Indian Institute of Technology, Delhi
EEL 101: Fundamentals of Electrical Engineering
Tutorial 4, 29th January, 2008

1. What will be the corresponding phasor, V, for $v(t) = 60\cos(100\pi t - 120^o)$?

2. What time function is represented by $I = 6 + j9\mu$A, if the frequency is 400 Hz?

3. For the circuit in Fig. (a), solve for $v(t)$ when $i_s(t) = 0.8\cos(1000t - 20^o)$A.

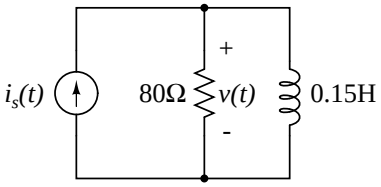
4. Determine the input impedance, $\overline{Z}$ of the circuit shown in Fig. (b), if the frequency is 60 Hz.

5. Solve for $i(t)$ in Fig. (c), if $v(t) = 10\cos(1000t)$Volts.

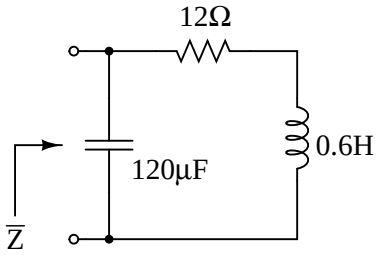
6. Transform the circuit in Fig. (d) to its Norton equivalent form.

7. By proper choice of X_C and X_L, the 10 Ω resistor in Fig. (e) can be transformed to "look" like a 50 Ω resistance at a specified frequency. Find X_C and X_L, such that at 1 kHz the input impedance, $\overline{Z}$, is 50 Ω. What are the corresponding inductance and capacitance values?

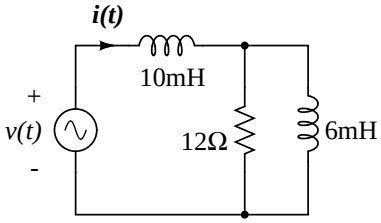
8. Find $v_{ab}(t)$ in Fig. (f), if $v_1(t) = 100\cos(120\pi t)$ Volts, and $v_2(t) = 80\sin(120\pi t)$ Volts.


$i_s(t)$
80Ω
+
$v(t)$
-
0.15H

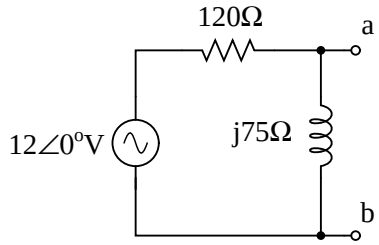
(a)


12Ω
120μF
0.6H
$\overline{Z}$

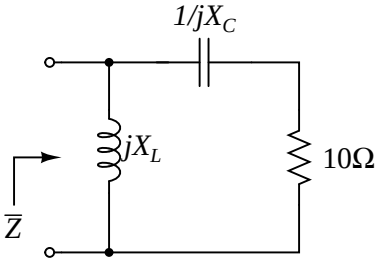
(b)


i(t)
10mH
+
$v(t)$
-
12Ω
6mH

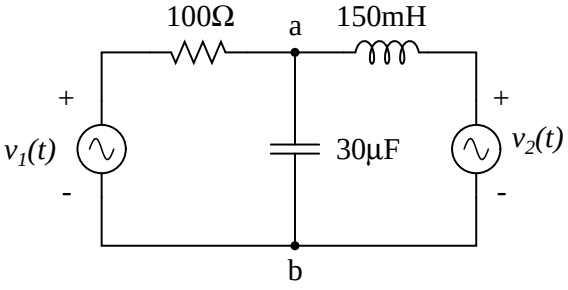
(c)


120Ω
a
$12\angle 0^{o}$V
j75Ω
b

(d)


$1/jX_C$
jX_L
10Ω
$\overline{Z}$

(e)


100Ω
a
150mH
+
$v_1(t)$
-
30μF
+
$v_2(t)$
-
b

(f)