P 2.2):

The flux in the core of a 1 φ transformer varies with time as shown in Fig. P2.2. The primary coil has 400 turns and the secondary coil has 100 turns. Sketch the waveform of the induced voltage e_1 in the primary winding.

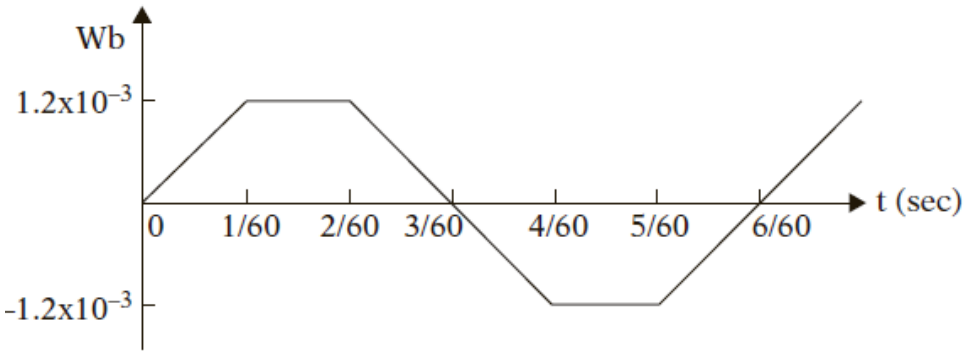
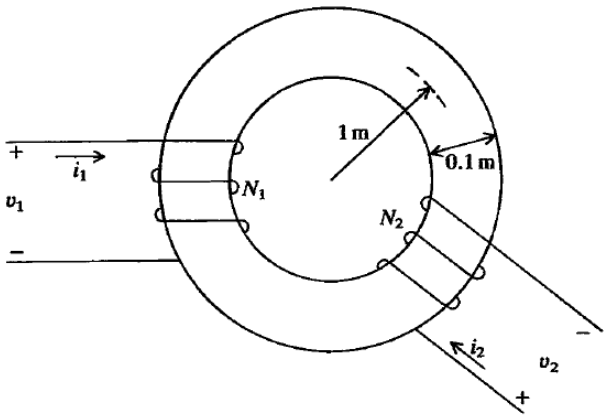


FIGURE P2.2

Q2):

An iron "doughnut" (toroid) with two coils is shown in $N_1 = 100$ turns and $N_2 = 200$ turns, $\mu_r = 10^4/4\pi$. Calculate L_{12}.

Also calculate L_{21}, L_{11}, L_{22}.



Remember:

$$\lambda_1 = L_{11} i_1 + L_{12} i_2$$
$$\lambda_2 = L_{21} i_1 + L_{22} i_2$$

Q3):

Two coupled coils have the following parameters: $r_1 = 10\,\Omega$, $L_{l1} = 0.1\,L_{11}$, $r_2 = 2.5\,\Omega$, $L_{l2} = 0.1\,L_{22}$, $L_{11} = 100\,\text{mH}$, $N_1 = 100$ turns, $L_{22} = 25\,\text{mH}$, $N_2 = 50$ turns. Develop an equivalent T circuit with (a) winding 1 as the reference winding and (b) winding 2 as reference winding.

P 2.16):

A 1ϕ, 100 kVA, 11000/2200 V, 60 Hz transformer has the following parameters.

$R_{HV} = 6.0\,\Omega$ $R_{LV} = 0.28\,\Omega$

$L_{HV} = 0.08$ H $L_{LV} = 0.0032$ H

$L_{m(HV)} = 160$ H

$R_{c(HV)} = 125\,\text{k}\Omega$

Obtain an equivalent circuit of the transformer:

(a) Referred to the high-voltage side.

(b) Referred to the low-voltage side

Q5):

A 1ϕ, 100 kVA, 1000/100 V transformer gave the following test results:

open-circuit test (HV side open)

100 V, 6.0 A, 400 W

short-circuit test

50 V, 100 A, 1800 W

(a) Determine the rated voltage and rated current for the high-voltage and low-voltage sides.

(b) Derive an approximate equivalent circuit referred to the HV side.
