Rafmagnsfræði

1) a) Tíðni er eitt rið á sekúndu

b) Tákniið fyrir tíðni er f og einingin er HZ

3)

a) $W = m \cdot C \cdot \Delta\theta$ / $W = 8 \cdot 90 \cdot 4187 = 3014640$ w/sek

$$\eta = \frac{P_{út}}{P_{inn}} \; ; \quad \eta \cdot P_{inn} = \frac{P_{út}}{P_{inn}} \cdot P_{inn} \; ; \quad P_{inn} = \frac{P_{út}}{\eta}$$

$$P_{inn} = \frac{3014640}{0,75} = 4019520 \text{ W/sek}$$

$$\frac{4019520 \text{ W/sek}}{1000 \cdot 60 \cdot 60} = 1.1165 \text{ kW/h}$$

kostnaður $= 1.1165 \cdot 9,60 = 10,7184$ kr

4)

a) $\frac{10}{600} = 0,01666$ W/sek

$0,01666 \cdot 1000 \cdot 60 \cdot 60 = 59976$ W/sek

$$W = \frac{P}{t} \; ; \quad P = \frac{W}{t}$$

$$P = \frac{59976}{30} = 1999.2 \text{ W}$$

b) $P = U \cdot I \cdot \cos\phi \; ; \quad I = \frac{P}{U \cdot \cos\phi}$

$$I = \frac{1999,2}{230 \cdot 1} = 8.692 \text{A}$$

c) $R = \frac{230}{8.692} = 26.46\,\Omega$

Rafinnaigusfraedi

6)

a)

$\tan\phi = \frac{X}{R}$; $X = \tan\phi \cdot R$

$X = \tan(30) \cdot 16{,}1 = 9{,}29\,\Omega$

$X_C = X_L + 9{,}29$

$X_L = 23 + 9{,}29 = 32{,}29\,\Omega$

$C = \frac{1}{2\pi \cdot 50 \cdot 32{,}29} = 9{,}85\,\mu F$

b)

$Z = \frac{R}{\cos\phi} = \frac{16{,}3}{\cos(30)} = 18{,}82\,\Omega$

$I = \frac{230}{18{,}82} = 12{,}22\,A$

7)

a) $\tan\phi = \frac{X}{R}$; $X = \tan\phi \cdot R$

$X = \tan(30) \cdot 16{,}1 = 9{,}29\,\Omega$

$X_C = X_L - 9{,}29$

$X_L = 23 - 9{,}29 = 13{,}71\,\Omega$

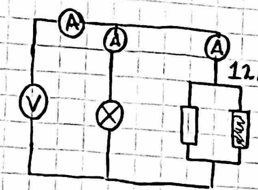
$C = \frac{1}{2\pi \cdot 50 \cdot 13{,}71} = 2{,}32\,\mu F$

b)

Rafmagnsfræði

5)

a)



$\cos\phi = 0{,}4$
$\angle\phi = 66{,}42°$

b) $P_{Flúr} = 230 \cdot 12 \cdot \cos(66{,}42) = \underline{1104{,}08}$

$\tan\phi = \frac{Q}{P}$; $Q = P \cdot \tan\phi$

$Q_{Flúr} = 1104{,}1 \cdot \tan(66{,}42) = 2529{,}54\,VAr$

$P_{gló} = 10 \cdot 60W = \underline{600W}$

$Q_{gló} = 0W$

$P_H = 1104{,}08 + 600 = \underline{1704{,}1}\,W$

$Q_H = \underline{2529{,}54}\,VAr$

$S_H = \sqrt{1704{,}1^2 + 2529{,}54^2} = \underline{3050{,}004}\,VA$

c) $I = \frac{600}{230} = \underline{2{,}608A}$

d) $I_H = \frac{S_H}{U_H} = \frac{3050{,}004}{230} = \underline{13{,}26}$

$\cos\phi = \frac{P_H}{S_H} = \frac{1704{,}1}{3050{,}004} = \underline{0{,}5587}$

e) $Q_C = P(\tan\phi_1 - \tan\phi_2)$

$\cos\phi = 0{,}9$
$\angle\phi = 25{,}84°$

$Q_C = 1704{,}1 \cdot (\tan(66{,}42) - \tan(25{,}84))$

$Q_C = 3078{,}1\,VAr$

$X_C = \frac{U^2}{Q_C} = \frac{230^2}{3078{,}1} = 17{,}18\,\Omega$

$C = \frac{1}{2 \cdot \pi \cdot 50 \cdot 17{,}18} = \underline{1{,}854F}$

12) a) $\frac{18000}{1500} = 12$ ofnar

b) $I = \frac{P}{U \cdot \cos\phi} = \frac{1500}{230 \cdot 1} = 6{,}52A$

c) 8 greinar og 6,52 á hverri grein fyrir sig