1. For the steady state analysis in Fig. P1, \( v_i(t) = 100\sqrt{2} \sin 1000t \, \text{V} \), \( L_i = 10 \, \text{mH} \) and \( R_i = 10 \, \Omega \). Find the steady state \( i_L(t) \) and \( v_n(t) \). (20%)

![Fig. P1](image1)

2. In Fig. P2, the impedance \( \tilde{Z}_L \) is adjusted until it absorbs the maximum average power. If the \( \tilde{V}_s = 200\angle 0^\circ \, \text{V} \) (rms), calculate the \( \tilde{Z}_L \) and the maximum average power absorbed by it. (15%)

![Fig. P2](image2)

3. In the circuit of Fig. P3, let \( R = 100 \, \Omega \), \( L = 10 \, \text{mH} \), and \( C = 100 \, \mu\text{F} \). Find the resonant frequency, the quality factor and the bandwidth of the circuit. (15%)

![Fig. P3](image3)
4. Find the Thevenin equivalent circuit of the circuit shown in Fig. P4, $R_{in}$ and $V_{in}$ to the left of the terminals a-b. Then find the current through $R_L=16\Omega$.

![Fig. P4](image)

5. (a) Find the current through a 5-H inductor if the voltage across it is

$$v(t)=\begin{cases} 30 t^2 & \text{if } t > 0 \\ 0 & \text{if } t < 0 \end{cases}$$

(b) Find the energy stored at $t=5$ s. Assume $i(v) > 0$.

6. Find the following currents in the circuit of Fig. P6 for $t > 0$. Assume that the switch has been closed for a long time.

(a) $i(0^-)$
(b) $i(\infty)$
(c) $i(t)$