

$$\text{Power (AB)} = I_{AB}^2 \times R_{AB} = 40^2 \times 3 = 1600 \times 3 = 4800 \text{ W}$$

$$\text{Power (BC)} = I_{BC}^2 \times R_{BC} = 40^2 \times 3 = 1600 \times 3 = 4800 \text{ W}$$

$$\text{Power (CA)} = I_{CA}^2 \times R_{CA} = 25.6^2 \times 5 = 3276.8$$

$$P_T = P_{AB} + P_{BC} + P_{CA} = 12876.8$$

(c) OVER ALL P.F

$$\tan \theta = \frac{\sqrt{3} (W_1 - W_2)}{W_1 + W_2}$$

$$\tan \theta = \frac{\sqrt{3} (3039.2 - (-9835))}{3039.2 + (-9835)}$$

$$\tan \theta = 1.7321 \times \frac{(3039.2 + 9835)}{(3039.2 - 9835)}$$

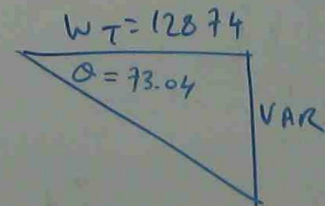
$$\tan \theta = \frac{1.7321 \times 12874.2}{-6795}$$

$$\tan \theta = -3.28$$

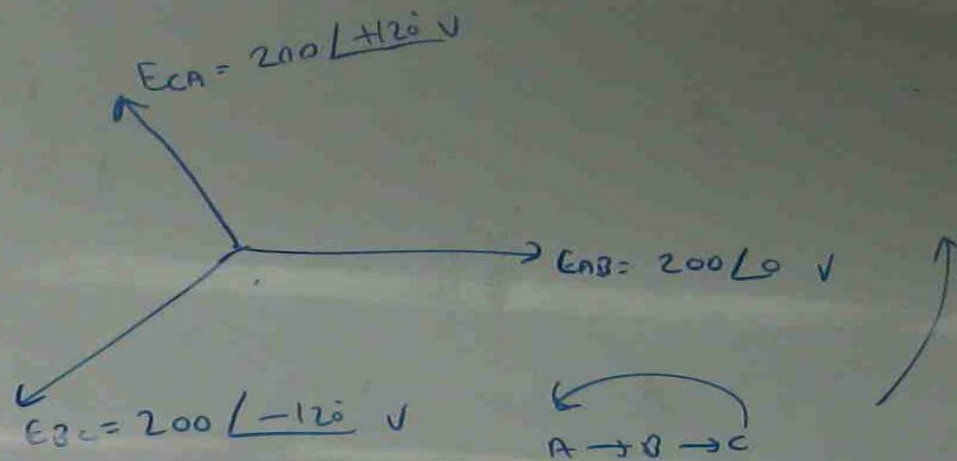
$$\theta = \tan^{-1}(-3.28) = -73.04$$

LAGGING P.F

$$\cos \theta = (-73.04) = 0.29$$



$$\begin{aligned} VAR &= W_T \tan \theta \\ &= 12874 \tan 73.04 \\ &= 42214 \text{ VAR} \end{aligned}$$



$$Z_{AB} = 3 + j4 = \sqrt{3^2 + 4^2} \angle \tan^{-1} \frac{4}{3} = 5 \angle 53.2^\circ$$

$$Z_{BC} = 3 - j4 = \sqrt{3^2 + 4^2} \angle -\tan^{-1} \frac{4}{3} = 5 \angle -53.2^\circ$$

$$Z_{CA} = 5 + j6 = \sqrt{5^2 + 6^2} \angle \tan^{-1} \frac{6}{5} = 7.81 \angle 50.2^\circ$$

$$I_{AB} = \frac{E_{AB}}{Z_{AB}} = \frac{200 \angle 0^\circ}{5 \angle 53.2^\circ} = 40 \angle -53.2^\circ \text{ Amp}$$

$$I_{BC} = \frac{E_{BC}}{Z_{BC}} = \frac{200 \angle -120^\circ}{5 \angle -53.2^\circ} = 40 \angle -66.8^\circ$$

3.04
VAR

$$I_{CA} = \frac{E_{CA}}{Z_{CA}} = \frac{200 \angle 120^\circ}{7.81 \angle 50.2^\circ} = 25.6 \angle 69.8^\circ$$