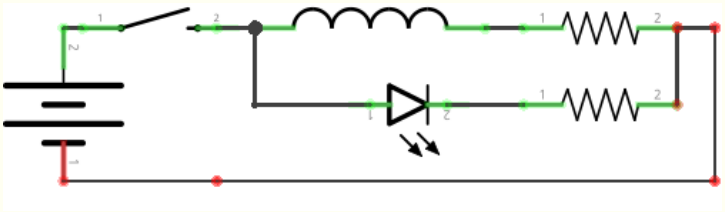
1. Selbstinduktion

$$U = 50\ \text{V}; \quad U_z = 80\ \text{V}; \quad R = 1500\ \Omega; \quad I = 0.15\ \text{A}; \quad \delta t = 1\ \text{ms}$$

(a)



(b)

(c)

(d)

2. Transformator

$$U_1 = 230\ \text{V}$$

(a)

$$U_2 = \underline{\underline{U_1 \frac{N_2}{N_1}}}$$

(b) $N_2 = 1; R_2 = 0.2\ \Omega; \quad P = 800\ \text{W}$

$$P = \frac{U_2^2}{R_2}$$
$$U_2 = \sqrt{PR_2}$$
$$N_1 = \frac{U_1 N_2}{\sqrt{PR_2}} = \underline{\underline{18.18}}$$

(c)

$$I = \frac{P}{U} = \underline{\underline{3.48\ \text{A}}}$$

(d)

3. Energiedichte einer Zylinderspule

(a)

$$B = \mu_0 \frac{n}{l} I$$
$$\Phi = \int \vec{B}\ \mathrm{d}\vec{A} = \mu_0 \frac{n}{l} I \int 1\ \mathrm{d}\vec{A} = A\mu_0 \frac{n}{l} I$$
$$L = N\frac{\mathrm{d}\Phi}{\mathrm{d}t} = \underline{\underline{\frac{\mu_0 A n^2}{l}}}$$

(b) $n = 2000$; $A = 4\ \text{cm}^2$; $l = 0.3\ \text{m}$; $I = 4\ \text{A}$

$$E = \frac{1}{2} L I^2 = \frac{\mu_0 A n^2 I^2}{2l} = \underline{\underline{0.054\ \text{J}}}$$

(c)

$$\rho = \frac{E}{V} = \frac{\mu_0 n^2 I^2}{2l^2} = \underline{\underline{446.80\ \text{J/m}^3}}$$

(d)

$$\omega_{mag} = \frac{B^2}{2\mu_0} = \mu_0 \frac{n^2}{2l^2} I^2 = \underline{\underline{446.80\ \text{J/m}^3}}$$