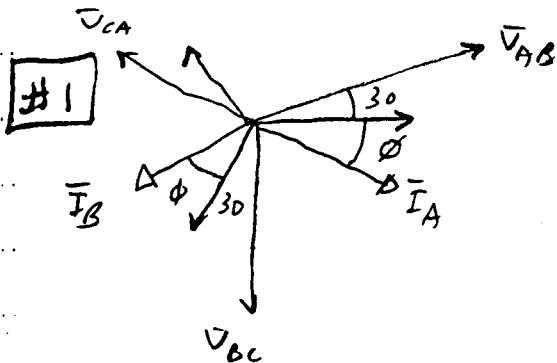


EXAM #1

SOLUTION

SP 13



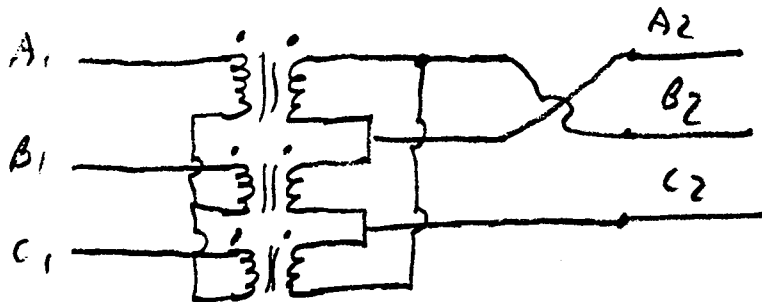
$$400 = 230 \times 15 (\cos(-90^\circ - (-90^\circ - \phi - 30^\circ)))$$

$$\phi + 30^\circ = \pm 83^\circ \quad \phi = +53^\circ$$

$$P_{3\phi} = \sqrt{3} \times 230 \times 15 (\cos(53^\circ)) = 3596 \text{ W}$$

$$Q_{3\phi} = \sqrt{3} \times 230 \times 15 (\sin(53^\circ)) = 4772 \text{ vars}$$

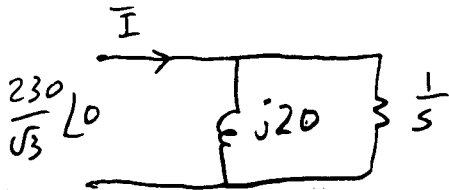
#2



#3

$$|\bar{z}_{e1}| = \frac{30}{40} = 0.75 \quad \%Z = \frac{0.75}{240/41.7} \times 100 = 13\%$$

#4



$$(a) S=0 \quad |\bar{I}| = \frac{230/\sqrt{3}}{20} = 6.6 \text{ A}$$

$$(b) S=1 \quad \bar{I} = \frac{230/\sqrt{3}}{j20} + \frac{230/\sqrt{3}}{1} = 133 - j6.6$$

$$|\bar{I}| = 133 \text{ A}$$

$$(c) S = \frac{1800 - 1620}{1800} = 0.1 \quad \bar{I} = \frac{230/\sqrt{3}}{j20} + \frac{230/\sqrt{3}}{10} = 13.3 - j6.6$$

$$|\bar{I}| = 15 \text{ A}$$

$$(d) f_r = 0.1 \times 60 = 6 \text{ Hz}$$

#5 (a) $C=0$ $1000 + j1000 = 120 \angle 0 \bar{I}^*$

$$\bar{I} = \frac{1000 - j1000}{120} = 11.8 \angle -45^\circ$$

(b) $\bar{I} = 0$ when $Q_{cap} = -1000$

$$Q_{cap} = -120^2 \times 377C = -1000$$

$$C = 184 \mu F$$

(c) $1000 + j0 = 120 \angle 0 \bar{I}$

$$\bar{I} = \frac{1000}{120} = 8.3 A$$