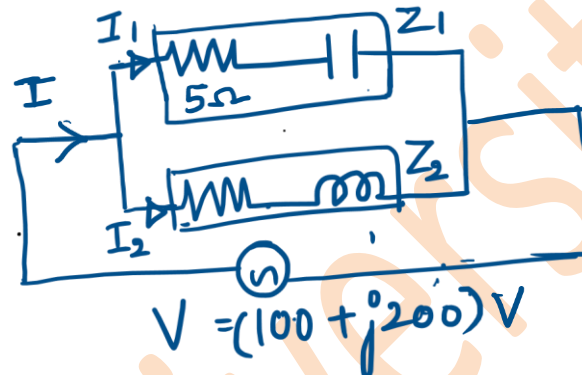


Lecture 33

1. Two impedances Z_1 and Z_2 are connected in parallel. The first branch takes a leading current of 16A and has resistance of 5Ω and while the second branch takes a lagging current at a power factor of 0.8. The total power supplied is 5kW and the applied voltage being $(100+j200)$ V. Determine the complex expressions for branch currents and the total current. Also draw the complete phasor diagram representing the circuit taking voltage as the reference phasor

Solution:



$$V = (100 + j200) = 223.6 \angle 63.43^\circ$$

$$P_T = 5 \text{ kW} = P_1 + P_2$$

$$P_1 = I^2 R = 16^2 \times 5 = 1.28 \text{ kW}$$

$$\text{Also } P_1 = V I_1 \cos \phi_1$$

$$\cos \phi_1 = 0.35$$

$$\vec{I}_1 = 16 \angle 69.51^\circ$$

$$\vec{I}_1 = (5.60 + j14.98) \text{ A}$$

Unit I: Assessment: Q & A (Selected)

$$\therefore P_2 = P_T - P_1 = 3.72 \text{ kW}$$

Now $P_2 = V I_2 \cos \phi_2$ (Taking V as ref)

$$I_2 = \frac{3.72}{223.6 \times 0.8} = 20.79 \angle -36.86^\circ$$

$$\bar{I}_2 = (16.634 - j12.47) \text{ A}$$

Total current $\bar{I} = \bar{I}_1 + \bar{I}_2$

$$= 16 \angle 69.51^\circ + 20.79 \angle -36.86^\circ$$

$$= 22.37 \angle 6.45^\circ \text{ A}$$

Phasor diagram

