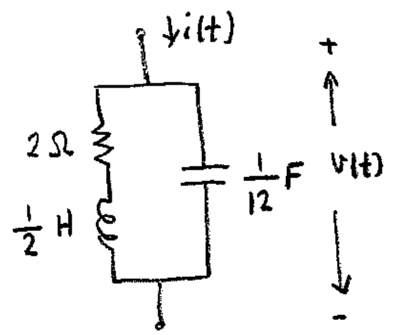
METU / EEED

EE 202 / VPS III

Spring 2012

1)



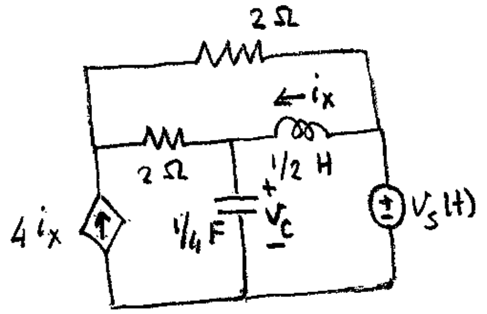
$i(t) = I_M \cos(\omega t + \theta)$ A

The one-port is in the SSS.

(a) Determine the frequencies at which the one-port is (i) resistive, (ii) inductive, (iii) capacitive.

(b) For $i(t) = 3\cos(6t + 35^\circ)$ A find $v(t)$.

2)

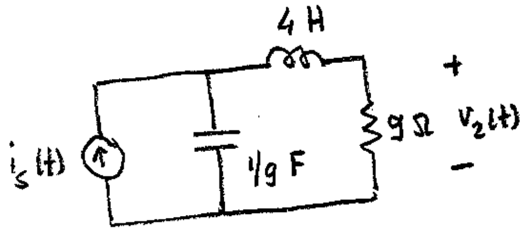


$v_s(t) = 10 \sin(4t + 35^\circ)$ V

The circuit is in the SSS.

Find $v_c(t)$ and $i_x(t)$.

3)

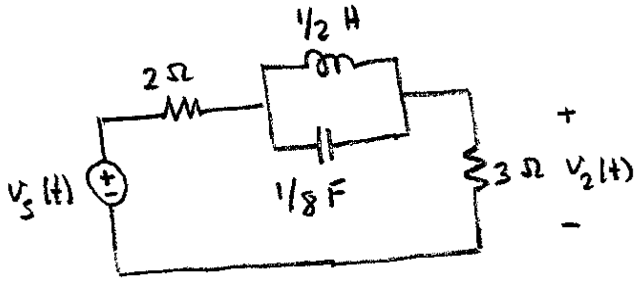


$v_2(t) = 18\cos(3t + 60^\circ)$ V

(a) Find $i_s(t)$.

(b) Sketch the phasor diagram.

4)



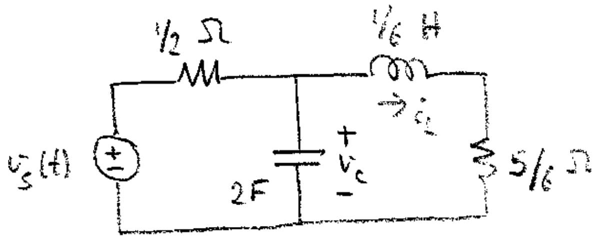
$v_s(t) = 10 + 6\cos(t + 15^\circ) + 12\cos(4t - 28^\circ) + 3\cos(6t + 10^\circ)$ V

The circuit is in the steady-state.

(a) Find $v_2(t)$.

(b) Find the average power delivered to the 3 Ω resistor.

5)



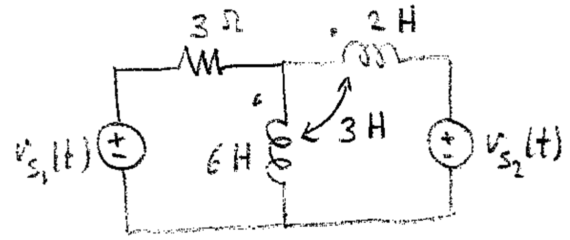
$v_s(t) = 2 + 4\cos(2t + 60°) + \sin(3t)$ V

The circuit is in the steady-state.

(a) Find $v_c(t)$ and $i_L(t)$.

(b) Compute the average powers delivered to the resistors, the average power supplied by the source, the average stored energies in the capacitor and in the inductor.

6)



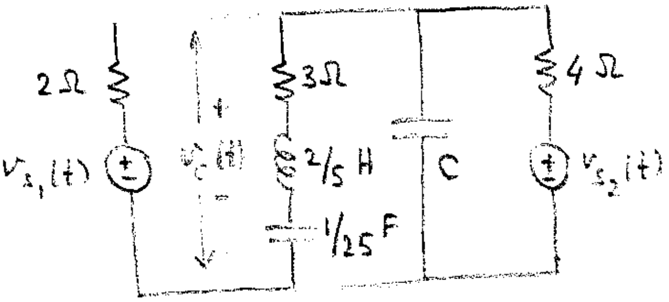
$v_{s_1}(t) = 6\cos(2t)$ V

$v_{s_2}(t) = 10\sin(t + 30°)$ V

The circuit is in the steady-state.

Compute the average power delivered to the resistor, the average powers supplied by the sources, the average stored energy in the coupled inductor.

7)



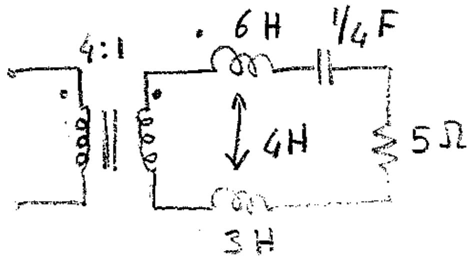
$v_{s_1}(t) = V_{m_1}\cos(5t + \theta_1)$ V

$v_{s_2}(t) = V_{m_2}\cos(12.5t + \theta_2)$ V

$v_o(t) = \sqrt{2}\,[60\cos(5t) + 90\cos(12.5t)]$ V

(a) Compute $P_{3\Omega_{avg}}$.

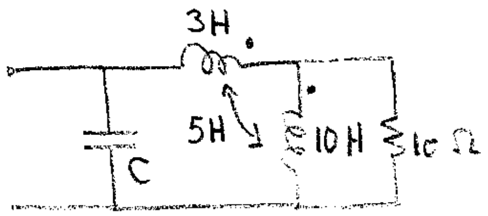
(b) The average power supplied by the left source is 2 KW. Compute $P_{2\Omega_{avg}}$.

8) 

The one-port is in the sss at the frequency ω rad/sec.

(a) Find the input impedance $Z(j\omega)$.

(b) For which values of ω is the one-port resistive? capacitive? inductive?

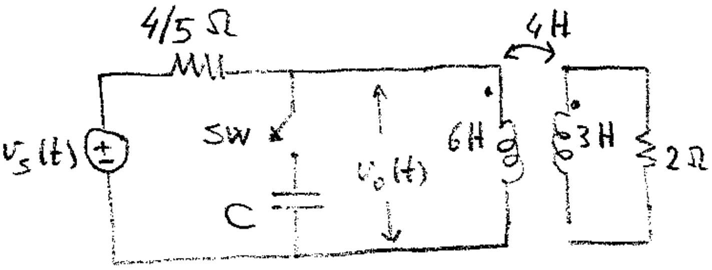
9) 

The one-port is in the sss at the frequency 2 rad/sec.

(a) Express the input admittance $Y = G + jB$ in terms of C.

(b) Define $\gamma \triangleq G/|Y|$. Determine the value of C such that

(i) $\gamma = 1$, (ii) $\gamma = 0.8$, $B > 0$, (iii) $\gamma = 0.8$, $B < 0$.

10) 

$v_s(t) = V_m \cos(2t + \theta_s)$ V

The circuit is in the sss.

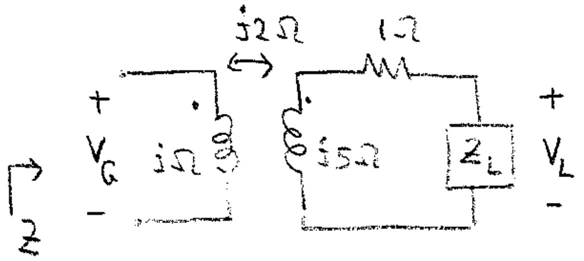
(a) The switch is open, $V_{o_{eff}} = 10$ V.

Compute $P_{2\Omega_{avg}}$ and the average stored energy in the coupled inductor.

(b) The switch is closed, $V_{o_{eff}} = 10$ V.

Determine the value of C so that the average power supplied by the source is 1 W less than that of Part (a).

11)

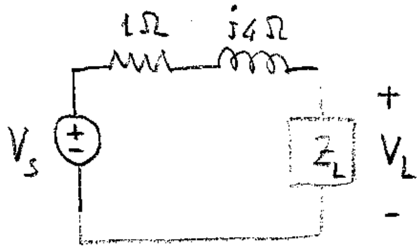


$V_{L_{eff}} = 10$ V, $Z_L = 1 + j3\ \Omega$

(a) Find Z and $V_{G_{eff}}$.

(b) Compute the average power delivered to the resistor and the ratio of the average stored energies in Z_L and in the coupled inductor.

12)

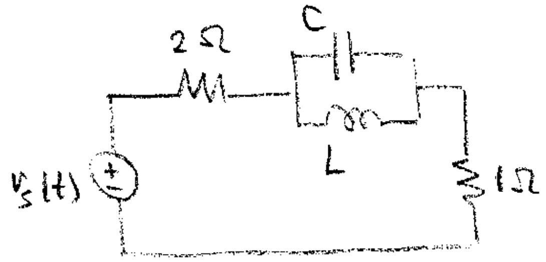


$V_L = 200\ V_{rms}$, $P_{1\Omega_{avg}} = 400$ W, $P_{L_{avg}} = 3.2$ KW

Z_L is capacitive.

Find $V_{s_{eff}}$.

13)



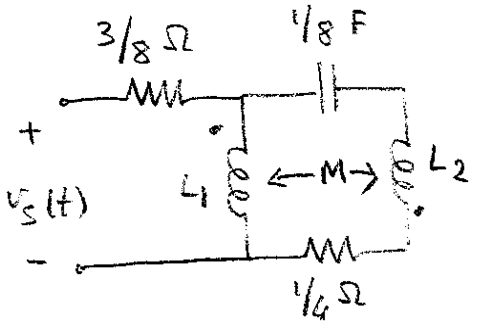
$v_s(t) = 50 \cos(2t)\ V_{rms}$

The circuit is in the SSS.

$P_{2\Omega_{avg}} = 200$ W, $E_{C_{avg}} = 200$ J

Find $E_{L_{avg}}$.

14)



$v_s(t) = V_m \cos(4t + \theta_s)$ V

The coupled inductor is passive.

The one-port is in the SSS.

$P_{\frac{3}{8}\Omega_{avg}} = 6$ W, $E_{CI_{avg}} = 4$ J

The input impedance of the one-port is $Z = Z_m(0.6 - j0.8)\ \Omega$.

Find V_m and Z_m.