Háskóli Íslands Vor 2005

Verkfræðideild

Rafmagns- og tölvuverkfræðiskor

08.31.01 Greining Rása

Lokapróf

30. apríl 2005, kl. 9:00 - 12:00

1. (10 %) Orka sem geymd er í 50 μF þétti er gefin með

$$W_c(t) = 2\exp(-50t) \quad \text{J} \quad \text{fyrir } t \geq 0$$

Finna skal spennuna yfir þéttinn, strauminn um þéttinn og aflið sem geymt er í þéttinum við $t = 30$ ms.

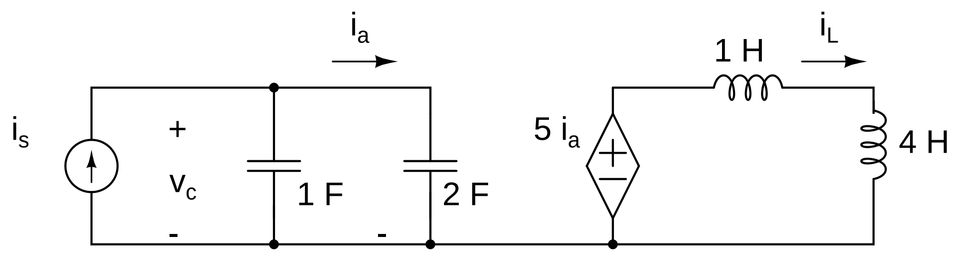
Energy stored in a 50 μF capacitor is given by

$$W_c(t) = 2\exp(-50t) \quad \text{J} \quad \text{fyrir } t \geq 0$$

Find the voltage across the capacitor terminals, the current through the capacitor and the power stored in the capacitor at $t = 30$ ms.

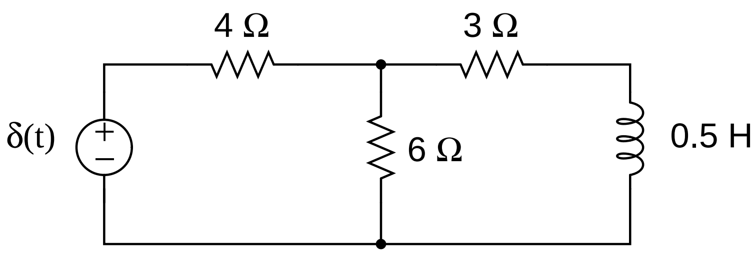
2. (12 %) Ákvarða skal $v_c(t)$ og orkuna í 4 H spólunni ef $i_s = 6u(t)$.

Determine $v_c(t)$ and the energy in the 4 H coil for $i_s = 6u(t)$.



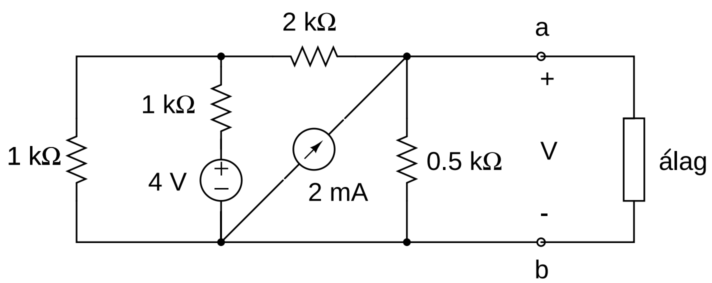
3. (18 %) Finna skal impúlssvörunina fyrir strauminn um spóluna og spennuna yfir 4 Ω viðnámið í rásinni hér fyrir neðan.

   Find the unit-impulse response for the current through the coil and the voltage across the 4 Ω resistor in the circuit below.



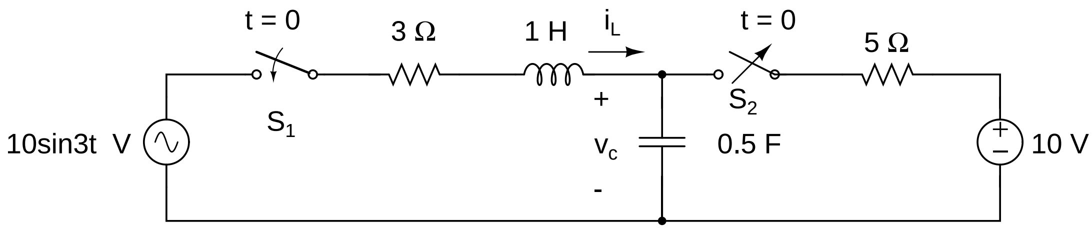
4. (15 %) Finna skal Thévenin viðnámið R_{th} séð á milli pólanna a og b. Einnig skal finna skammhlaupsstrauminn I_{SC} á milli pólanna a og b. Að lokum skal teikna Thévenin rásina.

   Determine the Thévenin resistance R_{th} between the terminals a and b. Furthermore, determine the short-circuit current I_{SC} between the terminals a and b. Draw the Thévenin equivalent circuit.



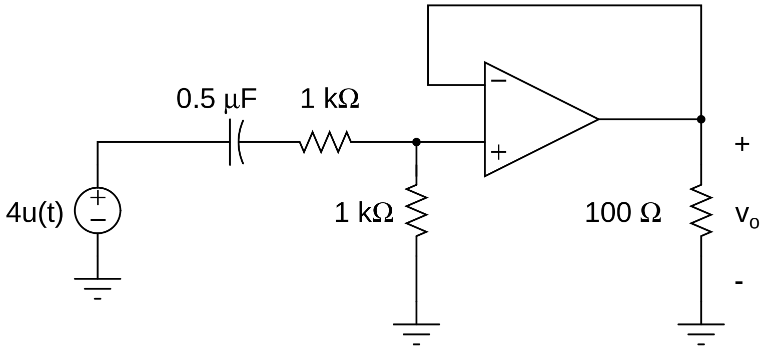
5. (20 %) Rofinn S_1 lokast við tímann $t = 0$ og um leið opnast rofinn S_2 sem verið hefur lokaður lengi. Finnið $i_{\mathrm{L}}(t)$ fyrir $t > 0$.

   The switch S_1 is closed at $t = 0$ and at the same time the switch S_2 opens. They have been in their initial positions for a long time. Find $i_{\mathrm{L}}(t)$ for $t > 0$.



6. (10 %) Finna skal útspennuna $v_\text{o}(t)$ fyrir $t > 0$.

   Find the output voltage $v_\text{o}(t)$ for $t > 0$.



7. (15 %) Rásin er drifin af sínusstraum $i_\text{s}(t) = 30\cos 200t$ mA. Finna skal vísinn $\mathbf{V}$ og bylgjuform $v(t)$.

   The circuit is driven by a sinusoidal current $i_\text{s}(t) = 30\cos 200t$ mA. Find the phasor $\mathbf{V}$ and the waveform $v(t)$.