Attribution Nidhal Abdulaziz

Tutorial 9 additional solutions

Question 1
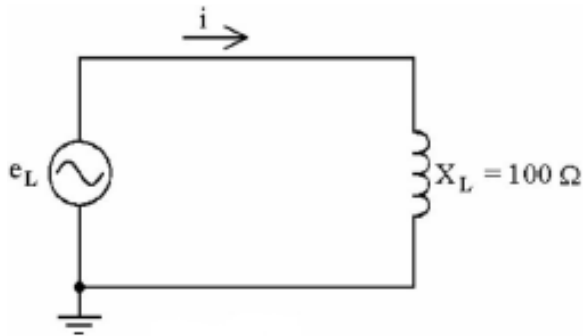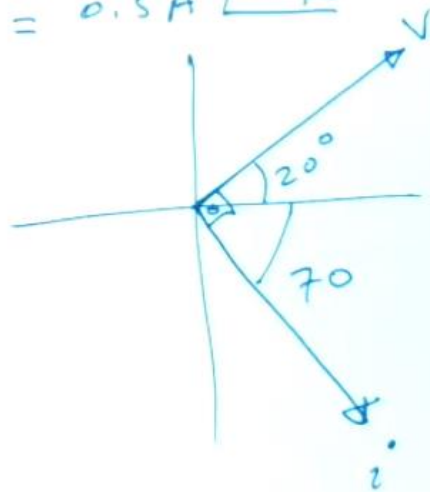

e_L $X_L = 100\,\Omega$

Tut week 10

on-line Tut

8.1

$e_L = 50 \sin(50t + 20^\circ)$ e_L X_L $100\,\Omega$

$$i = \frac{e}{X_L} = \frac{50\,\angle\,20^\circ}{100\,\angle +90} = 0.5A\,\angle -70^\circ$$
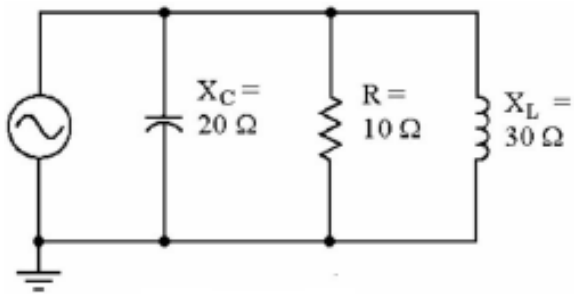
Question 16
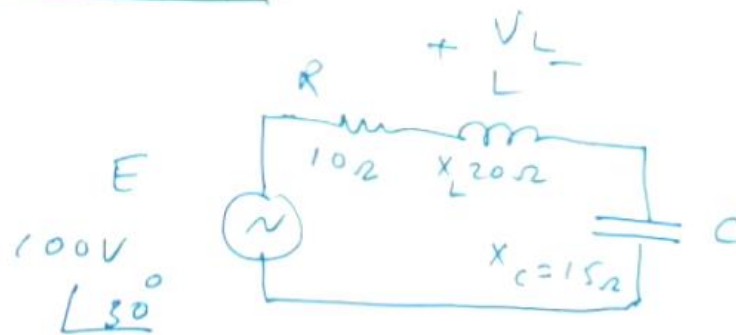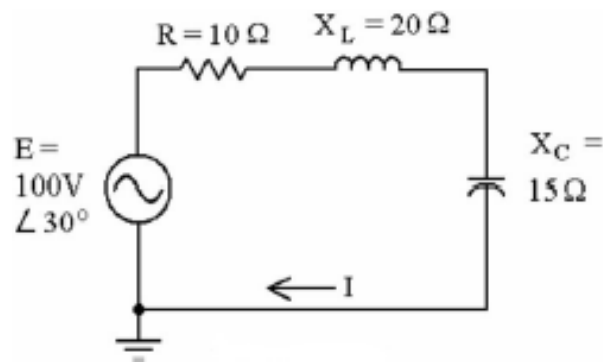
$$V_L = E \times \frac{X_L}{R + jX_L - jX_C}$$

$$V_L = \frac{100V \; \angle 30° \; \times \; 20 \; \angle +90°}{10 + j20 - j15}$$

$$V_L = \frac{2000 \; \angle 120°}{10 + j5}$$

$$V_L = \frac{2000 \; \angle 120°}{11.18 \; \angle 26.5°} = 178.9 V \; \angle 93.5$$
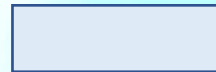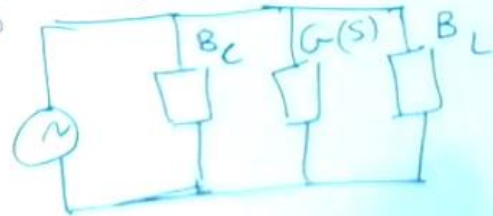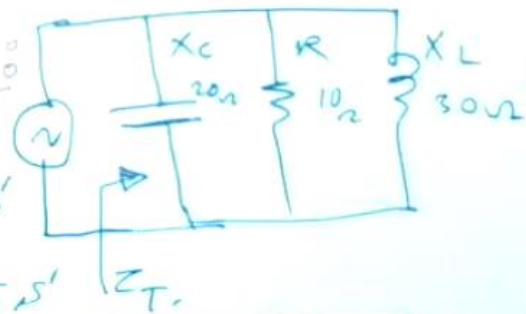
Question 20

Q. 20   On-line Tut.

$$G = \frac{1}{R} = \frac{1}{100} = 0.01\ S\angle 0°$$

$$B_L = \frac{1}{X_L} = \frac{1}{30} = 0.033\ S\ \angle -90°$$

$$B_C = \frac{1}{X_C} = \frac{1}{20} = 0.05\ S\ \angle +90°$$

$$Y = G + B_L + B_C$$

=

$$Y = G - jB_L + jB_C$$

$$Y = 0.01 - j\,0.033 + j0.05$$

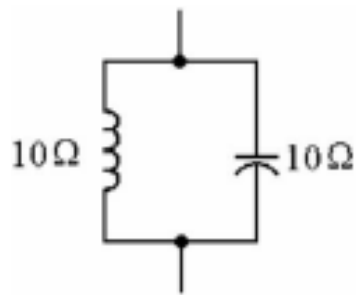$$Y = 0.01 + j0.017$$

$$|Y| = \sqrt{(0.01)^2 + (0.017)^2} = 0.019 \; \mho$$

$$\theta_Y = \tan^{-1}\left(\frac{0.017}{0.01}\right) = 59.53^{\circ}$$

$$Y_T = 0.019 \; \mho \; \underline{/59.53^{\circ}}$$

$$Z_T = \frac{1}{Y} = \frac{1}{0.019} \; \underline{/-59.53^{\circ}}$$
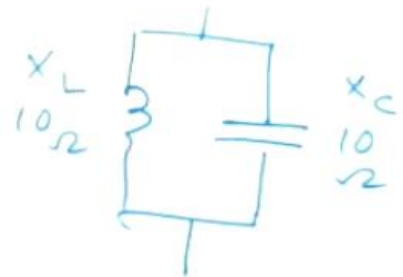
$$Z_T = 52.60 \; \Omega \; \underline{/-59.53^{\circ}}$$

Question 31

Tut week 10

8. 31

$Z_T = ?$
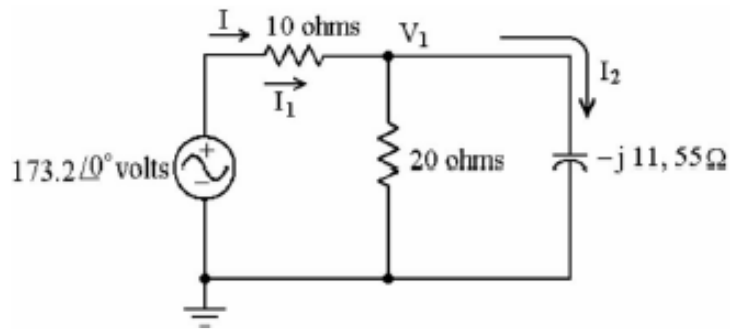
$Z_T = \dfrac{Z_1 \cdot Z_2}{Z_1 + Z_2} \longrightarrow Z_T = \dfrac{10 \angle 90° \times 10 \angle -90°}{j10 - j10}$

$Y_t = Y_1 + Y_2$ $\qquad Z_T = \infty$
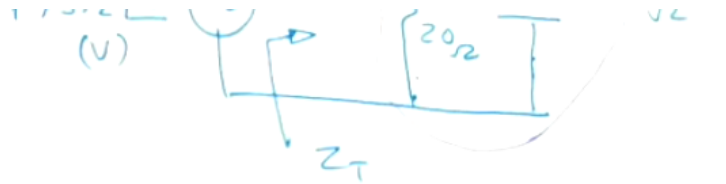
$Z_T = \dfrac{1}{Y_t}$

Question 34

$$I = \frac{R_{in}}{Z_T}$$

$$Z_T = 10\Omega + Z'$$

$$Z' = \frac{20 \angle 0° \times (11.55 \angle -90°)}{20 - j\,11.55} = \frac{20 \times 11.55 \angle -90°}{23 \angle -30°}$$
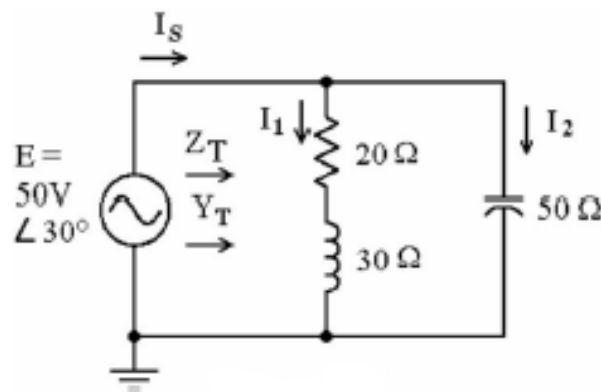
$$Z' = 10 \angle -60° \ (\Omega)$$

$$Z_T = 10 + \left[10 \cos(-60°) + j\,10 \sin(-60°)\right]$$

$$Z_T = (\ ) \angle$$
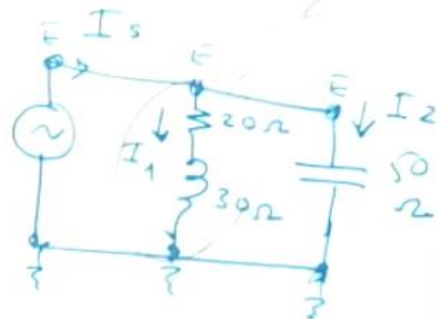
$$i = \frac{173.2 \angle 0°}{Z_-}$$

Question 38

Week 10   On-line Tut

Q.38

$I_2 = \dfrac{E}{X_c}$

$I_2 = \dfrac{50V \; \underline{/30^\circ}}{50\Omega \; \underline{/-90^\circ}} = 1A \; \underline{/120^\circ}$

$I_1 = \dfrac{E}{Z'} = \dfrac{50V \; \underline{/30^\circ}}{20 + j30} = \dfrac{50 \; \underline{/30^\circ}}{36 \; \underline{/56.3^\circ}}$

$$I_1 = 1.38 \text{ A} \underline{/-26.3^\circ}$$

$$I_s = I_1 + I_2$$

$$= 1.38 \underline{/-26.3^\circ} + 1 \underline{/120^\circ}$$

$$I_s = 1.38 [\cos(-26.3^\circ) + j \sin(-26.3^\circ)]$$
$$+ 1 [\cos(120^\circ) + j \sin(120^\circ)]$$

$$I = Re + j \, Im.$$