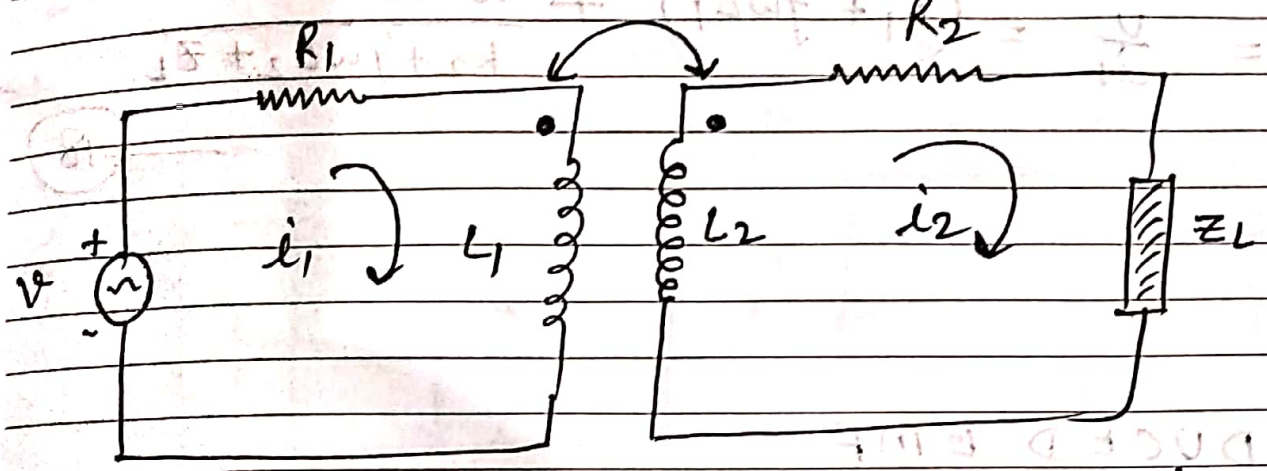
REFLECTED IMPEDANCE



Eq: Primary Coil Secondary coil

Apply KVL.

$$V = (R_1 + jL_1\omega)i_1 - j\omega M i_2 \quad \text{---- (14)}$$

$$0 = (R_2 + j\omega L_2 + Z_L)i_2 - j\omega M i_1 \quad \text{---- (15)}$$

from these eqn.

$$i_2 = \frac{j\omega M i_1}{R_2 + j\omega L_2 + Z_L} \quad \text{---- (16)}$$

from eqn (14) and (15), we get-

$$\frac{V}{i_1} = (R_1 + j\omega L_2) + \frac{\omega^2 M^2}{(R_2 + j\omega L_2 + Z_L)} \quad \text{---- (17)}$$

Notes

Appointment

November'11

Monday		7	14	21	28
Tuesday	1	8	15	22	29
Wednesday	2	9	16	23	30
Thursday	3	10	17	24	
Friday	4	11	18	25	
Saturday	5	12	19	26	
Sunday	6	13	20	27	

$$Z_{in} = \frac{V}{I_1} = (R_1 + jwL_1) + \frac{w^2 M^2}{R_2 + jwL_2 + Z_L}$$

(18)

INDUCED EMF

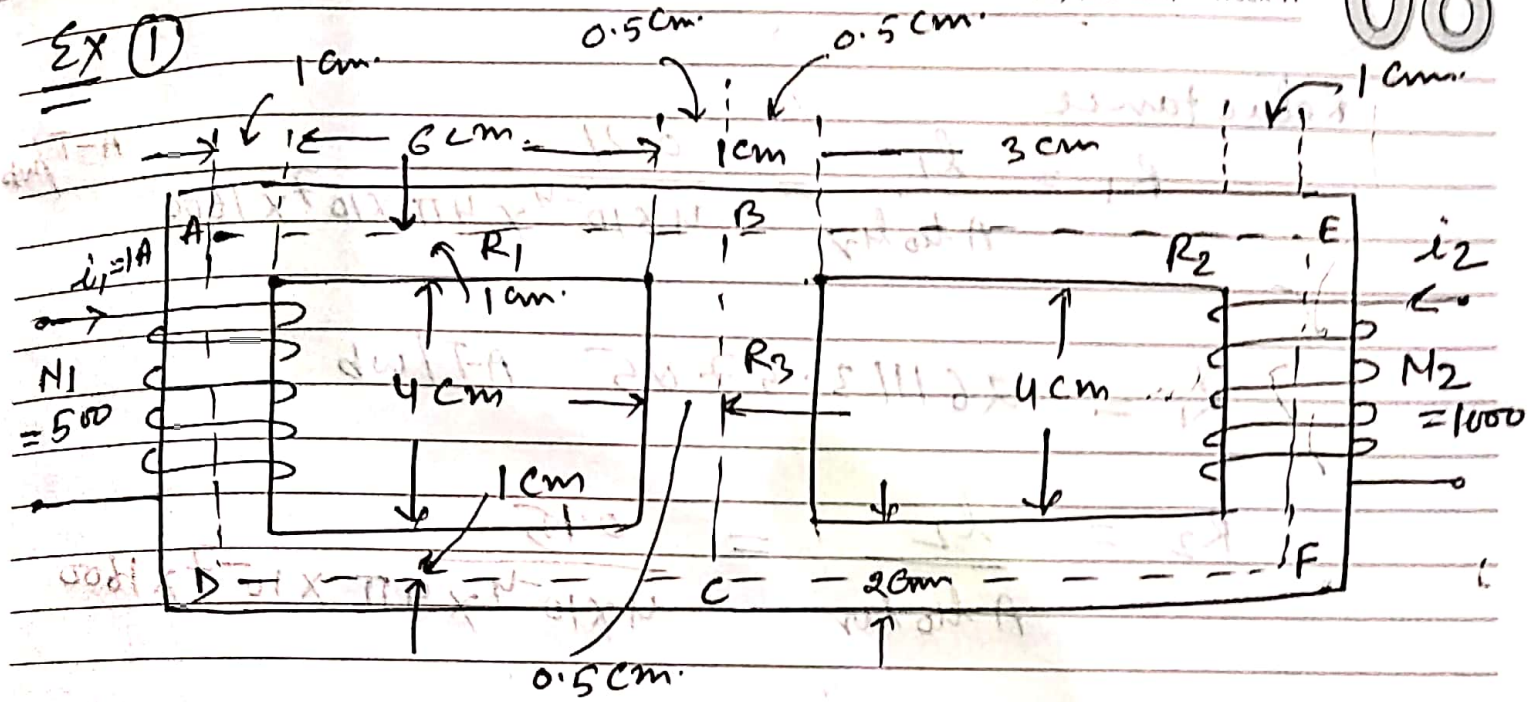
$$\phi = \phi_{max} \sin(wt)$$

$$v = N \cdot \frac{d\phi}{dt} = N \phi_{max} w \cos(wt)$$

$$\therefore v = 2\pi f N \phi_{max} \cos(wt)$$

$$\therefore V_{rms} = \sqrt{2}\, \pi f N \phi_{max} = 4.44 f N \phi_{max}$$

Ex ①



$\mu_r = 1600$

Determine L_1, L_2, M_{12} and M_{21}.
Each coil is excited with 1 Amp current

Sol

$$R = \frac{l}{A\mu} = \frac{l}{A\mu_0\mu_r} \quad A\text{-T/wb}$$

Sunday 09

$$\phi = \frac{fm}{R} \quad wb$$

$l_1 = (6+1+0.5)\times 2 + (4+2) = 21\ cm = 0.21\ mt.$

$l_2 = (3+1+0.5)\times 2 + (4+2) = 15\ cm = 0.15\ mt.$

$l_3 = 4+2 = 6\ cm = 0.06\ mt$

$A = 2\times 2 = 4\ cm^2 = 4\times 10^{-4}\ m^2$

Notes

Appointment

November'11

Monday		7	14	21	28
Tuesday	1	8	15	22	29
Wednesday	2	9	16	23	30
Thursday	3	10	17	24	
Friday	4	11	18	25	
Saturday	5	12	19	26	
Sunday	6	13	20	27	

2011

10 Monday

October

Reluctance

$$R_1 = \frac{l_1}{A \mu_0 \mu_r} = \frac{0.21}{4\times10^{-4}\times4\pi\times10^{-7}\times1600} \quad A\text{-}T/Wb$$

$$R_1 = 26112.57.85 \quad A\text{-}T/Wb$$

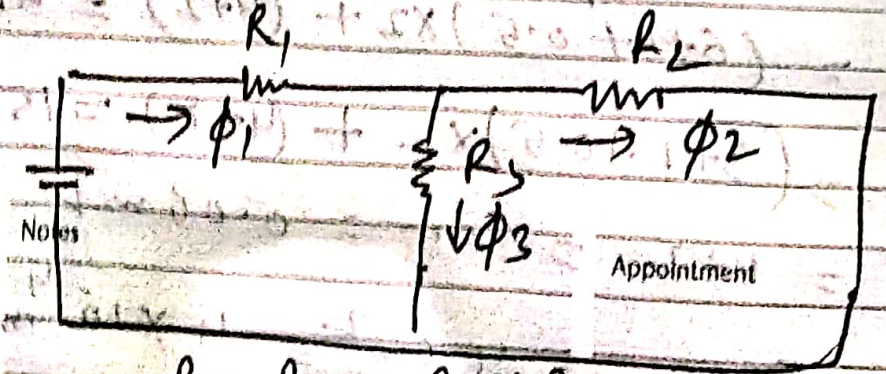
$$R_2 = \frac{l_2}{A \mu_0 \mu_r} = \frac{0.15}{4\times10^{-4}\times4\pi\times10^{-7}\times1600}$$

$$\therefore R_2 = 186509.7 \quad A\text{-}T/Wb$$

$$R_3 = \frac{l_2}{A \mu_0 \mu_r} = \frac{0.06}{2\times1\times10^{-4}\times4\pi\times10^{-7}\times1600}$$

$$R_3 = 149207.76 \quad A\text{-}T/Wb$$

$$F_{m1} = N_1 I_1 = 500\times1 = 500 \quad A\text{-}T$$



$$R = R_1 + \frac{R_2 \times R_3}{R_2 + R_3} = 344006.78 \quad A\text{-}T/Wb$$

October'11

Monday	31	3	10	17	24
Tuesday		4	11	18	25
Wednesday		5	12	19	26
Thursday		6	13	20	27
Friday		7	14	21	28
Saturday	1	8	15	22	29
Sunday	2	9	16	23	30

Notes

Appointment

$$\phi_1 = \frac{F_{m1}}{R} = \frac{500}{34406.78} \text{ Wb}$$

$$= 1.453 \text{ mHb}$$

$$\phi_2 = \phi_{21} = \phi_1 \times \frac{R_3}{(R_3+R_2)} = 0.646 \text{ mHb}$$

$$L_1 = \frac{N_1 \phi_1}{I_1} = \frac{500 \times 1.453}{1} \text{ mH}$$

$$L_1 = 0.7265 \text{ H} \qquad [LI = N\phi]$$

$$M_{21} = \frac{N_2 \phi_{21} (= \phi_2)}{I_1} = \frac{1000 \times 0.646}{1} \text{ mH}$$

$$M_{21} = 0.646 \text{ H}$$

Similarly compute L_2, M_{12} by exciting coil 2 ($i_2 = 1$ amp, $i_1 = 0$)

Notes

Appointment