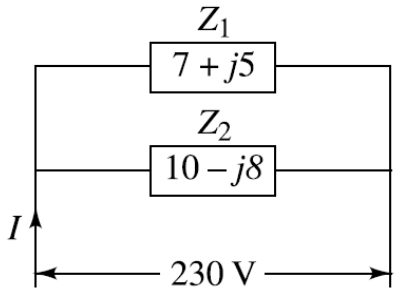
NOTES -Class 31

Numerical Examples on Parallel RLC Circuit:

1. An impedance of (7+ j5) Ω is connected in parallelwith another impedance of (10–j8)Ω across a 230-V, 50-Hz supply .Calculate (i) admittance, conductance and susceptance of the combined circuit, and (ii) total current and power factor.



Solution

Data $\bar{Z}_1 = (7 + j5)\ \Omega$

$\bar{Z}_2 = (10 - j8)\ \Omega$

$V = 230$ V

$$\bar{Y}_1 = \frac{1}{\bar{Z}_1} = \frac{1}{7 + j5} = 0.12\angle -35.54^\circ\ \text{℧}$$

$$\bar{Y}_2 = \frac{1}{\bar{Z}_2} = \frac{1}{10 - j8} = 0.08\angle 38.66^\circ\ \text{℧}$$

$$\begin{aligned}\bar{Y} &= \bar{Y}_1 + \bar{Y}_2 \\ &= 0.12\angle -35.54^\circ + 0.08\angle 38.66^\circ \\ &= 0.16\ \angle -7.04^\circ\ \text{℧} \\ &= 0.16 - j0.02\ \text{℧}\end{aligned}$$

Admittance $Y = 0.16$ ℧

Conductance $G = 0.16$ ℧

Susceptance $B = 0.02$ ℧

$$\begin{aligned}\bar{I} &= \bar{V} \cdot \bar{Y} \\ &= (230\ \angle 0^\circ)\ (0.16\ \angle -7.04^\circ) = 36.8\ \angle -7.04^\circ\ \text{A}\end{aligned}$$

$I = 36.8$ A

pf $= \cos\phi = \cos(7.04^\circ) = 0.99$ (lagging)