Dr. Mohamed Bakr, EE2CI5, 2007

Note Title 11/13/2007

Lecture 24

from Sections 8.5 - 8.8 of Text

Solve E8.9 - E8.12, 8.20, 8.24, 8.28, 8.32, 8.34, 8.37, 8.40, 8.44

Admittance

* Admittance is the invere of impedance

$$Y = \frac{1}{Z} = \frac{I}{V} = Y_M \angle \theta_y$$

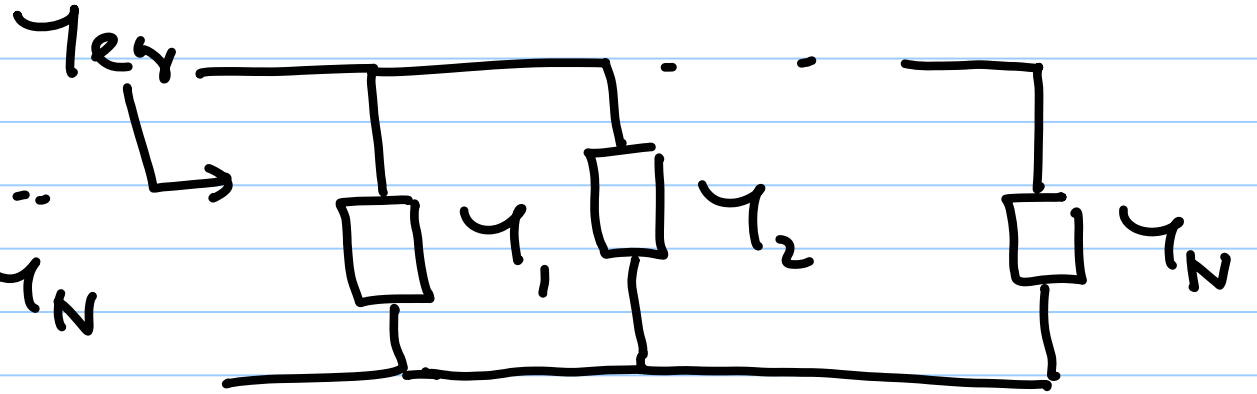
$$Y = G + jB$$

G: Conductance

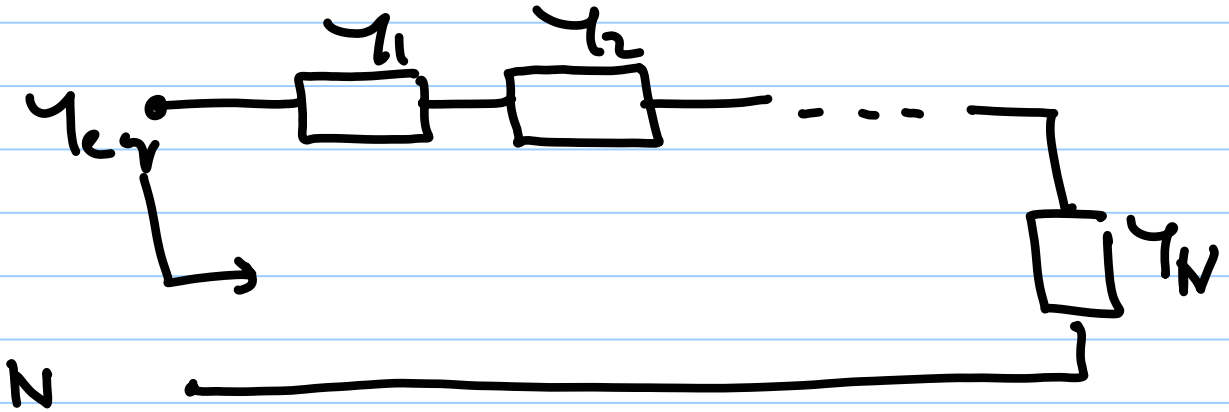
B: Susceptance

* Notice that $G + jB = \frac{1}{Z} = \frac{1}{R + jX}$

Admittances (cont'd)

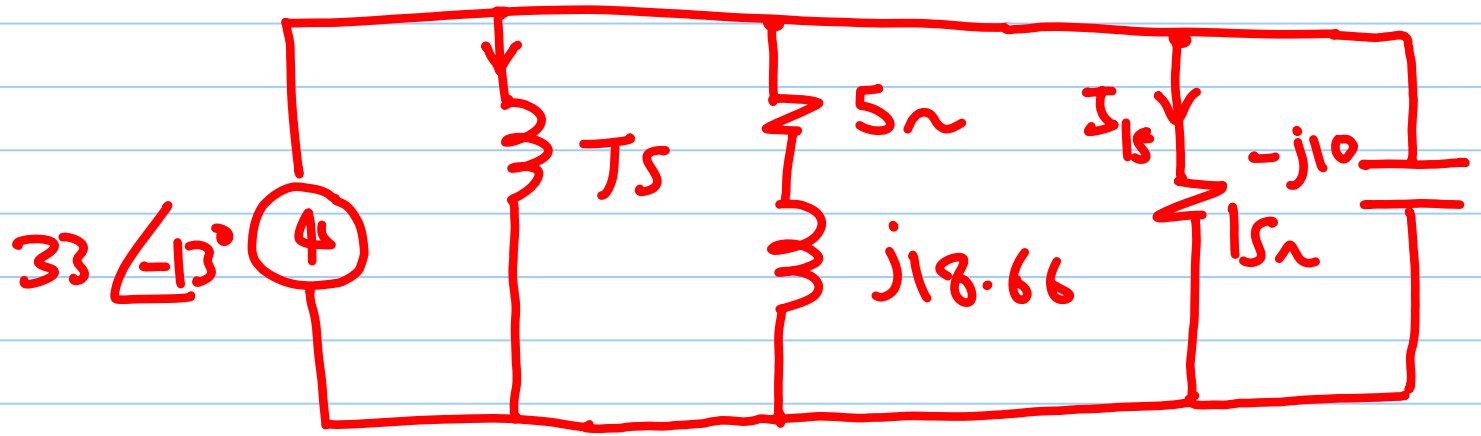


* $Y_{eq} = Y_1 + Y_1 + \cdots + Y_N$



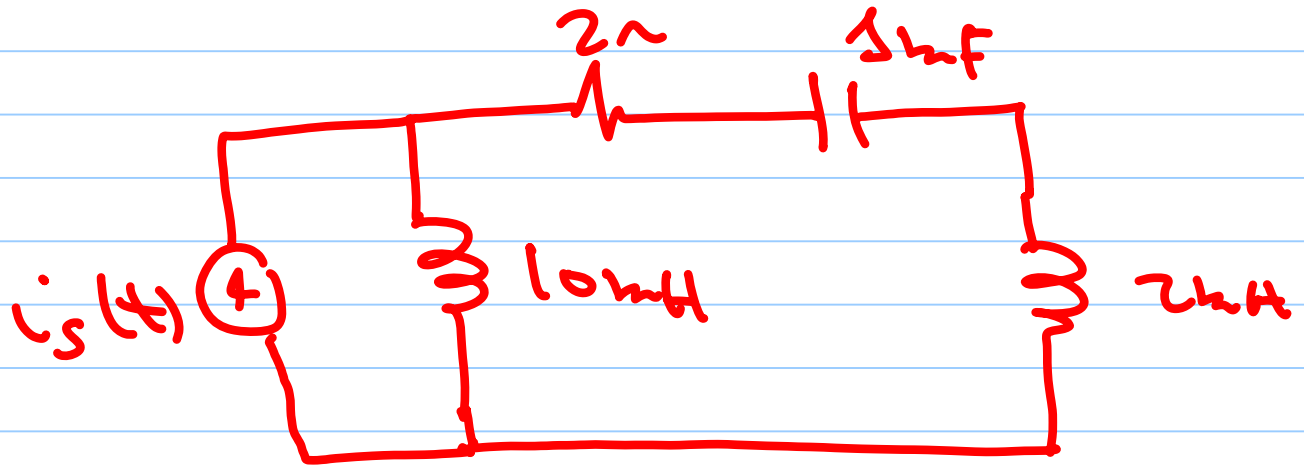
$$\frac{1}{Y_{eq}} = \frac{1}{Y_1} + \frac{1}{Y_2} + \cdots + \frac{1}{Y_N}$$

Example



Calculate the current in the 15Ω resistor

Example

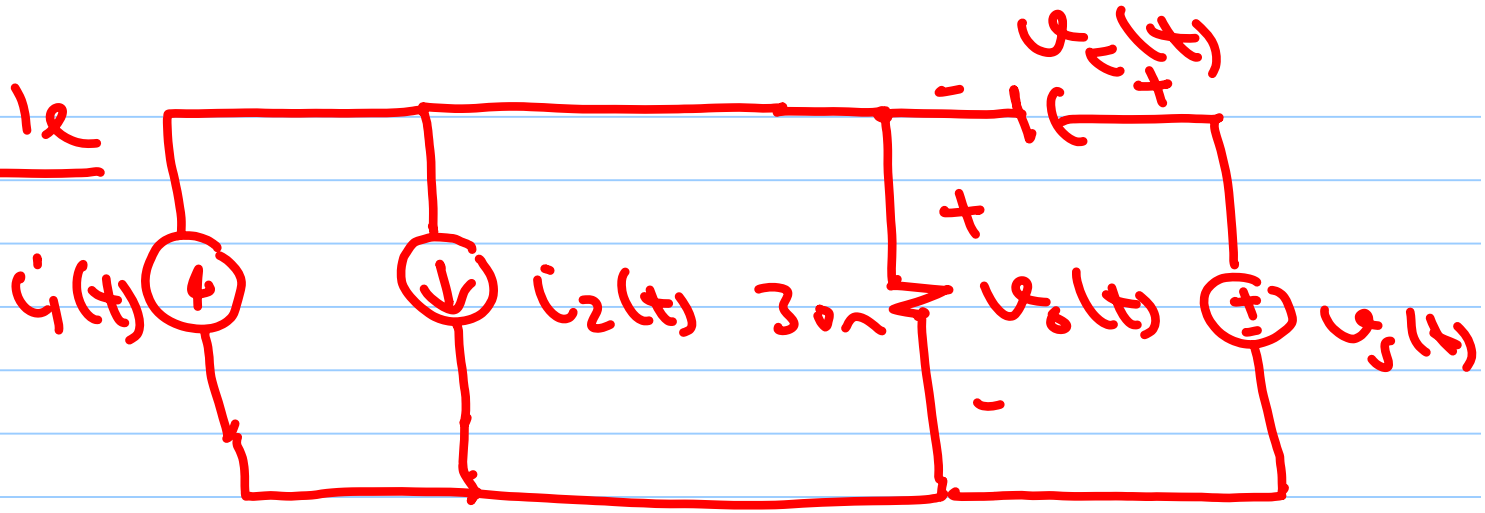


Draw the frequency domain circuit and calculate $v(t)$ if $i_s(t) = 2\cos(1000t + 120°)$ A

Phasor Diagrams

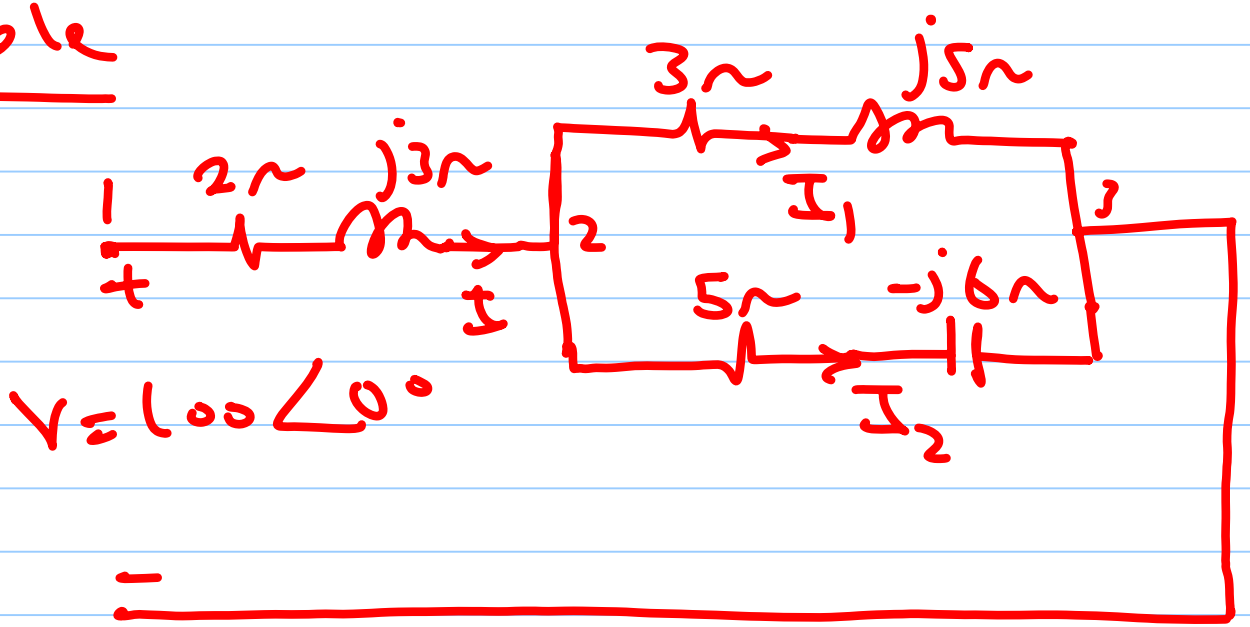
* Frequency domain currents and voltages are phasors
* KCL gives the phasor sum of currents at a node
* KVL gives the phasor sum of voltages in a loop

Example



* Calculate $v_o(t)$ if $i_1(t) = 200\cos(10^5 t + 60^\circ)$, $i_2(t) = 100\sin(10^5 t + 90^\circ)$, and $v_s(t) = 10\sin(10^5 t)$ V. Use a phasor diagram to find $v_c(t)$

Example



* Find the currents I, I_1, and I_2
* Draw a phasor diagram showing V_1, V_{12}, and V_{23}.