

Lecture 35

1. An 4kW inductive load connected across 200V, 50 Hz supply is operating at 0.8 Lagging powerfactor.

i) Determine active, reactive and apparent powers supplied by the source.

ii) What must be the capacitance of the Capacitor that must be connected in parallel with the load to raise overall powerfactor to Unity

Solution: Given

$$P = 4 \text{ kW}$$

$$V = 200 \text{ V}$$

$$\cos\phi = 0.8 \text{ lag}$$

$$\text{Apparent Power } S = \frac{P}{\cos\phi} = \frac{4 \text{ K}}{0.8} = 5 \text{ KVA}$$

$$\text{Reactive power } Q = \sqrt{S^2 - P^2} = 3 \text{ KVAR}$$

By adding a capacitor, there will be no change in the active power supplied by the source.

$$\text{Hence } P_{\text{new}} = 4 \text{ kW}$$

$$\text{Given, new pf } \cos\phi = 1$$

$$S_{\text{new}} = \frac{P_{\text{new}}}{\cos\phi_{\text{new}}} = 4 \text{ KVA}$$

$$\therefore Q_{\text{new}} = \sqrt{S_{\text{new}}^2 - P_{\text{new}}^2} = 0$$

Hence $Q_{\text{new}} = 0$
i.e. net reactive power supplied by the source is zero.
i.e entire reactive power demanded by the load i.e 3 KVAR is supplied by the capacitor itself.

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