
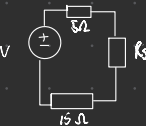
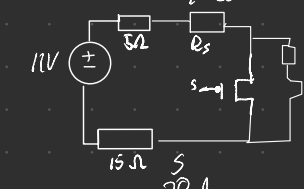
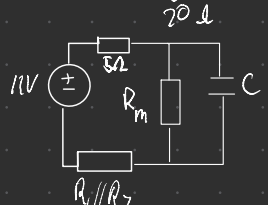


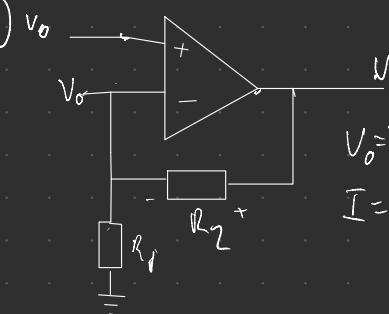


1) a)  $u = k \cdot v = k \cdot i \cdot R = 10 \cdot \frac{12V}{20\Omega} \cdot 15\Omega = \frac{90}{20} \text{ rpm}$
 $i = \frac{12V}{20\Omega}$

b)  $u = k \cdot v \Rightarrow v = \frac{u}{k} = \frac{33}{10} = 3.3V$
 $I = \frac{3.3V}{15\Omega} = 0.22A$
 $V_{R_S} = 12V - 3.3V - 1.1V = 7.6V$
 $R_S = \frac{7.6V}{0.22A} = \underline{\underline{34.5\Omega}}$

c)  $u = k \cdot v \Rightarrow v = \frac{u}{k} = \frac{45}{10} = 4.5V$
 $I = \frac{4.5V}{15\Omega} = 0.3A$
 $V_{R_S} = 11V - 4.5V - 1.5V = 5V$
 $R_S = \frac{5V}{0.3A} = \underline{\underline{16.7\Omega}}$

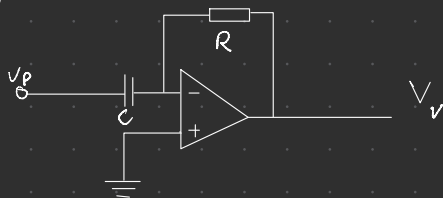
d)  $v(t) = 4.5 + (3.3 - 4.5)e^{-\frac{t}{RC}} = 4.5 - 1.2e^{-\frac{t}{RC}}$
 $v(0) = 3.3V$
 $v(\infty) = 4.5V$
 $e^{-\frac{t}{RC}} = \frac{0.5}{1.2}$
 $C = -\frac{1}{40 \cdot \ln\left(\frac{0.5}{1.2}\right)} = \underline{\underline{0.029F}}$

e)  $V_0 = V_A - V_{R_2} = I \cdot R_2 \Rightarrow V_A - \frac{V_A R_2}{R_1 + R_2} = V_A \left(1 - \frac{R_2}{R_1 + R_2}\right)$
 $I = \frac{V_A}{R_1 + R_2}$
 $R_2 = 1k\Omega$
 $R_1 = 9k\Omega$
 $\frac{R_2}{R_1 + R_2} = \frac{9}{10}$
 $10R_2 = 9R_2 + 9R_1$
 $R_2 = 9R_1$

$$\begin{aligned}
 06) \quad P &= \frac{1}{2T} \int_0^T v(t)^2 dt & P &= \frac{a}{2T} \int_0^T (1 + \cos(4\pi t)) dt \Rightarrow \left[t - \frac{1}{4\pi} \sin(4\pi t) \right]_0^T \\
 v_s(t) &= 3 \cdot \cos(2\pi f t) & P &= \frac{a}{2RT} \cdot \left(T - \frac{T}{4\pi} \sin(4\pi) \right) \\
 v_s(t)^2 &= 9 \cdot \cos^2(2\pi f t) & P &= \frac{a}{2R} - \frac{a}{8RT} \cdot \sin(4\pi) = \underline{\underline{9mW}} \\
 \cos^2(x) &= \frac{1}{2} (1 + \cos(2x))
 \end{aligned}$$

0a) D-vippe $\xrightarrow{\text{CLK}}$  CLK start
an sensor

3a)



$$\begin{aligned}
 i_R &= i_C \\
 -\frac{v_v}{R} &= C \dot{v}_p \\
 v_v &= -RC \dot{v}_p \\
 \underline{\underline{v_v}} &= \underline{\underline{-T \dot{v}_p}}
 \end{aligned}$$

b) I
$$\begin{aligned}
 v_v &= -TA \frac{dv_p}{dt} \\
 v_v &= -1 \cdot \frac{1}{20} \cdot (-15) = \underline{\underline{1,25 V}}
 \end{aligned}$$

II
$$\begin{aligned}
 v_T &= v_{DD} \frac{R_2}{R_1 + R_2} \\
 v_T R_1 + v_T R_2 - v_{DD} R_2 &= 0 \\
 R_2 &= R_1 \frac{v_T}{v_{DD} - v_T} = 1000 \frac{1,25}{5 - 1,25} = \underline{\underline{333 \Omega}}
 \end{aligned}$$

c) Bytte R_1 og R_2 med et
potensiometer