

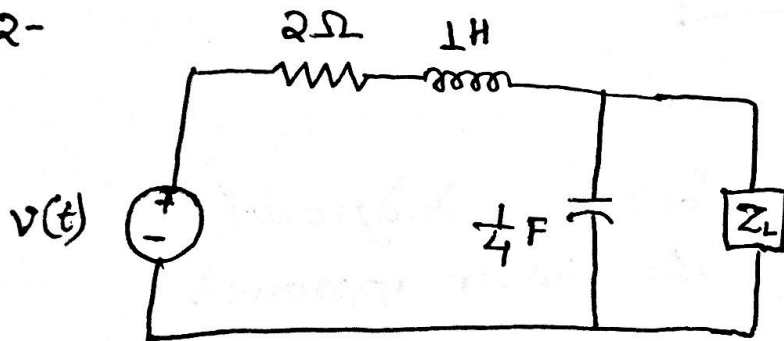
Tutorial

Q1- An Electric motor operating at 220V rms , 60Hz draws a current of 20A rms at a power factor of 0.75 lagging.

(a) What is average power absorbed by the motor?

(b) What value capacitor should be connected in parallel with the motor such that the resulting combination has a unity p.f. (i.e. p.f. = 1)?

Q2-

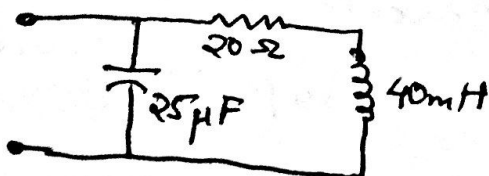


For the ckt. shown above, $v(t) = 8\cos 2t\text{ V}$, find

a) Load impedance Z_L that absorbs max. power and determine this power.

b) Find the load ~~resistance~~ resistance R_L that absorbs the maximum power for resistive loads and determine this power.

Q3-



Load shown operates at 60Hz .

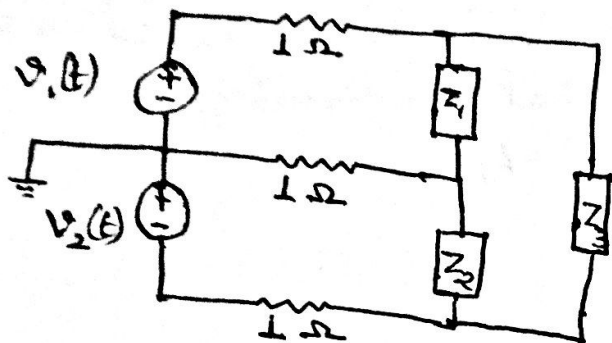
(a) What are the p.f. & the p.f. angle of this load?

(b) Is this p.f. leading or lagging?

(c) To what value should the capacitor be changed to get unity power factor?

Q4 - For the single phase, three-wire circuit shown in fig, suppose $V_1(t) = 120\sqrt{2} \sin \omega t$ and $V_2(t) = 120\sqrt{2} \cos \omega t$.

Find the average power supplied by each source:-



$$Z_1 = 2 + j5$$

$$Z_2 = 3 + j4$$

$$Z_3 = 5 - j15$$

Q5 - Find $v(t)$ in the following integrodifferential equations using the phasor approach:

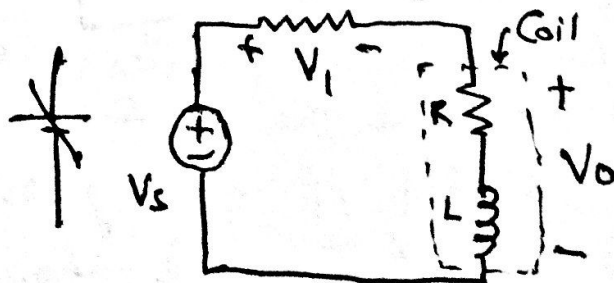
(a) $v(t) + \int v dt = 10 \cos t$

(b) $\frac{dv(t)}{dt} + 5v(t) + 4 \int v(t) dt = 20 \sin(4t + 10^\circ)$

Q6 - An industrial coil is modeled as a series combination of an inductance L and resistance R , as shown in fig. 9.90. Since AC voltmeter measures only the magnitude of the sinusoid, the following measurements are taken at 60 Hz when the circuit operates in the steady state:

$$|V_s| = 175V, |V_1| = 50V, |V_o| = 110V$$

Use these values to determine values of L & R .



7) The ac bridge in the figure is balanced when $R_1 = 400\Omega$, $R_2 = 600\Omega$, $R_3 = 1.2\text{ k}\Omega$ and $C_2 = 0.3\mu\text{F}$, find R_x and C_x . (freq. = 50 Hz)

