

HQ 36 : 44 W , PF 0,6 trễ

Quạt G : 100 W , PF 0,8 trễ

Ấm thanh 1bê : 100 W , PF 1

Máy chiến 1bê : 500 W , PF 0,9 sớm

a) S, P, Q, PF, I tổng.

$$P_{\text{tổng}} = 44.36 + 100.6 + 100 + 500$$

$$= 2784 \text{ (W)}$$

$$Q_{\text{tổng}} = 44.36 \cdot \tan(\arccos 0,6) + 100.6 \cdot \tan(\arccos 0,8)$$

$$- 500 \cdot \tan(\arccos 0,99)$$

$$= 2491 \text{ (VAR)}$$

$$S_{\text{tổng}} = \sqrt{P_{\text{tổng}}^2 + Q_{\text{tổng}}^2} = 3736 \text{ (VA)}$$

$$PF_{\text{tổng}} = \frac{P}{S} = \frac{2784}{3736} = 0,745$$

$$I_{\text{tổng}} = \frac{S_{\text{tổng}}}{V} = \frac{3736}{230} = 16,28 \text{ (A)}$$

b) $PF' = 0,95$ trễ ; $P'_{\text{tổng}} = P_{\text{tổng}} = 2784 \text{ (W)}$

$$Q'_{\text{tổng}} = P_{\text{tổng}} \cdot \tan(\arccos(0,95)) = 915 \text{ (VAR)}$$

$$S'_{\text{tổng}} = \sqrt{P_{\text{tổng}}^2 + Q_{\text{tổng}}^2} = 2931 \text{ (VA)}$$

$$I'_{\text{tổng}} = \frac{S'_{\text{tổng}}}{V} = 12,74 \text{ (A)}$$

$$Q_{\text{c bù}} = Q'_{\text{tổng}} - Q_{\text{tổng}} = 915 - 2491 = -1576$$

$$\Rightarrow C_{\text{bù}} = \frac{-Q_{\text{c bù}}}{U^2 \cdot 2\pi f} = 103,6 \text{ (}\mu\text{F)}$$

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B.T: HQ 36 44P, PF 0,6 trễ

Quạt 6 100W, PF 0,8 trễ

Ấm thanh l bô 100W, PF 1.

Máy chày 1bô 500W, PF 0,99 sớm

a) S, P, Q, PF, I tổng

b) bù CSPK PF' = 0,95 (trễ)

S', Q', P', PF' I' tổng.

$$a) P = 44.36 + 6.100 + 100 + 500 = 2784 \text{ (W)}$$

$$S = \frac{44.36}{0.6} + \frac{6.100}{0.8} + \frac{100}{1} + \frac{500}{0.99} = 2895,05 \text{ VA}$$

$$Q = \frac{44.36}{0.6} \sqrt{1-0.6^2} + \frac{6.100}{0.8} \sqrt{1-0.8^2} + 100 \cdot 0 + \frac{500}{0.99} \cdot (-0.141)$$

$$= 2490,788$$

$$b) S = 2784 + 2490,788 = 5274,788$$

$$P' = P = 2784 \text{ W}$$

$$Q' = P \tan(\cos^{-1}(0.95)) = 915,0567$$

$$S' = \sqrt{P'^2 + Q'^2} = 2930,5$$

$$\text{Bổ sung a) } S = P + jQ = 2784 + 2490,788j = 3735,57 \angle 41,82$$

$$PF = \frac{P}{S} = \cos(41,82) = 0,745 \text{ trễ}$$

$$V = 220 \angle 0^\circ$$

$$I = \frac{S}{V} = \frac{2784 + 2490,788j}{220 \angle 0} = 16,98 \angle 41,82$$

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LÊ MỸ THO
1613285

a) S, P, Q, PF, I tổng

$$\Sigma P_{HQ} = 36.44 = 1584 \text{ W} = P_1 \Rightarrow Q_1 = P_1 \tan(\arccos 0.6) = 2412 \text{ W}$$

$$P_{quat} = 6.100 = 600 \text{ W} = P_2 \Rightarrow Q_2 = P_2 \tan(\arccos 0.8) = 450 \text{ W}$$

$$P_{\text{âm thanh}} = 100 \text{ W} = P_3 \Rightarrow Q_3 = P_3 \tan(\arccos 1) = 0$$

$$I_{\text{máy chiếu}} = 500 \text{ W} = P_4 \Rightarrow Q_4 = P_4 \tan(-\arccos 0.91) = 71.25 \text{ VA}$$

$$\Rightarrow P = P_1 + P_2 + P_3 + P_4 = 2784 \text{ W}$$

$$Q = Q_1 + Q_2 + Q_3 + Q_4 = 2490 \text{ W}$$

$$S = \sqrt{P^2 + Q^2} = 3735.57$$

$$\bar{S} = P + jQ = 2784 + j2490 = \bar{V}\bar{I}^*$$

$$PF = \frac{P}{S} = 0.7453 \text{ (trễ)}$$

$$\bar{V} = 220 \angle 0$$

$$\bar{I} = I \angle \varphi \Rightarrow \bar{I}^* = I \angle -\varphi$$

$$\bar{S} = 2784 + j2490.23 = 220 \angle 0 \cdot (I \angle -\varphi)$$

$$= 200 I \angle -\varphi$$

$$\bar{S} = 3735.57 \angle 41.818^\circ = 220 I \angle (-\varphi)$$

$$I_{\text{rms}} = \frac{3735.574}{220} = 16.98 \Rightarrow \bar{I} = 16.98 \angle -41.8^\circ$$

$$\varphi_i = -41.818^\circ$$

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$$b) \theta_{min} = \arcsin(0.95) = 8,195^\circ$$

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$$\begin{aligned} W_{S115} &= (20 \times 10^3) \cos 15^\circ = 19,126 \text{ N} \\ W_{S120} &= (20 \times 10^3) \cos 20^\circ = 18,794 \text{ N} \\ W_{S135} &= (20 \times 10^3) \cos 35^\circ = 12,961 \text{ N} \\ W_{S150} &= (20 \times 10^3) \cos 50^\circ = 12,519 \text{ N} \\ W_{S165} &= (20 \times 10^3) \cos 75^\circ = 5,176 \text{ N} \\ W_{S180} &= (20 \times 10^3) \cos 90^\circ = 0 \text{ N} \end{aligned}$$

$$\begin{aligned} \sqrt{2} \cdot 20 \text{ kN} &= 28,284 \text{ kN} \\ \sqrt{2} &= 1,414 \\ (30) \sin 45^\circ &= \frac{1}{2} \end{aligned}$$

$$\begin{aligned} p \cdot 22 &= 47 \text{ (p} \cdot 2 \cdot 11 = 22) \\ (p \cdot 2 \cdot 11) \cdot 0,95 &= 20,005 \text{ N} \\ p \cdot 22000 &= 20,005 \text{ N} \\ (p \cdot 2 \cdot 11) \cdot 0,95 &= 20,005 \text{ N} \\ 11 \cdot 2 &= 22 \end{aligned}$$

HẢI TIẾN

BTVN

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Bài tập:

HQ : 36

44W , PF : trễ 0,6

Quạt : 6

100W , PF : 0,8 trễ

Âm thanh : 1 bô

100W , PF : 1

Máy chiếu : 1 bô

500W , PF : 0,99 sớm

a) Tính S, P, Q, R, I tổng

b) Bù CS để PF = 0,95 trễ, tính lại các giá trị ở câu a

Bài làm

Đèn HQ : $P_d = 44 \cdot 36 = 1584W$.

$$\theta = +\arccos(0,6) = 53,13^\circ$$

$$Q_d = P_d \tan \theta = 2122,112$$

$$\rightarrow S_d = P + jQ = 1854 + j2112$$

Quạt : $P = 100 \cdot 6 = 600W$.

$$\theta = +\arccos(0,8) = 36,87^\circ$$

$$Q_q = P \tan \theta = 450 \text{ VAR}$$

$$S = P + jQ = 600 + j450$$

Âm thanh : $P = 100W$.

$$\theta = +\arccos 1 = 0$$

$$\rightarrow Q = 0$$

$$\rightarrow S = 100 \text{ V}$$

Máy chiếu :

$$P = 500W$$

$$\theta = -\arccos 99 = -8,1^\circ$$

$$\rightarrow Q = P \tan \theta = -71,25 \text{ VAR}$$

HẢI TIẾN

$$\rightarrow S = P + jQ = 500 - j71,25$$

$$\rightarrow P_{\text{tổng}} = P_R + P_L + P_{at} + P_{mc} = 1584 + 600 + 100 + 500 = 2784 \text{ (W)}$$

$$Q_{\text{tổng}} = Q_R + Q_L + Q_{at} + Q_{mc} = 2112 + 450 + 0 - 71,25 = 2490,75 \text{ (Var)}$$

$$S_{\text{tổng}} = 2784 + j2490,75 = 3735,57 \angle 41,82$$

$$pf = \cos \theta = \cos 41,82 = 0,745 \text{ trễ}$$

$$V = 220 \angle 0^\circ$$

$$I^* = \frac{S}{V} = \frac{2784 + j2490,75}{220 \angle 0} = 16,98 \angle 41,82$$

$$\rightarrow I = 16,98 \angle -41,82$$

$$R = \frac{V}{I} = \frac{220 \angle 0}{16,98 \angle -41,82} = 12,96 \angle 41,82$$