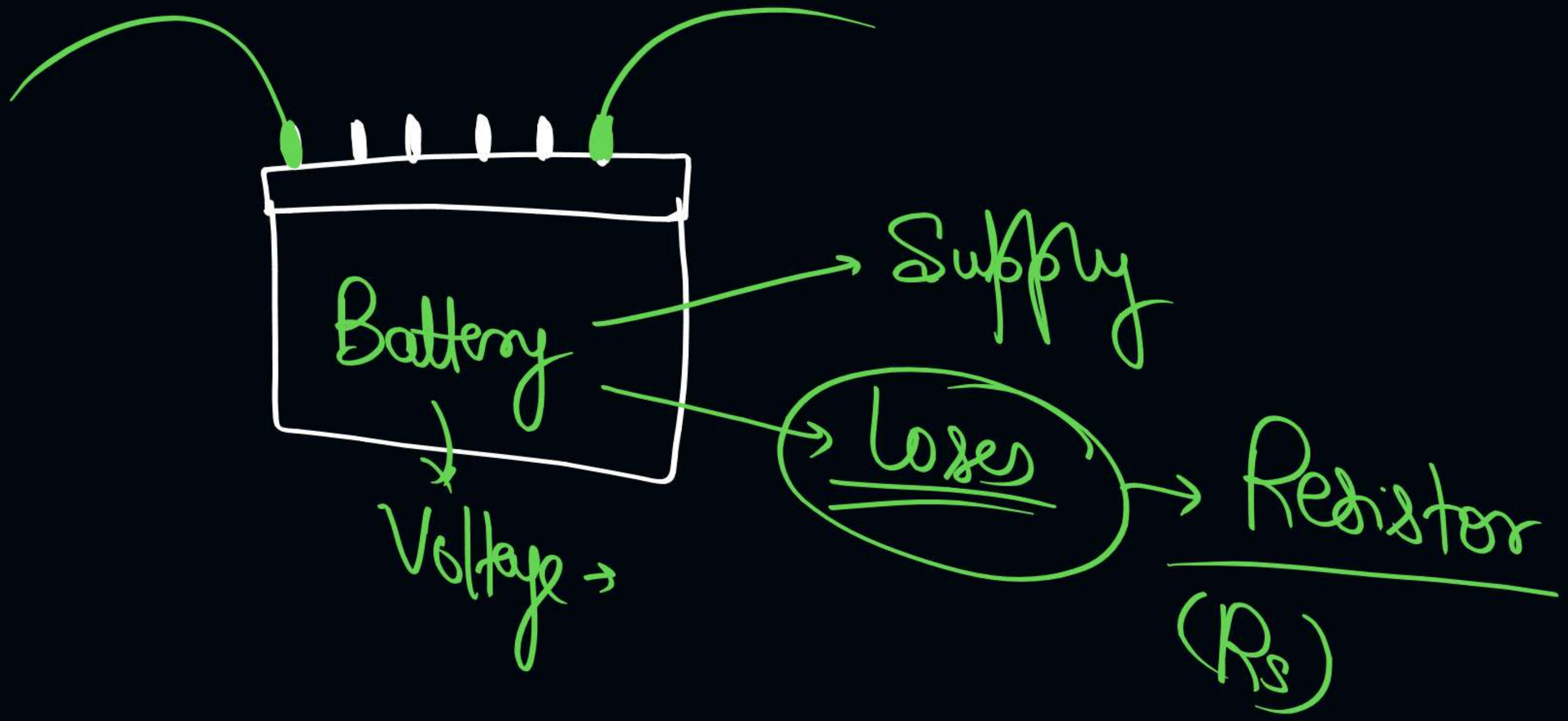
d) amp

Voltage Source



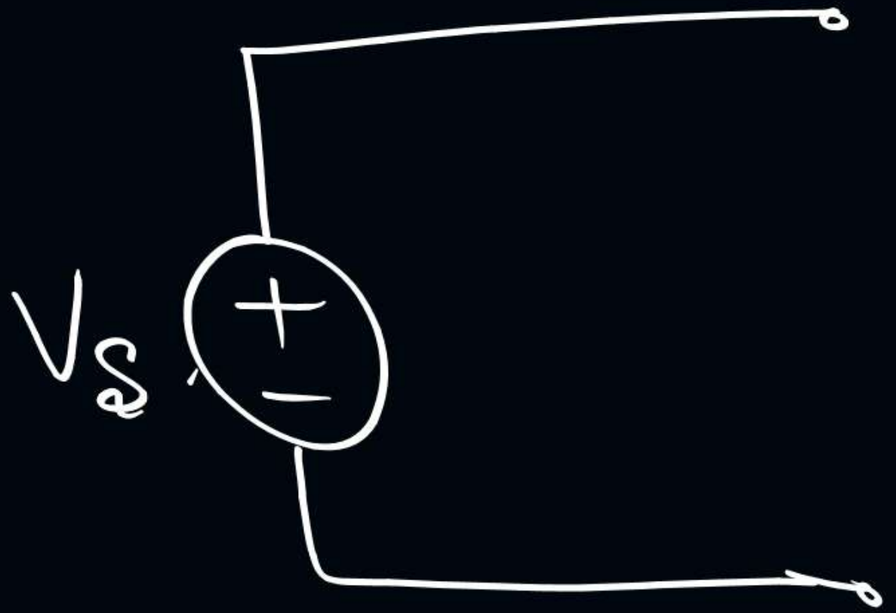
→ Practical Voltage Source

When, R_s → Internal Resistence of Voltage Source.



Ideal Voltage Source:

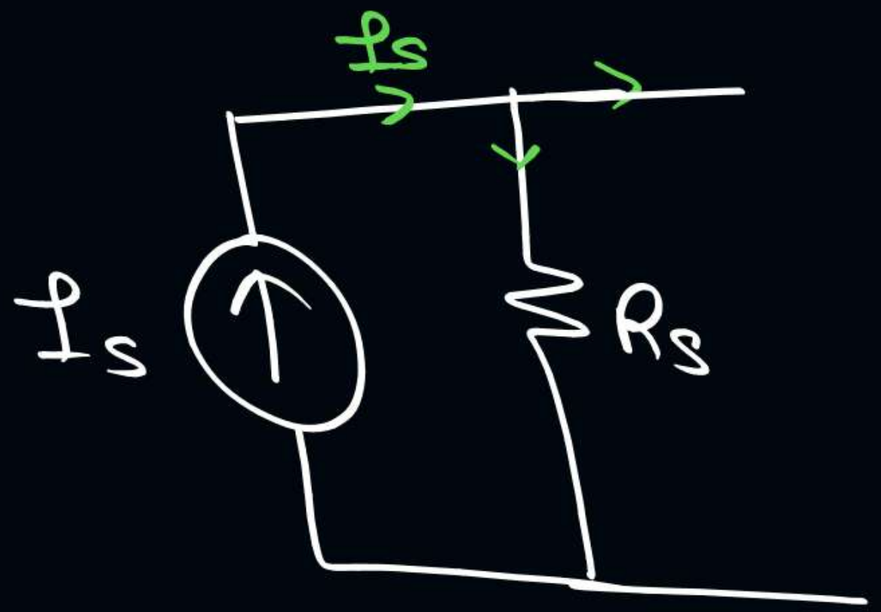
$R_S = 0$



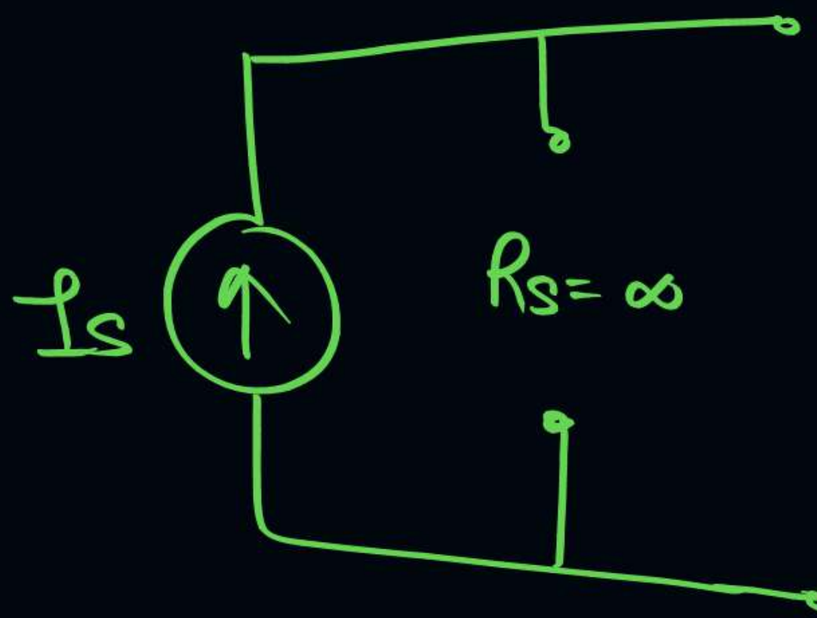
→ Ideal Voltage Source

Current Source:

→ Current



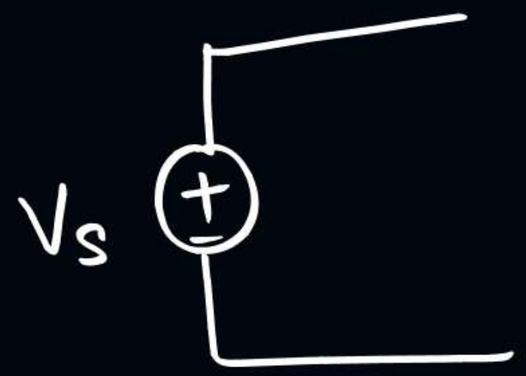
R_s → Internal Resistance of Current Source



⟶ Ideal Current Source

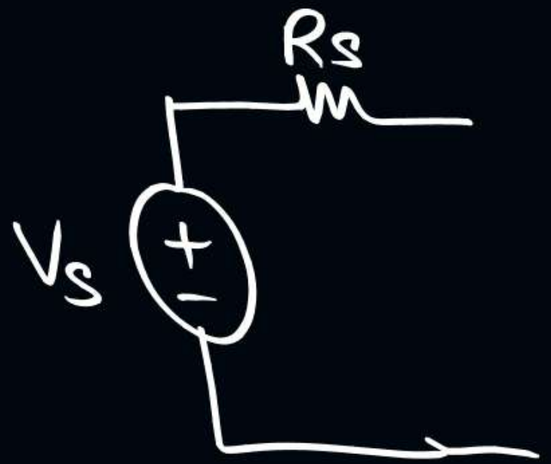
$R_S = \infty$ Ω

Ideal Voltage



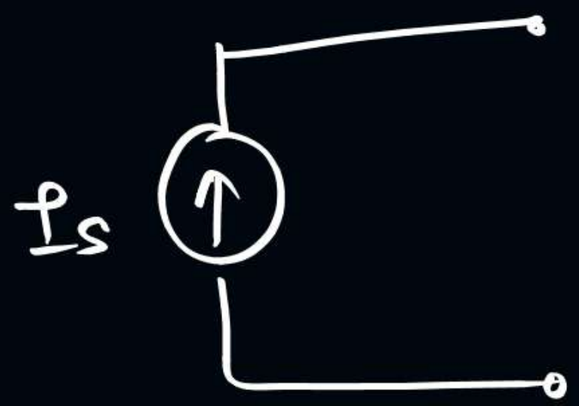
$R_s = 0$

Practical Voltage Source



R_s = V.V. low

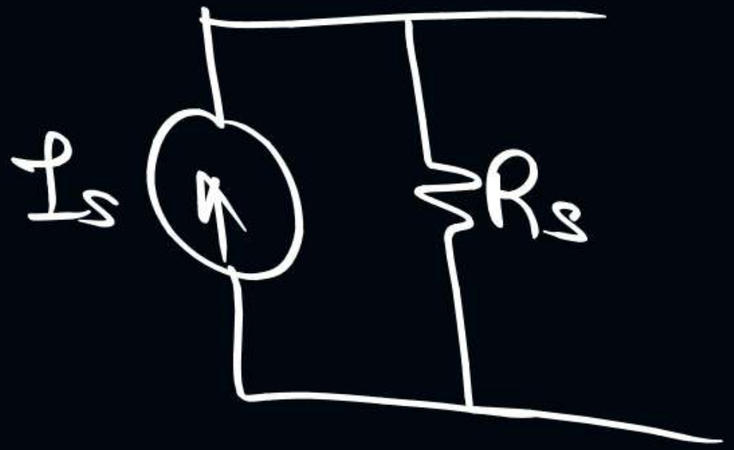
Ideal Current



Internal Resistance

$R_s = \infty$

Practical Current Source



R_s = v. v. high

Q: The internal Resistance of Practical Voltage Source is

(Kilo-ohm)

a) ∞

b) 10Ω

c) 0Ω

d) 100KΩ

Input Resistance of

Output Resistence of

Voltage Amplifier

=

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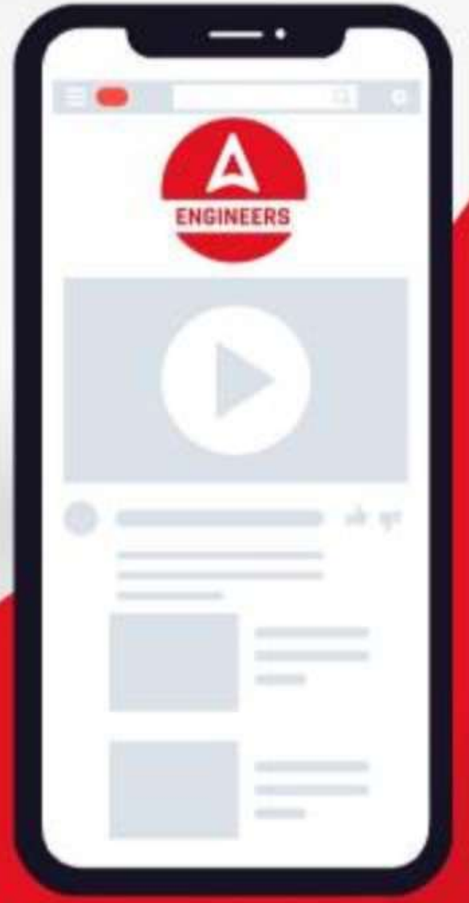

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