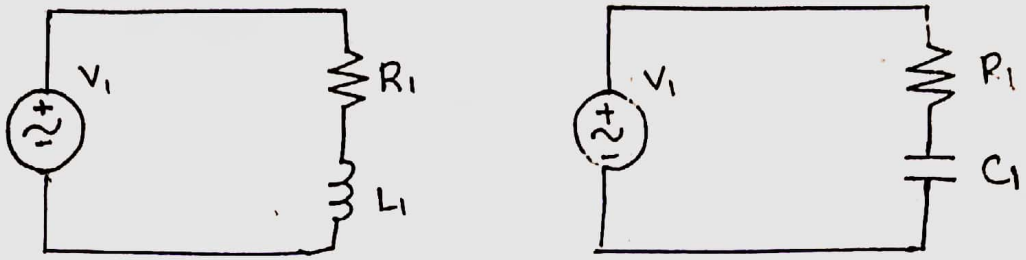
Questions :-



1) How much average power is consumed by the inductor & Capacitor?

Ans: The average power consumed by the inductor and the capacitor is zero. Since the voltage (V) and current (I) are 90° out of phase for all reactive loads, the power factor for them, $P_f = \cos \pm 90° = 0$. Therefore the average power consumed by reactive load is zero. as and the power recived capacitor and inductor is returned back in the cycle.

2. What is the effect of the inductor and capacitor on the instantaneous power of the RI

Ans: A circuit element produces or dissipates power according to $P = I.V$ where I is the current ~~across~~ through the element and V is the voltage across it. Since the current and voltage depends on time in a AC circuit, instantaneous power is also time dependent For RI, I(t) and V(t) are in phase and ~~are~~ therefore Always it have the same sign but for a capacitor and inductor, the relative sign of V(t) and I(t) vary over ~~time~~ due to a ~~any~~ cycle due to their phase difference. Consequently, P(t) is positive at times and negative at others indicating that capacitive and inductive element produces power at some instants and absorbs it at other.

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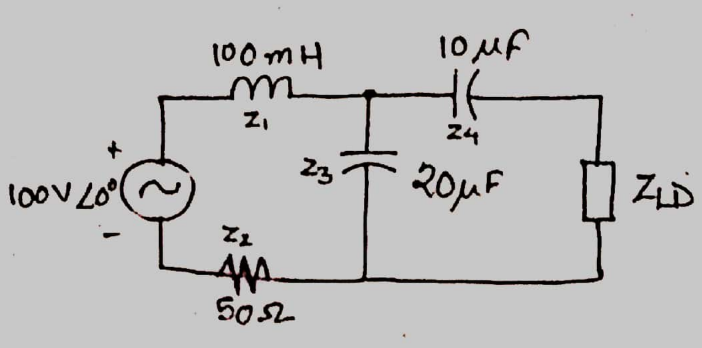
3) Determine the load Z_{LD} that will allow maximum power delivered to the load for the following circuit. if the frequency is 192.241 Hz. What should be the maximum power of the load? Construct a final circuit in multisim and measure the power at the load. Is the result similar to the theoretical maximum power. Attach the simulation screenshot in the lab report.



Ans: Maximum power delivered where $Z_{LD} = Z_{TH}$

$\therefore Z_{LD} = \{(Z_1 + Z_2) \,||\, Z_3\} + Z_4$ where $Z_1 = j \times 2\pi \times 192.241 \times 100 \times 10^{-3}$

$= \{(j120.79 + 50) \,||\, -j41.39\} + (-j82.79)$ $= j120.79\ \Omega$

$Z_2 = 50\ \Omega$

$Z_3 = -j41.994\Omega$

$Z_4 = -j82.79\ \Omega$

$= 0.731 - j139.63$

$= 139.98 \angle -86.013$

~~Maximum power~~ $P_{max} = \dfrac{V_{TH}^2}{4RL}$

$= \dfrac{100^2}{}$

$V_{TH} = \dfrac{-j41.394}{j120.79 + 50 + (-j41.394)} \times 100$

$= -34.096 - j2.429$

$= 34.18 \angle -175.9\ \Omega.$

$P_{max} = \dfrac{|V_{TH}|^2}{8 R_{TH}}$

$= \dfrac{34.18^2}{8 \times 139.98}$

$= 1.043\ W$

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