EE 111 Homework 5

Due date: May. 06th, 2019

Turn in your homework in class

Rules:

- Work on your own. Discussion is permissible, but similar submissions will be judged as plagiarism.
- Please show all intermediate steps: a correct solution without an explanation will get zero credit.
- Please submit on time. No late submission will be accepted.
- Please prepare your submission in English only. No Chinese submission will be accepted.

1. Calculation of Complex Numbers

(1) $\dfrac{(50-j60)(220\angle 70^\circ + 150\angle -30^\circ)}{(70-j80)90\angle 210^\circ}$

(2) Solve ***x*** for

$$x^3 = (40\angle 50^\circ + 20 - j70)\frac{45-j100}{30-j80}$$

2. Find the following results (using phasors if necessary)

(1) $3\cos(30t+40°)-20\sin(30t-70°)$

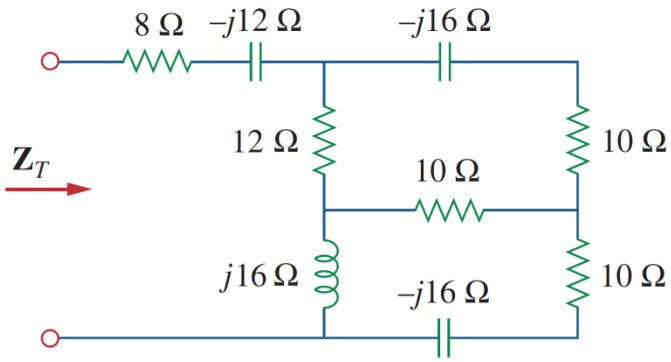
(2) $30\cos^2(10t+30°)-40\sin(20t-120°)$

(3) Solve the integrodifferential equation:

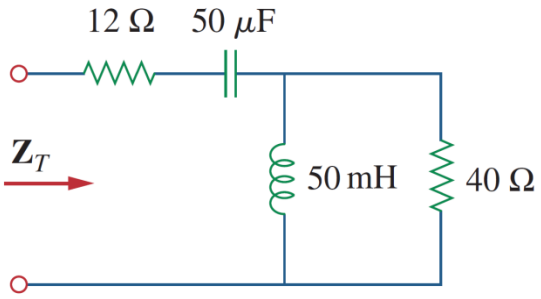
$$\frac{dv(t)}{dt}+4v(t)+3\int v(t)\,dt=20\sin(10t+20°)$$

3. Find the equivalent impedance

(1) Find $\boldsymbol{Z}_T$

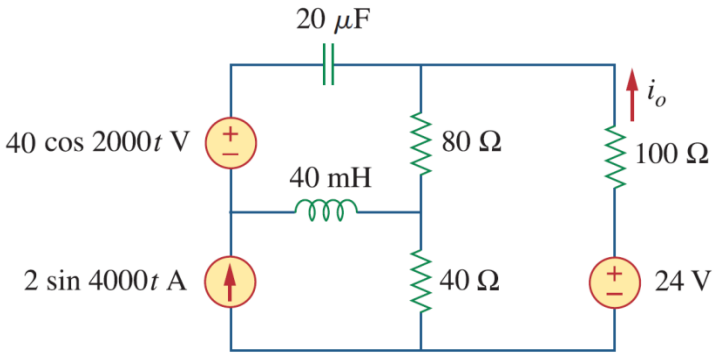


(2) Find $\boldsymbol{Z}_T$ where the system is operating at the frequency f = 50 Hz.



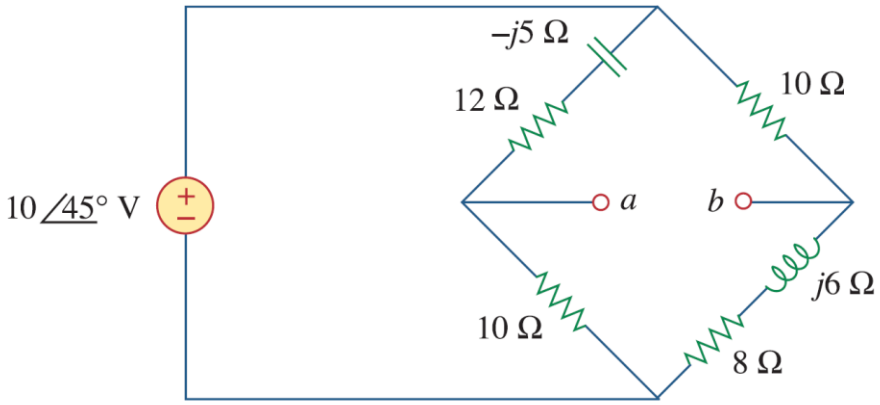
4. Superposition Theorem

Find steady state current i_0(t) using Superposition Theorem



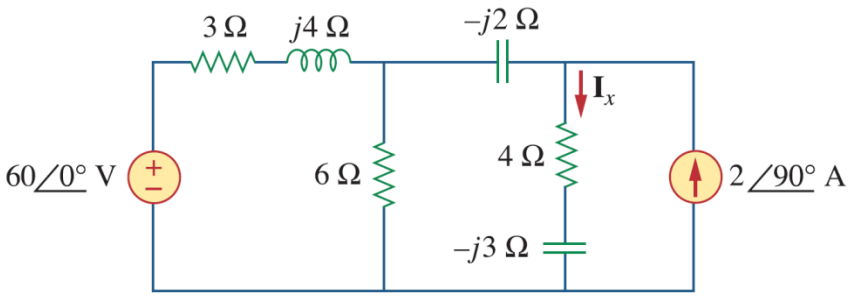
5. Thevenin equivalent

Find Thevenin equivalent circuit at terminals a-b



6. Source Transformation

The two sources are with the same angular frequency. Use source transformation to find $\tilde{I}_x$



7. $\tilde{V}_{in}$ and $\tilde{I}_{in}$ are phasors. Express $\dfrac{\tilde{V}_{in}}{\tilde{I}_{in}}$ as functions of R_1, R_2, R_3, R_4 and C.