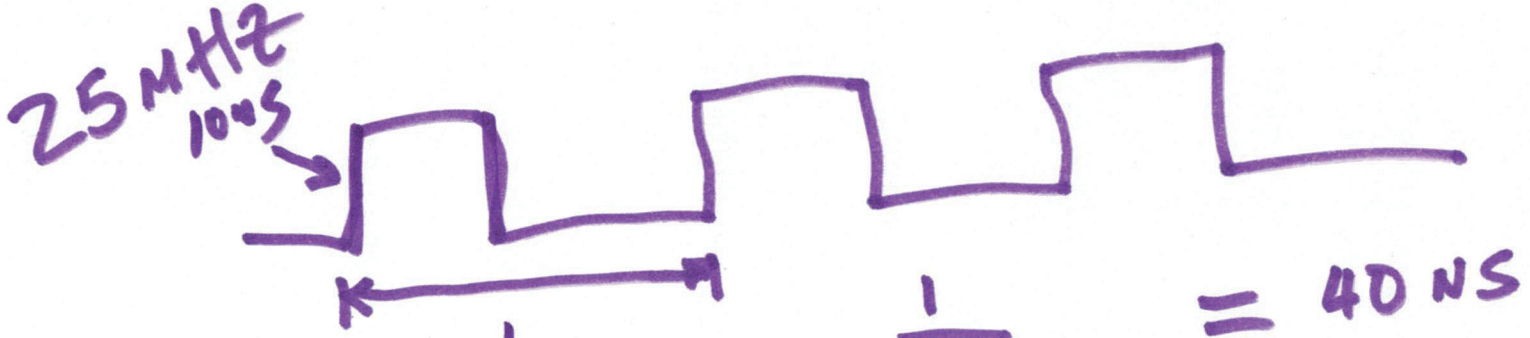
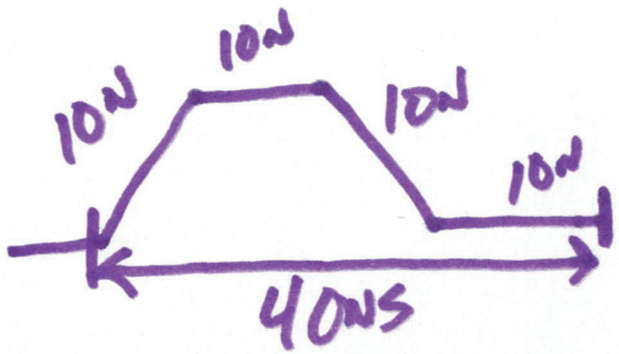
EE 220 Circuits I

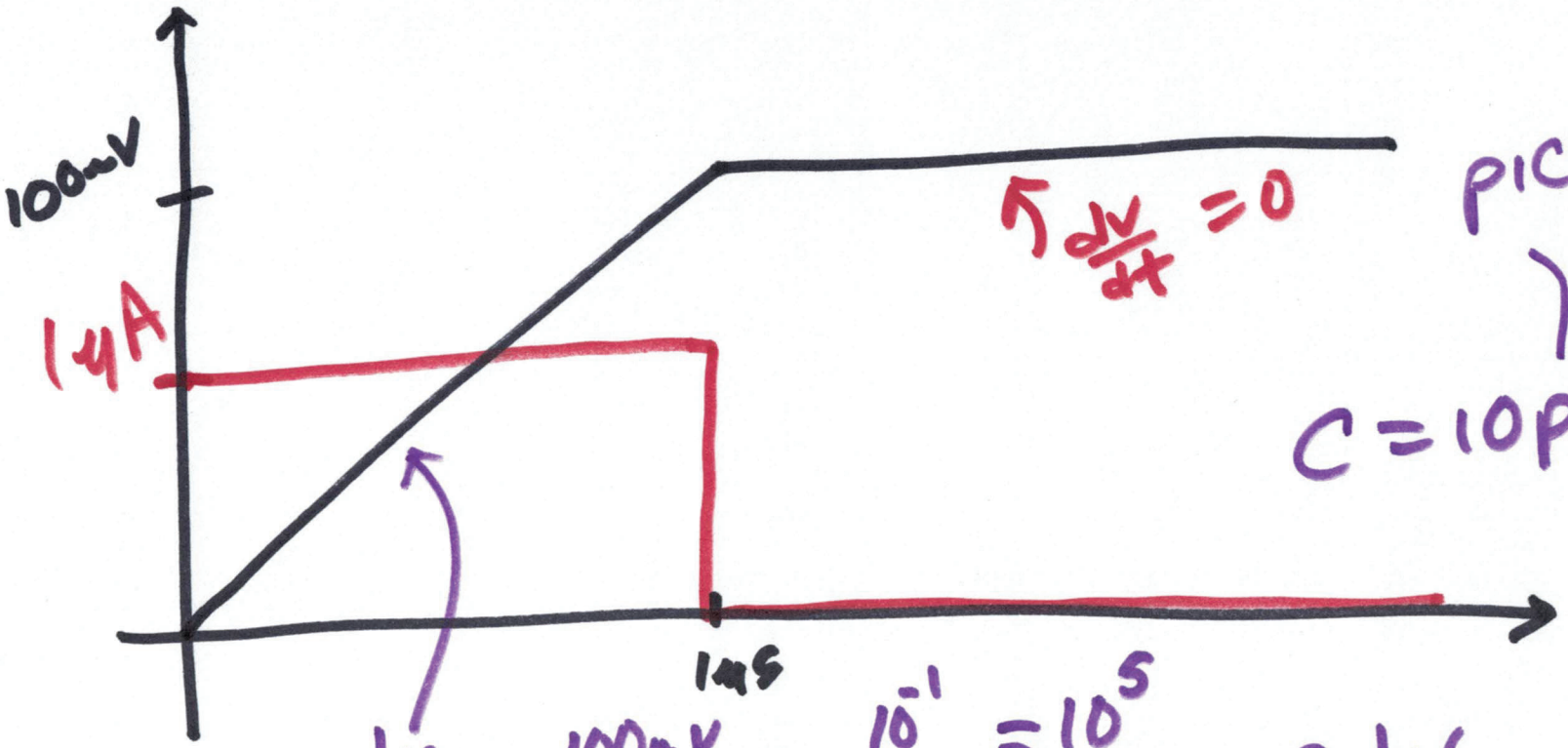
Lecture 16

OCT. 26, 2022





50%



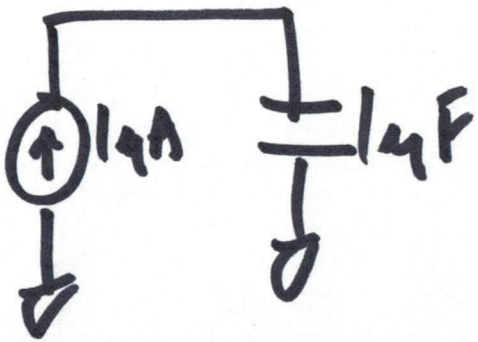
$\frac{dV}{dt} = 0$

PICO

$C = 10pF = 10^{-11}$

$\frac{dV}{dt} = \frac{100mV}{1\mu s} = \frac{10^{-1}}{10^{-6}} = 10^{5}$

$I = C\frac{dV}{dt}$

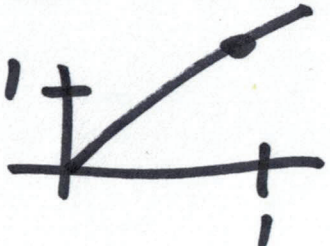


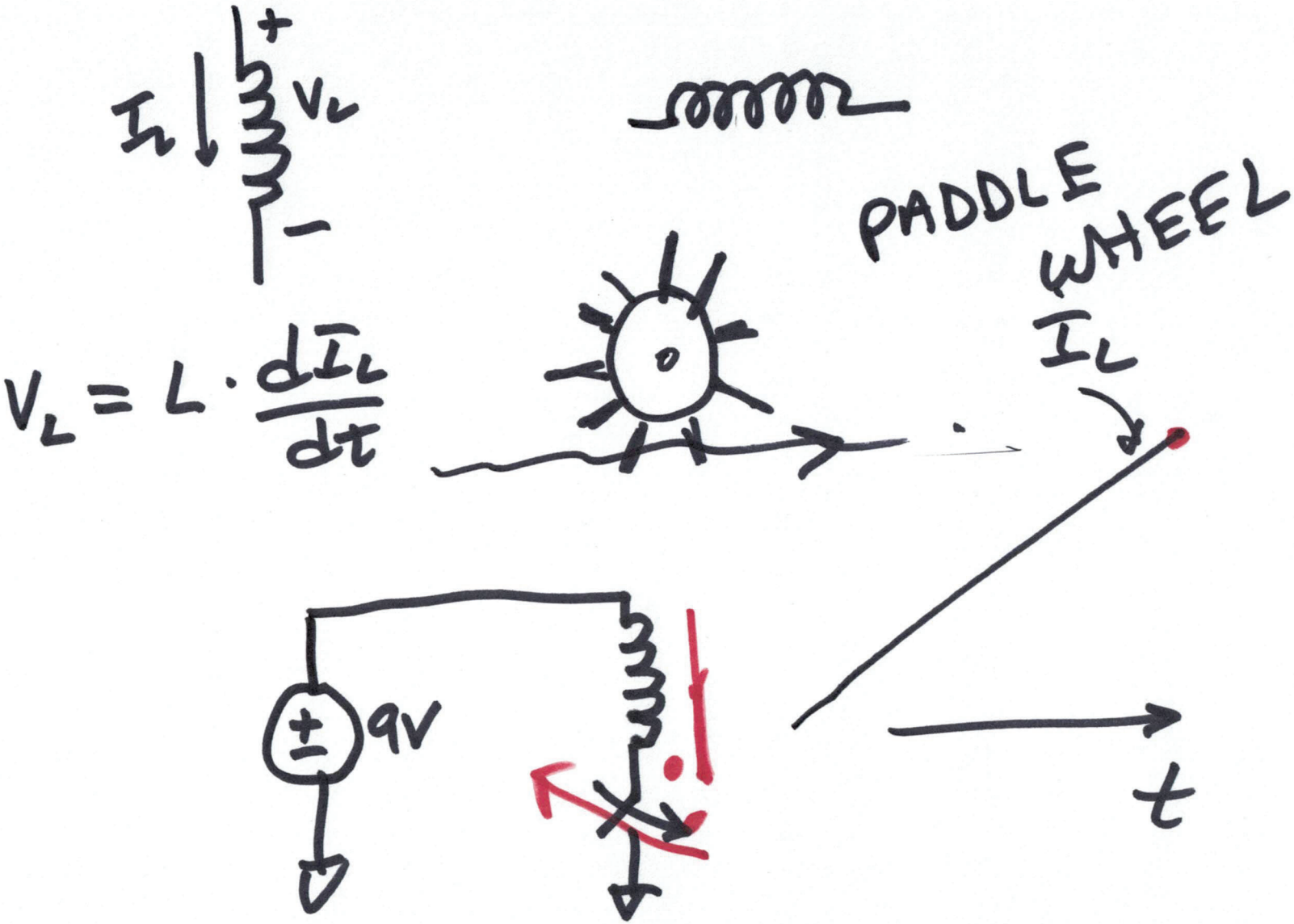
$I = 10^{-11} \cdot 10^{5} = 10^{-6}\ A$

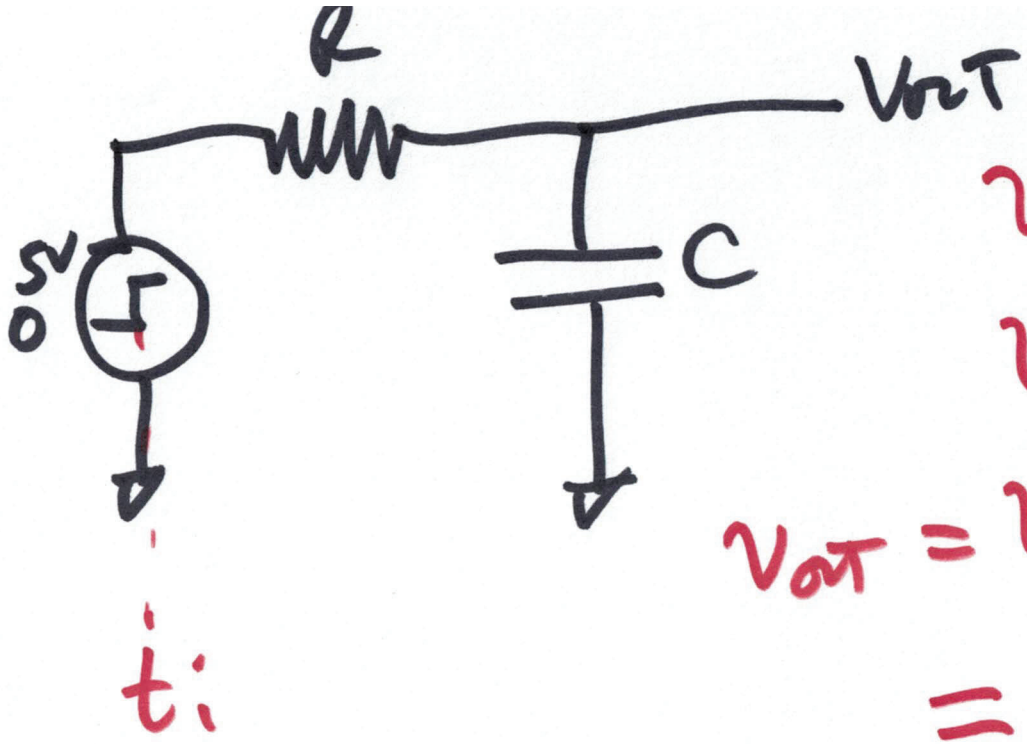
$1\mu A = 1\mu F \cdot \frac{dV}{dt}$

$I = 1\mu A$

$\frac{dV}{dt} = \frac{1V}{s}$




+
I_L
V_L
−
$V_L = L \cdot \frac{dI_L}{dt}$
PADDLE WHEEL
I_L
9V
t



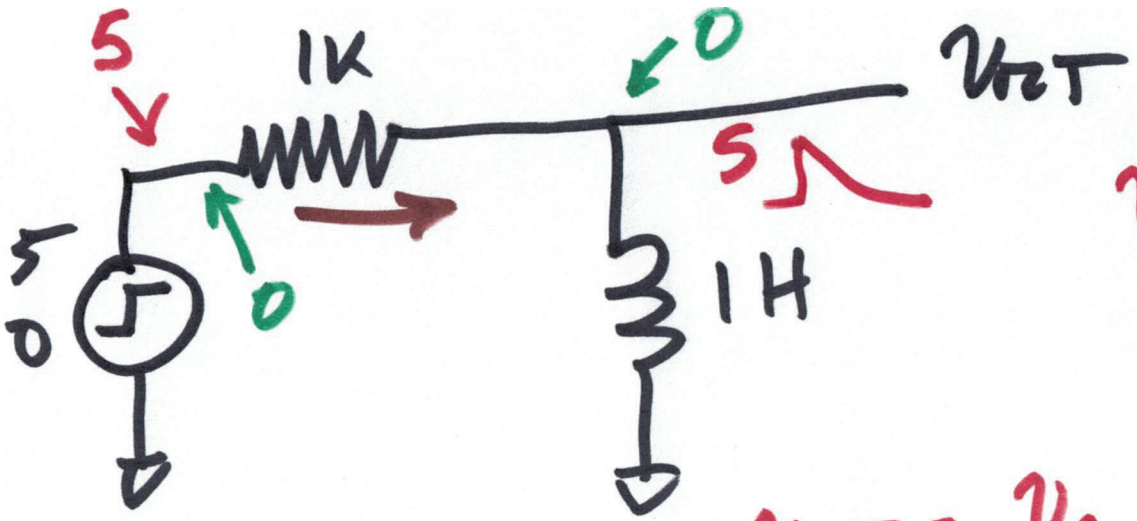
$$v_i = 0$$

$$v_f = 5$$

$$v_{OUT} = v_f + (v_i - v_f)e^{-(t-t_i)/RC}$$

$$= 5(1 - e^{-t/RC}) \quad t \geq 0$$

$$t_i = 0$$



$v_i = 5 \quad \tau = \frac{L}{R}$

$v_f = 0$

$v_{OUT} = v_f + (v_i - v_f)e^{-t/L/R}$

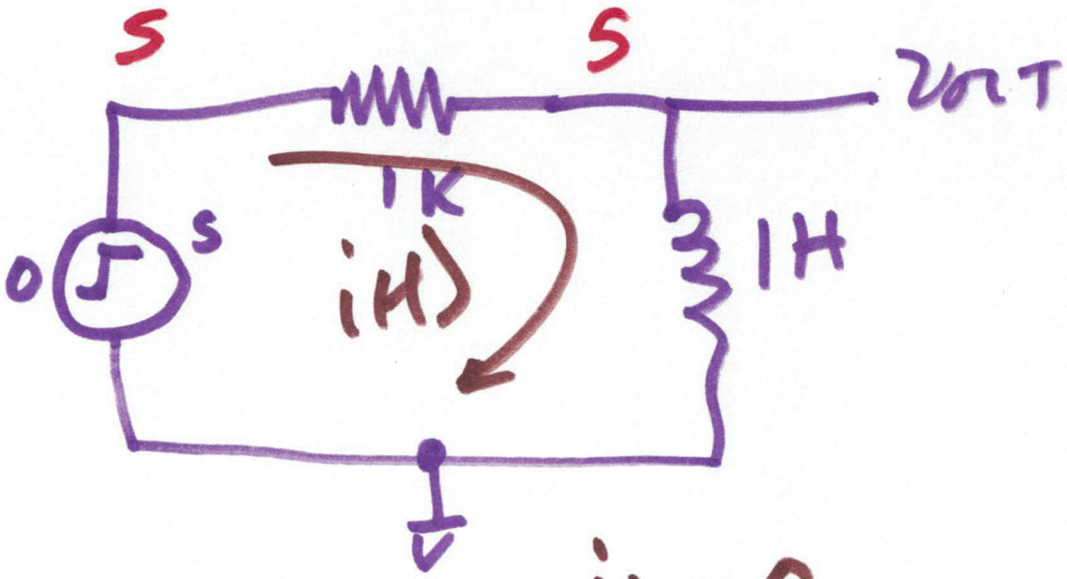
$= 5e^{-t/1ms} \quad t \geq 0$

$10^{-3} = \frac{L}{R} = \frac{1}{1K} = 1ms$

$i(H) = \frac{5 - v_{OUT}}{1K}$

$= \frac{5 - 5e^{-t/1ms}}{1K} \quad -t/1ms$

$= 5mA - 5mAe$



$v_i = 5V$

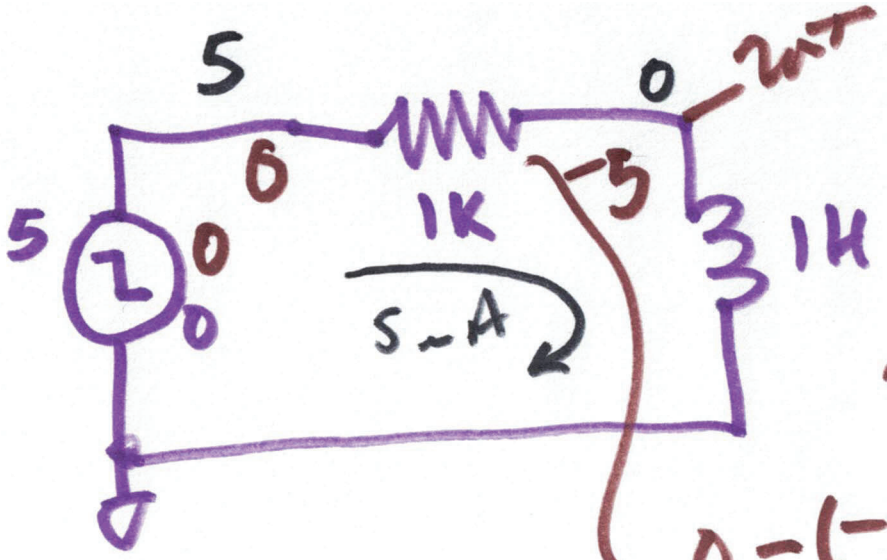
$v_f = 0$

$i_i = 0$

$i_f = 5\text{mA}$

$$i(t) = i_f + (i_i - i_f)e^{-t/L/R}$$

$$= 5\text{mA}\left(1 - e^{-t/1\text{ms}}\right)$$



$v_i = -5$ ✓

$v_f = 0$

$v_{out} = v_f + (v_i - v_f)e^{-t/L/R}$

$\frac{0-(-5)}{1K} = 5\text{-}A$

$v_{out} = -5e^{-t/1\text{-}s}$