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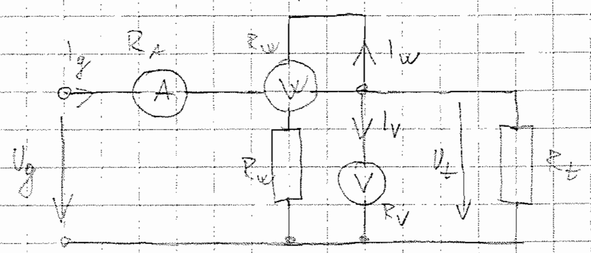
① Odrediti faktor snage tereta ukoliko je vatmetrom, čija je naponska grana spojena prema teretu, izmjerena snaga P = 74 W, voltmetrom napon na teretu 232 V, a ampermetrom struja iznosa 0,65 A. Otpor naponske grane vatmetra je 65 kΩ, a otpor voltmetra 250 kΩ.



$P = 74\ W$

$U_t = 232\ V$

$I_1 = 0,65\ A$

$R_W = 65\,000\ \Omega$

$R_V = 250\,000\ \Omega$

$$P_t = P_W - \left(\frac{U_t^2}{R_V} + \frac{U_t^2}{R_W}\right) = 74 - \left(\frac{232^2}{250000} + \frac{232^2}{65000}\right) = 72,97$$

$$U_t = U_V$$

$$I_t = I_A - I_W - I_V$$

$$I_t = I_A - \frac{U_V}{R_W} - \frac{U_V}{R_V} = 0,65 - \frac{232}{65000} - \frac{232}{250000} = 0,646$$

$$\cos\varphi = \frac{72,97}{232 \cdot 0,646} = 0,49$$

② Odrediti faktor oblika napona mjerenog voltmetrom V1 s odzivom na el. srednju vrijednost i voltmetrom V2 s odzivom na efektivnu vrijednost, ukoliko su njihova očitanja bila $U_{V1} = 46,5\ V$ i $U_{V2} = 53,7\ V$

$$\xi = \frac{53,7}{46,5} \cdot 1,11 = 1,281$$

1. MJERENJE

$V_0 = 49,2\ V$

$I = 32\ A$

$P = 155\ W$

$P_t = P_w - \frac{U_{V1}^2}{R_w} - \frac{U_{V2}^2}{R_{V1}} - \frac{U_{V1}^2}{P_{V2}}$

$P_t = 155 - 49,2^2 \cdot \left(\frac{1}{3000} \cdot 120 - \frac{1}{6 \cdot 1000} \right)$

$= 154,54$

$0,46$

2. MJERENJE

$V_0 = 50\ V$

$V_1 = 34\ V$

$V_2 = 26,64\ V$

$\mathcal{E} = ?$

$\mathcal{E} = \frac{34\ V}{26,64\ V} \cdot 1,11$

$\mathcal{E} = 1,42$

$P_w = 80\ W$

$I = 2,65\ A$

$P = U \cdot I = 50,11\ W$

INSTRUMENTI BEZ OBZIRA NA IZOLIČENJE MJERE PRAVU VRIJEDNOST

3. MJERENJE

$P_w = 162,5\ W$

$I = 4,75\ A$

$U_{V1} = 49,6\ V$

$U_{V2} = 49,58\ V$

	①	②	③	④	⑤
U_1	50 V	50 V	50 V	50 V	50 V
P	160 W	162 W	160,5 W	162,5 W	132,5 W
I	4,8 A	4,81 A	4,81 A	4,73 A	4,4 A
U1	48,6	48,5	48,4	48,6	48,6
cosφ	0,672	0,68	0,675	0,685	0,606

$P_1 = U_{V1} \cdot I = 238,08\ W$

$P_2 = 238,61$

$P_3 = 235,6$

$P_4 = 238,24$

$P_5 = 238,1$

$$F = \frac{P}{U_1}$$

$$\frac{dF}{dP} = \frac{1}{U_1} = \frac{1}{P} \qquad \frac{dF}{dU} = \frac{P}{I} \cdot \left(-\frac{1}{U}\right) = -\frac{I}{U}$$

$$\frac{dF}{dP} = \frac{P}{U_1}\left(-\frac{1}{I^2}\right) = \frac{1}{F}$$

$$U_B = \sqrt{\left(\frac{1}{P} \cdot U_P\right)^2 + \left(\frac{I}{U} \cdot U_U\right)^2 + \left(\frac{I}{I} \cdot U_I\right)^2}$$

$$U_P = \frac{6P}{\sqrt{3}} = \frac{0,005}{\sqrt{3}}$$

$$U_B = \sqrt{3 \cdot \left(\frac{0,005}{\sqrt{3}}\right)^2} = \sqrt{0,005^2} = 0,005 = 5 \cdot 10^{-3}$$