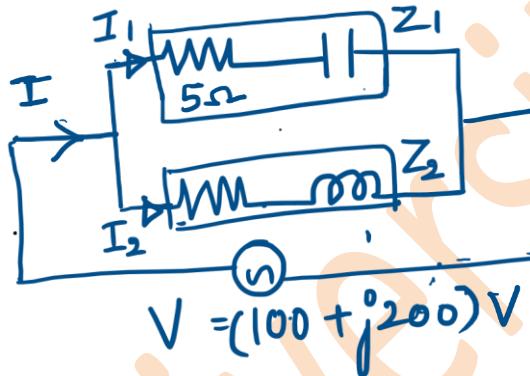


## Lecture 33

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  $5\Omega$  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:



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

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

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

$$\text{Also } P_1 = VI_1 \cos \phi_1$$

$$\cos \phi_1 = 0.35$$

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

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

## Unit I: Assessment: Q &amp; 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)

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

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

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

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

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

Phasor diagram

