

## EE 111 Homework 7

Due date: **May.22nd,2019**

Turn in your homework in class

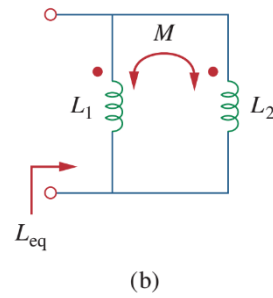
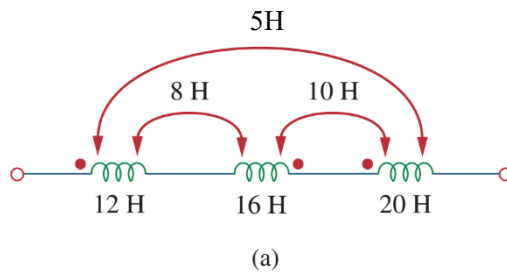
### Rules:

- 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. (a) For the three coupled coils in Fig. (a), calculate the total inductance.

(b) For the coupled coils in Fig. (b), show that

$$L_{\text{eq}} = \frac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}.$$

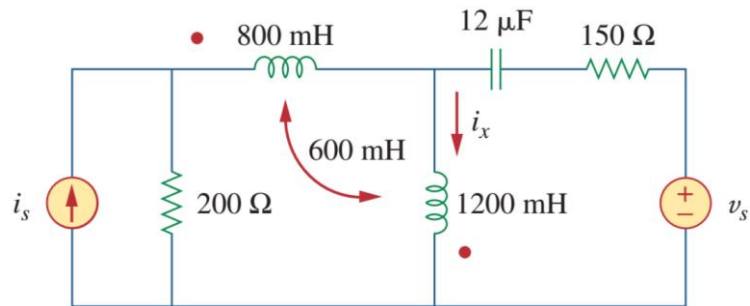


2、 With  $\dot{i}_s = 8\cos(600t)$  A and  $v_s = 100\cos(600t + 60^\circ)$  V,

(a) find the coupling coefficient,

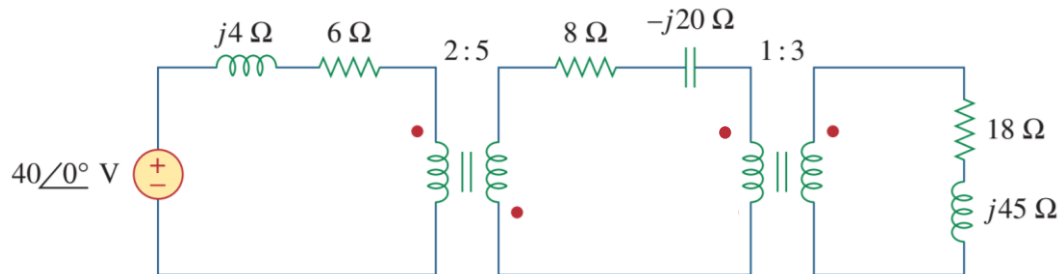
(b) use mesh analysis to find  $\dot{i}_x$ ,

(c) determine the energy stored in the coupled inductors at  $t = 2$  s.

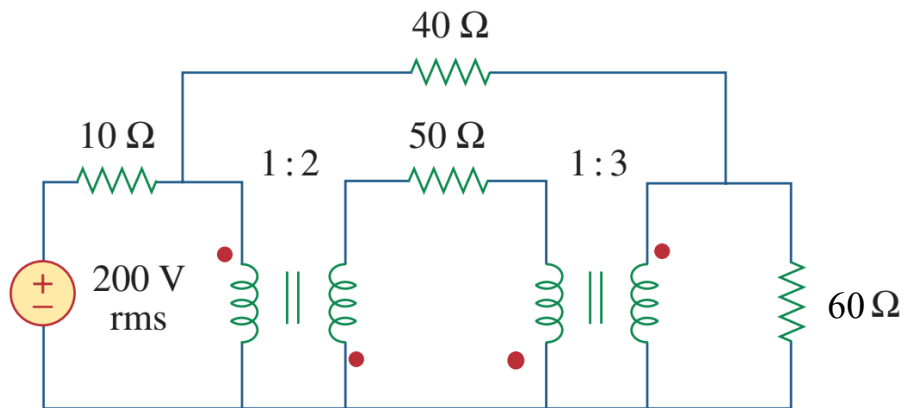


3、 For the network in the figure, find

- (a) the complex power supplied by the source,
- (b) the average power delivered to the  $8\text{-}\Omega$  resistor.



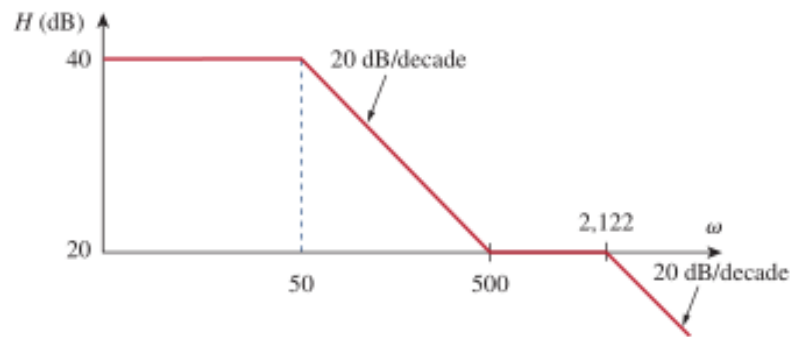
4. Calculate the average power dissipated by the  $40\Omega$  resistor.



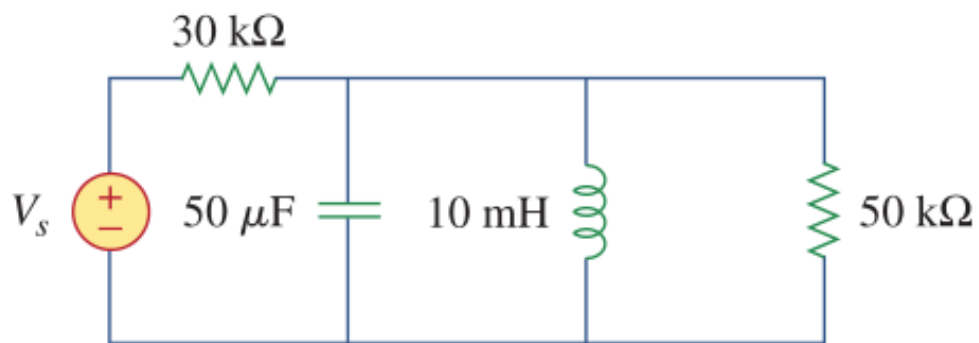
5. Sketch the Bode plots for

$$G(s) = \frac{s}{(s + 2)^2(s + 1)}, \quad s = j\omega$$

6. The magnitude plot below represents the transfer function of a preamplifier. Find  $H(s)$ .



7. For the circuit shown, find  $\omega_0$ , B, and Q, as seen by the voltage across the inductor.





8. For the circuit below,  $R=50\Omega$ ,  $L_1=5\text{mH}$ ,  $L_2=20\text{mH}$ ,  $C_2=1\mu\text{F}$ , when the frequency

of voltage source  $f = \frac{10^4}{2\pi}$  Hz,  $R$ ,  $L_1$ ,  $C_1$  is **in resonance as observed between Points**

**A and B.**

At this moment, the voltage  $U_{C_1}$  of capacitor  $C_1$  is 10 V ( $U_{C_1}=10$  V). Please find  $C_1$  and  $U(\text{rms})$ .

