Exam 22.12.2008: Problems 1,3,4,7,9
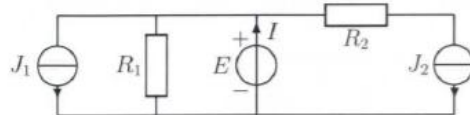**1. Mid-Term:** Problems 1,2,3,4,5   **2. Mid-Term:** Problems 6,7,8,9,10
You may choose not more than four problems/exam or mid-term, but you are allowed to include each answer both in the mid-terms and the exam (you may take the exam and mid-term simultaneously)! The highest point combination will set your course mark.
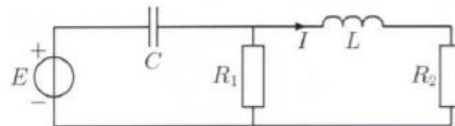
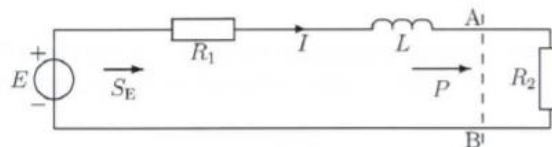**1.** Find current I. $R_1 = 2\,\Omega$, $R_2 = 4\,\Omega$, $E = 10$ V, $J_1 = 2$ A, $J_2 = 3$ A

2. The switch is closed at $t = 0$. How long does it take for $u_2(t)$ to reach 90 % of its maximum? $R_1 = 3\,\Omega$, $R_2 = 6\,\Omega$, $C = 0{,}22$ F, $U_{C0} = 0$ V.
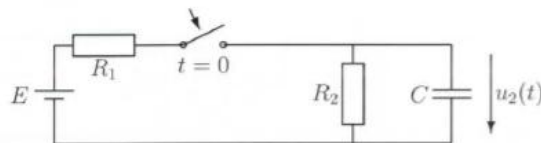
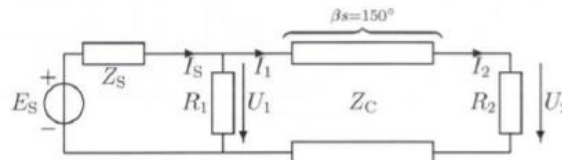**3.** Find current I. $E = 6\angle 0°$ V, $R_1 = 4\,\Omega$, $R_2 = 2\,\Omega$, $L = 0.2$ H, $C = 50$ mF, $\omega = 10\,\frac{1}{s}$.

4. The average power flowing from left to right through plane A-B equals $P = 80$ W. Find the complex power S_E taken from the voltage source. $R_1 = 10\,\Omega$, $R_2 = 20\,\Omega$, $L = 5$ H, $\omega = 4\,\frac{1}{s}$.

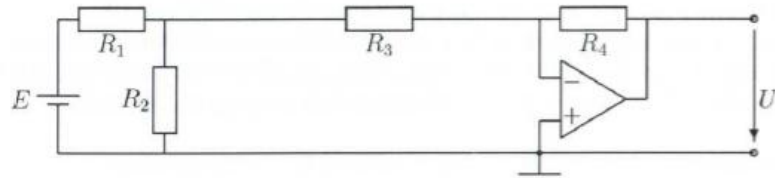**5.** Find current I_S of a sinusoidal signal source if the load current equals $I_2 = 1\angle 0°$ A. Use the transmission line equations. $R_1 = 10\,\Omega$, $R_2 = 20\,\Omega$, $Z_C = 60\,\Omega$.
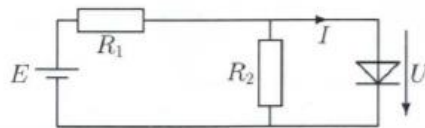

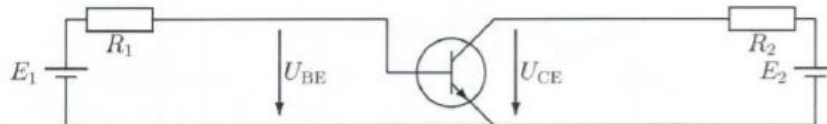**Answer only four problems.** Solutions can be found in Noppa. Next exam on Jan. 14th.
Turn

6. Find output voltage U of the operational amplifier. $R_1 = 10\text{ k}\Omega$, $R_2 = 20\text{ k}\Omega$, $R_3 = 10\text{ k}\Omega$, $R_4 = 100\text{ k}\Omega$, $E = 1\text{ V}$.

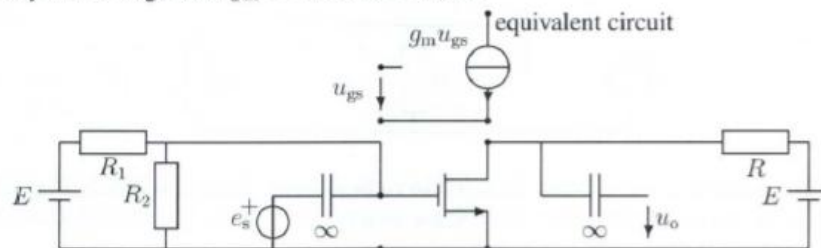**7.** Find E, corresponding $I = 1{,}20\text{ mA}$? $R_1 = 240\ \Omega$, $R_2 = 42\ \Omega$, $I_\text{S} = 1\text{ nA}$, $nU_T = 50\text{ mV}$.
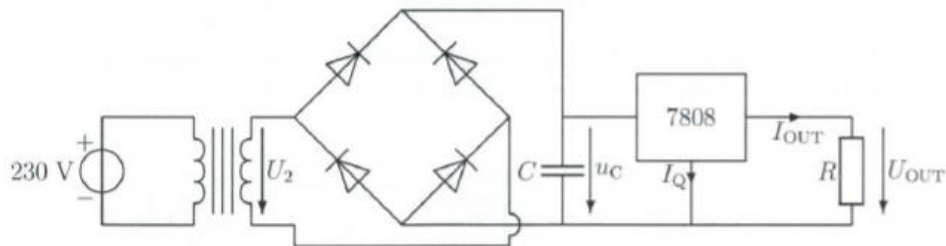

8. Find voltage U_CE. $E_1 = 5.1\text{ V}$, $R_1 = 22\text{ k}\Omega$, $R_2 = 0.2\text{ k}\Omega$, $E_2 = 8\text{ V}$, $U_\text{BE} = 0.7\text{ V}$, $\beta = 100$.

9. Find the small-signal output voltage u_o if $e_\text{s} = 1\text{ V}$? R_1 and R_2 can be considered so large that they can be neglected. $g_\text{m} = 1\text{ mS}$, $R = 10\text{ k}\Omega$.

10. The secondary voltage of a mains transformer ($f = 50\text{ Hz}$) equals $U_2 = 10\text{ V}$, $U_\text{OUT} = 8\text{ V}$, and $C = 4700\ \mu\text{F}$. Find ripple voltage u_C approximately, assuming $R = 20\ \Omega$ and $I_\text{Q} = 0$?

Answer only four problems!