

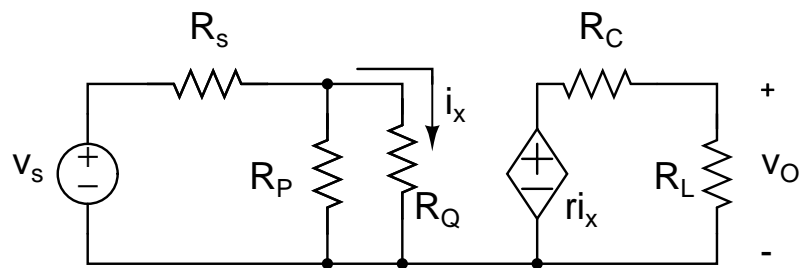
08.31.01 Greining Rása

Lokapróf

15. maí 2006, kl. 09:00 - 12:00

1. (7 %) Finna útspennuna v_O sem fall af innspennunni v_s .

Determine the output voltage v_O as a function of the input voltage v_s .



2. (8 %) Í rásinni hér að neðan er

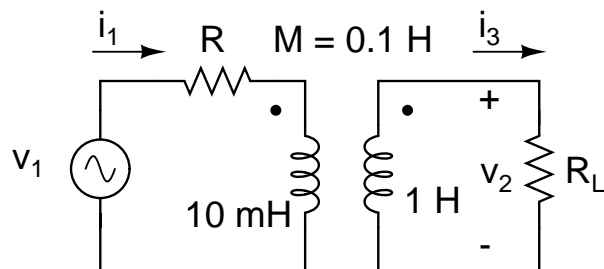
$$v_1(t) = 100 \cos 500t \text{ V}$$

Finna skal $v_2(t)$. Gefið er að $R = 5 \Omega$ og $R_L = 100 \Omega$.

For the circuit below

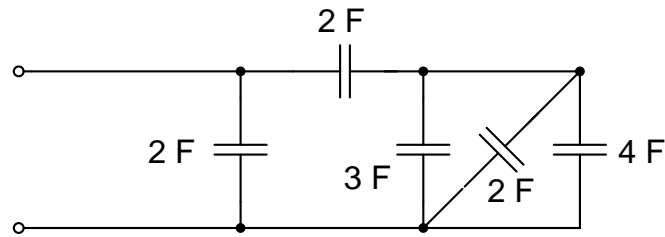
$$v_1(t) = 100 \cos 500t \text{ V}$$

Find $v_2(t)$. It is given that $R = 5 \Omega$ and $R_L = 100 \Omega$.



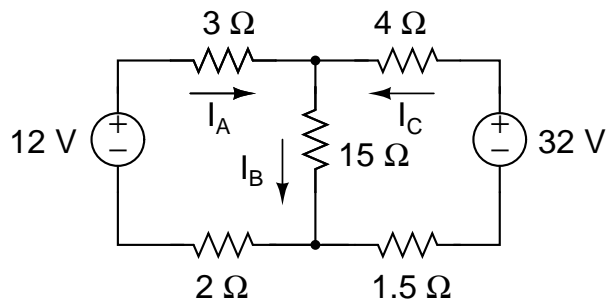
3. (5 %) Finna skal jafngildisrýmdina.

Determine the equivalent capacitance.



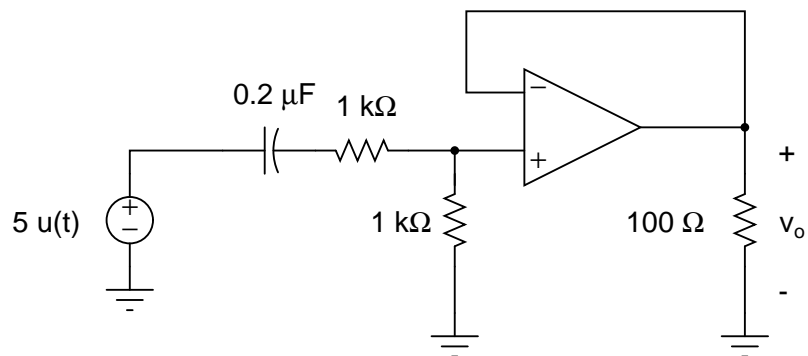
4. (15 %) Nota skal möskvajöfnur til að finna möskvastraumana I_A , I_B og I_C .

Use mesh equations to determine the mesh currents I_A , I_B og I_C .



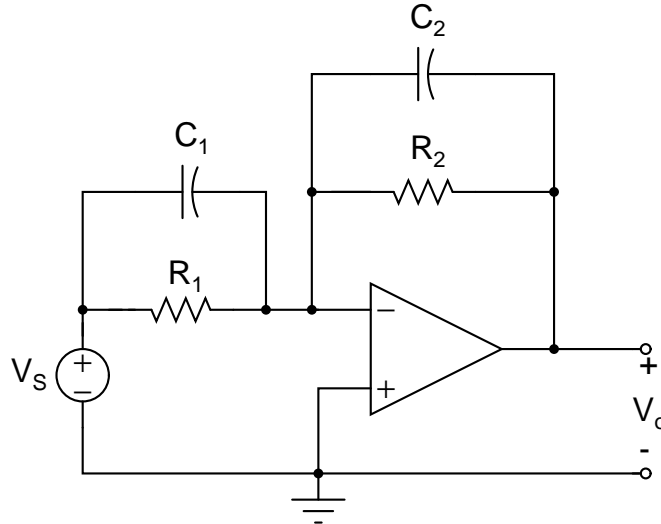
5. (15 %) Ákvarða skal spennuna $v_o(t)$ í rásinni hér að neðan. Gera skal ráð fyrir að aðgerðamagnarinn sé fullkominn.

Determine the voltage $v_o(t)$ in the circuit below. The operational amplifier can be assumed to be ideal.



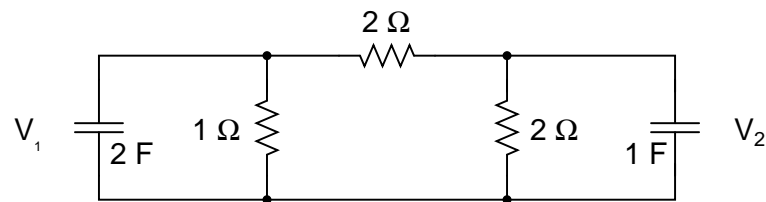
6. (20 %) Finna skal hlutfallið V_o/V_s fyrir rásina hér að neðan þegar $R_1 = 2 \text{ k}\Omega$, $R_2 = 20 \text{ k}\Omega$, $C_1 = 0$ og $C_2 = 0.1 \text{ }\mu\text{F}$ og $\omega = 10000 \text{ rad/s}$.

Determine the ratio V_o/V_s for the circuit below when $R_1 = 2 \text{ k}\Omega$, $R_2 = 20 \text{ k}\Omega$, $C_1 = 0$ and $C_2 = 0.1 \text{ }\mu\text{F}$ and $\omega = 10000 \text{ rad/s}$.



7. (15 %) Finna skal annarar gráðu diffurjöfnuna sem leysa þarf til að finna $v_1(t)$. Finna skal $v_1(t)$ og $v_2(t)$. Gefið er að $v_1(0) = 2 \text{ V}$ og $v_2(0) = 4 \text{ V}$.

Find the second order differential equation that is needed to solve to determine $v_1(t)$. Determine $v_1(t)$ and $v_2(t)$. Given $v_1(0) = 2 \text{ V}$ and $v_2(0) = 4 \text{ V}$.



8. (15 %) Leifturljós fær orku sína frá $150 \text{ }\mu\text{F}$ þétti sem þarf 120 V spennu til að hann hleypi af. Ef þéttirinn er hlaðinn með 150 V rafhlöðu um $18 \text{ k}\Omega$ viðnám, hve lengi þarf ljósmyndarinn að bíða milli ljósblossa? Gera skal ráð fyrir að þéttirinn sé full hlaðinn þegar af er hleypt.

A flashlight gets its energy from a $150 \text{ }\mu\text{F}$ capacitor that requires 120 V voltage to operate. If the capacitor is charged with a 150 V battery through $18 \text{ k}\Omega$ resistor, how long does the photographer have to wait between flashes? You can assume that the capacitor is fully charged when it is discharged.