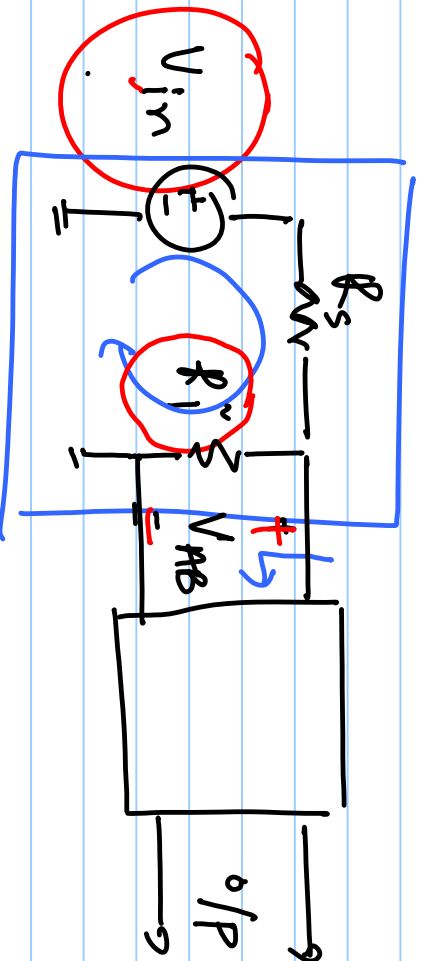


EE2019: Analog Systems.

Lecture #1

- Electrical fan → speed
- Speakers → loudness
- tube lights → brightness
- Display of phone → brightness

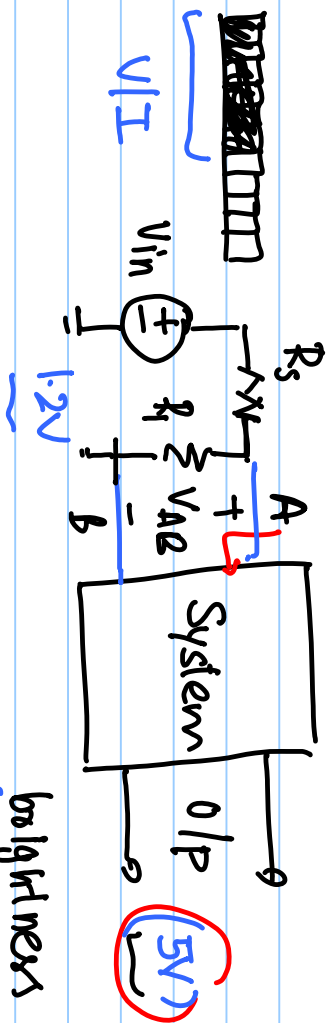
Control



(output) o/p ← V_{AB}

$$V_{AB} = \frac{R_1}{R_1 + R_s} V_{in}$$

$$V_{in} = \frac{1}{1 + \left(\frac{R_s}{R_1}\right)} V_{in}$$



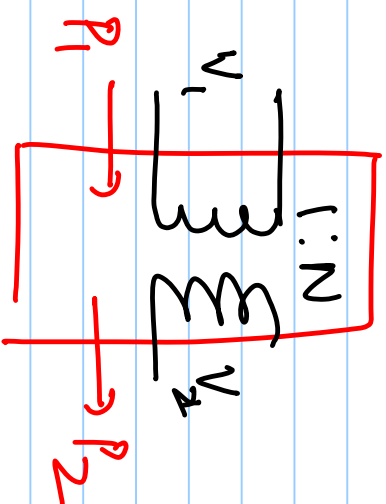
brightness
Current/Voltage

Max. output \rightarrow $V_{AB} = V_{in}$
 Min. output \rightarrow 0

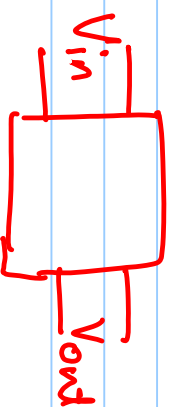
$R_1 \rightarrow \infty \Rightarrow V_{AB} = V_{in}$
 $R_1 \rightarrow 0 \Rightarrow V_{AB} = 0$

Power Consumed, $P = \frac{V_{in}^2}{R_s + R_1}$

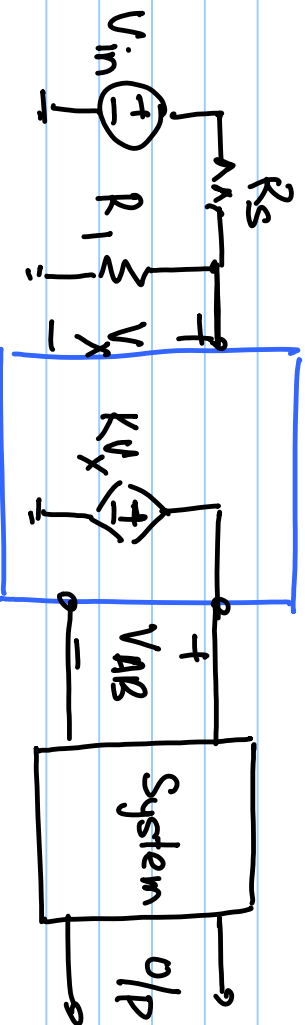
Max. Power = $\frac{V_{in}^2}{R_s}$



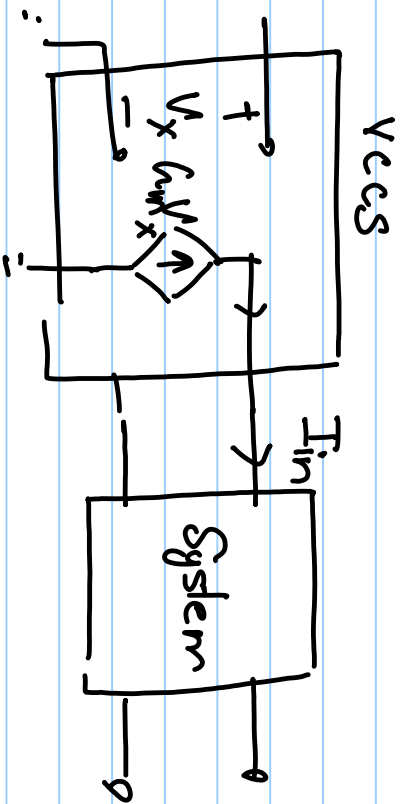
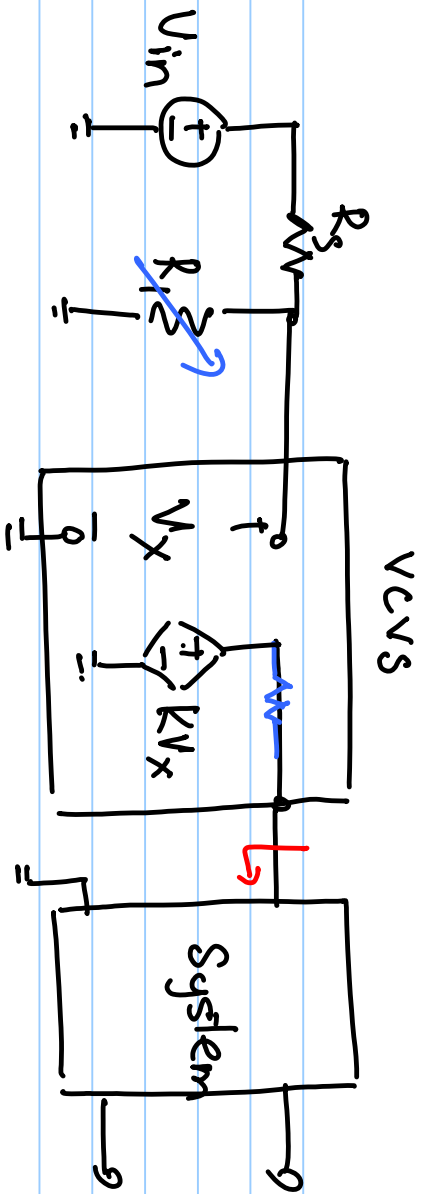
Min. power = 0



$V_{out} = R V_{in}$



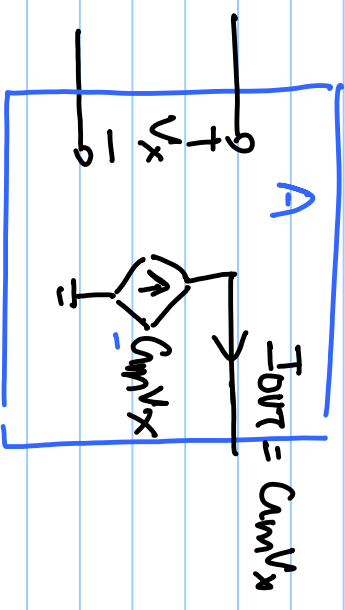
$V_{AB} = KV_x = K \cdot \frac{R_1}{R_1 + R_s} V_{in}$

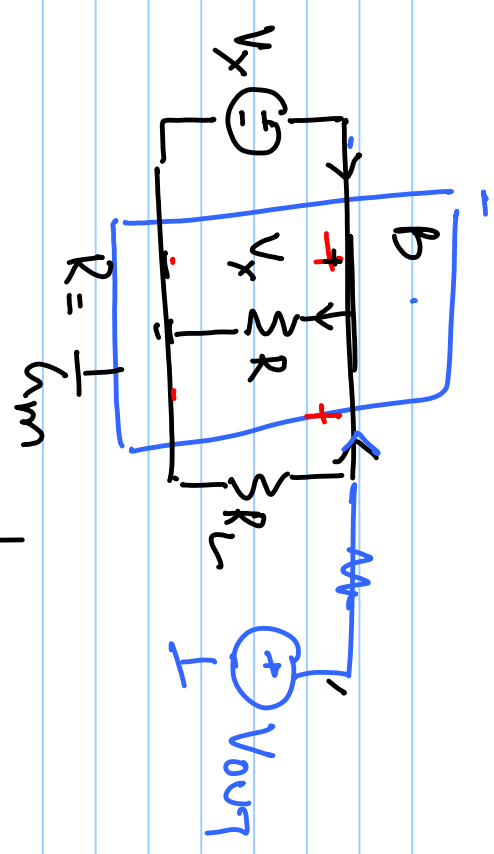
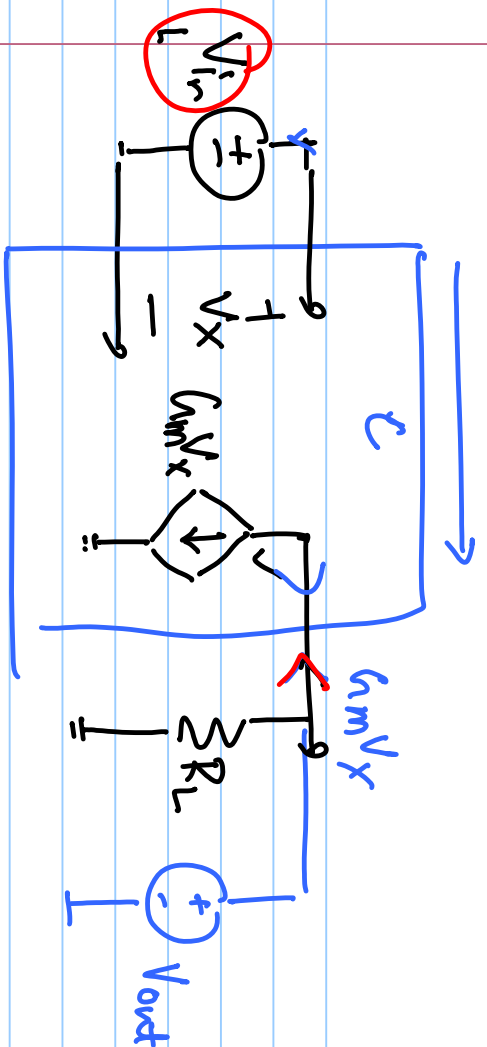


VCCS: Voltage Controlled current source

$$V_x = \frac{I_x}{R}$$

$$I = \frac{1}{R} V_x$$



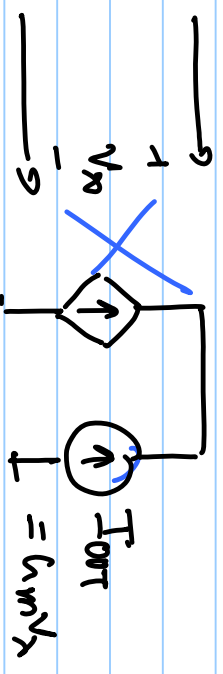
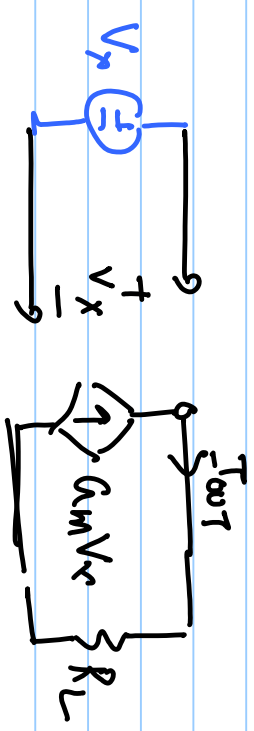


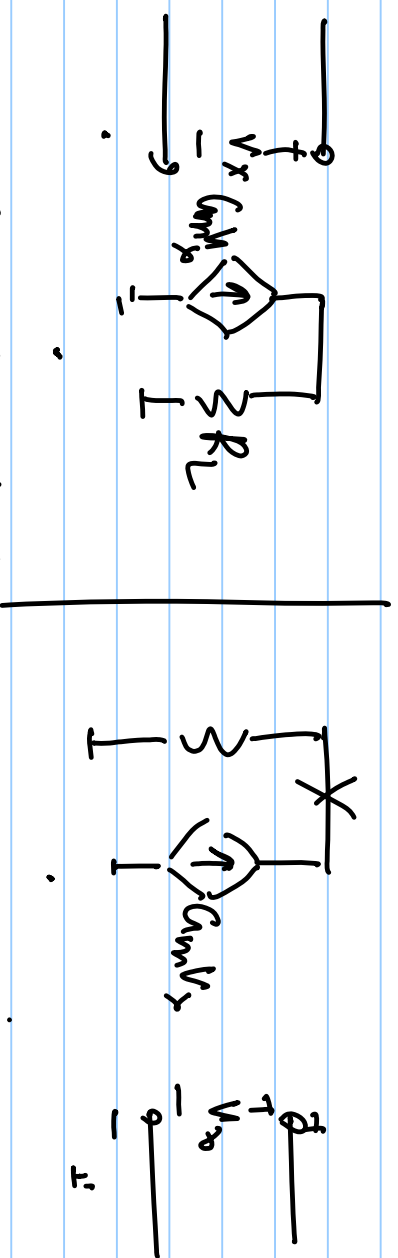
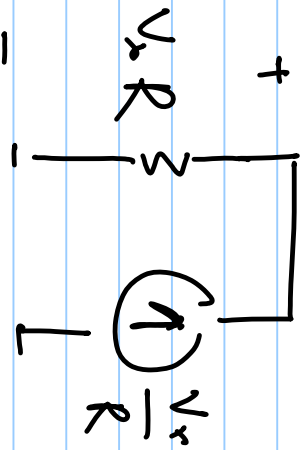
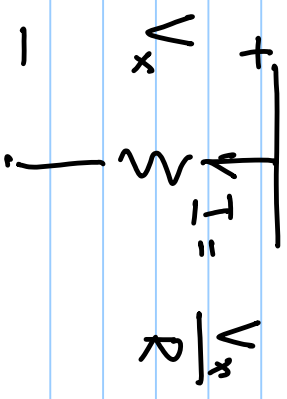
$$I_n = \frac{V_{oc}}{R_n}$$

$$R = f(V, I)$$

$G_m = f(V, I)$ for controlled source.

VCVS } Unilateral controlled sources
 VCCS }





CCCS : Current Controlled Current

CCVS