

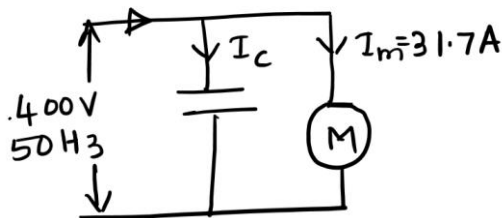
Unit II : Single Phase AC Circuits

NOTES -Class 34

Numericals on Power factor Improvement

1. A single phase motor connected to 400V, 50 Hz supply takes 31.7A at power factor of 0.7 lagging. Calculate the capacitance required in parallel with the motor to raise the power to 0.9 lagging

Solution



$$\text{Active Component of } I_m = I_m \cos \phi_m \\ = 31.7 \times 0.7 = 22.19 \text{ A}$$

$$\text{Active component of } I = I \cos \phi \\ = I \times 0.9 \\ I = 22.19 / 0.9 = 24.65 \text{ A}$$

$$\text{Reactive Component of } I_m = I_m \sin \phi \\ = 31.7 \times 0.714 = 22.6 \text{ A}$$

$$\text{Reactive Component of } I = I \sin \phi \\ = 24.65 \sqrt{1 - (0.9)^2} \\ = 24.65 \times 0.436 = 10.75 \text{ A}$$

$$I_c = \text{Reactive Component of } I_m - \text{Reactive Component of } I \\ = 22.6 - 10.75 = 11.85 \text{ A}$$

$$I_c = V_c / X_c = V \times 2\pi f C$$

$$11.85 = 400 \times 2\pi \times 50$$

$$C = 94.3 \times 10^{-6}$$

$$= 94.3 \mu\text{F}$$

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