MUTUAL INDUCTANCE :→

when two inductors (or coils) are in a close proximity to each other, the magnetic flux caused by current in one coil links with the other coil, thereby inducing voltage in the latter. This phenomenon is known as mutual inductance.

So for example this is a simple circuit

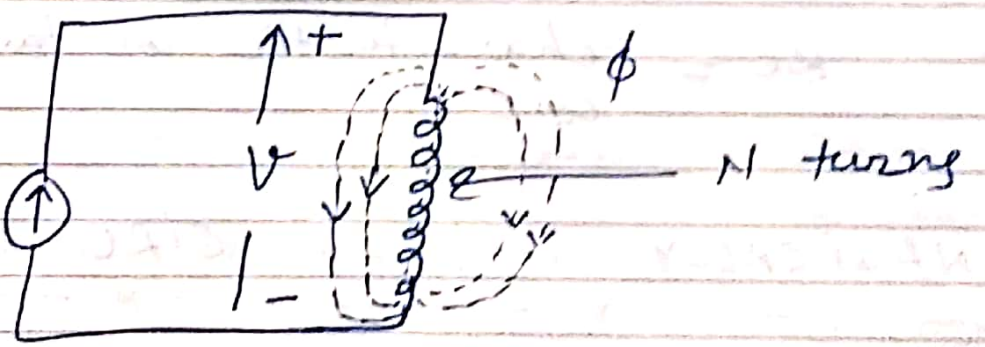

fig - Magnetic flux produced by a single coil with N turns

According to Faraday's law, the voltage v induced in the coil is proportional to the number of turns N and the time rate of change of the magnetic flux, that is

$$v = N\frac{d\phi}{dt}$$

September'11

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

Notes Appointment

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But the flux ϕ is produced by current i so that any change in ϕ is caused by a change in the current, Hence,

$$v = \frac{N d\phi}{dt} \cdot \frac{di}{dt} \qquad \left[\frac{d\phi}{dt} = \frac{d\phi}{di} \cdot \frac{di}{dt}\right.$$

$$\boxed{v = L \frac{di}{dt}} \qquad \left[\frac{N d\phi}{di} = L\right.$$

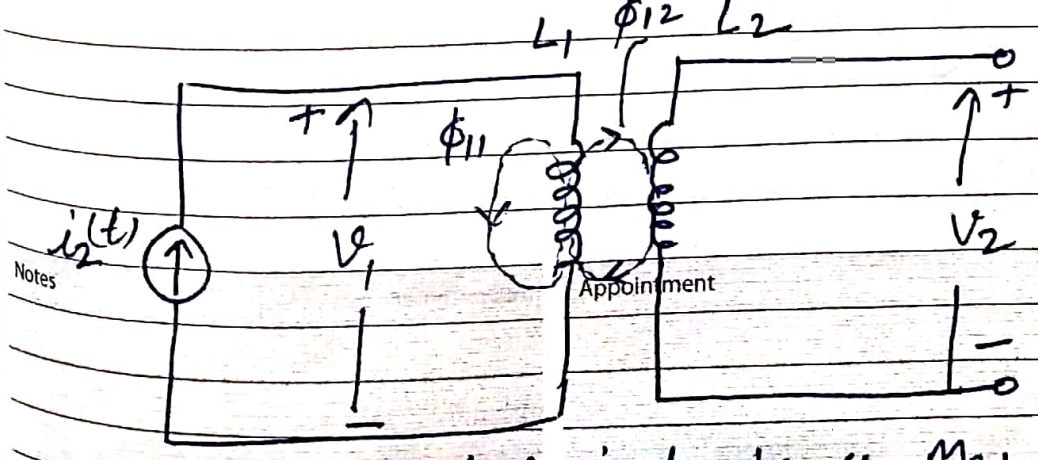
$$\left[L = \frac{N\phi}{i}\right.$$

$$\boxed{L = \frac{N d\phi}{di}} \qquad \left[Li = N\phi\right.$$

→ inductance of the coil commonly called as self-inductance.

Sunday 18

And we will take another example:



Total flux
$\phi_1 = \phi_{11} + \phi_{12}$

fig. Mutual inductance M_{21} of coil 2 with respect to coil 1

Notes
Appointment
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
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