Lecture-1

Mid - 1, 2, 5, 6

Final - 2, 3, 4

Topics

1] Transformer
2] Induction Motor
3] Synchronous generator
4] Synchronous Motor
5] DC Generator } DC machines.
6] DC Motor

$Z = R + jX$ → [Short circuit]

for, $L = 0$, $Z \approx 0$ [DC]

for, $C = 0$, $Z \approx \infty$ [DC] → [open circuit]

Transformer

a transformer is a static electrical device that transfers electrical power from one circuit to another circuit through electromagnetic induction.

$$V_{emf} = N\frac{d\phi}{dt}$$

N = Number of turns

ϕ = Magnetic flux

$\frac{d\phi}{dt}$ = Rate of change of flux

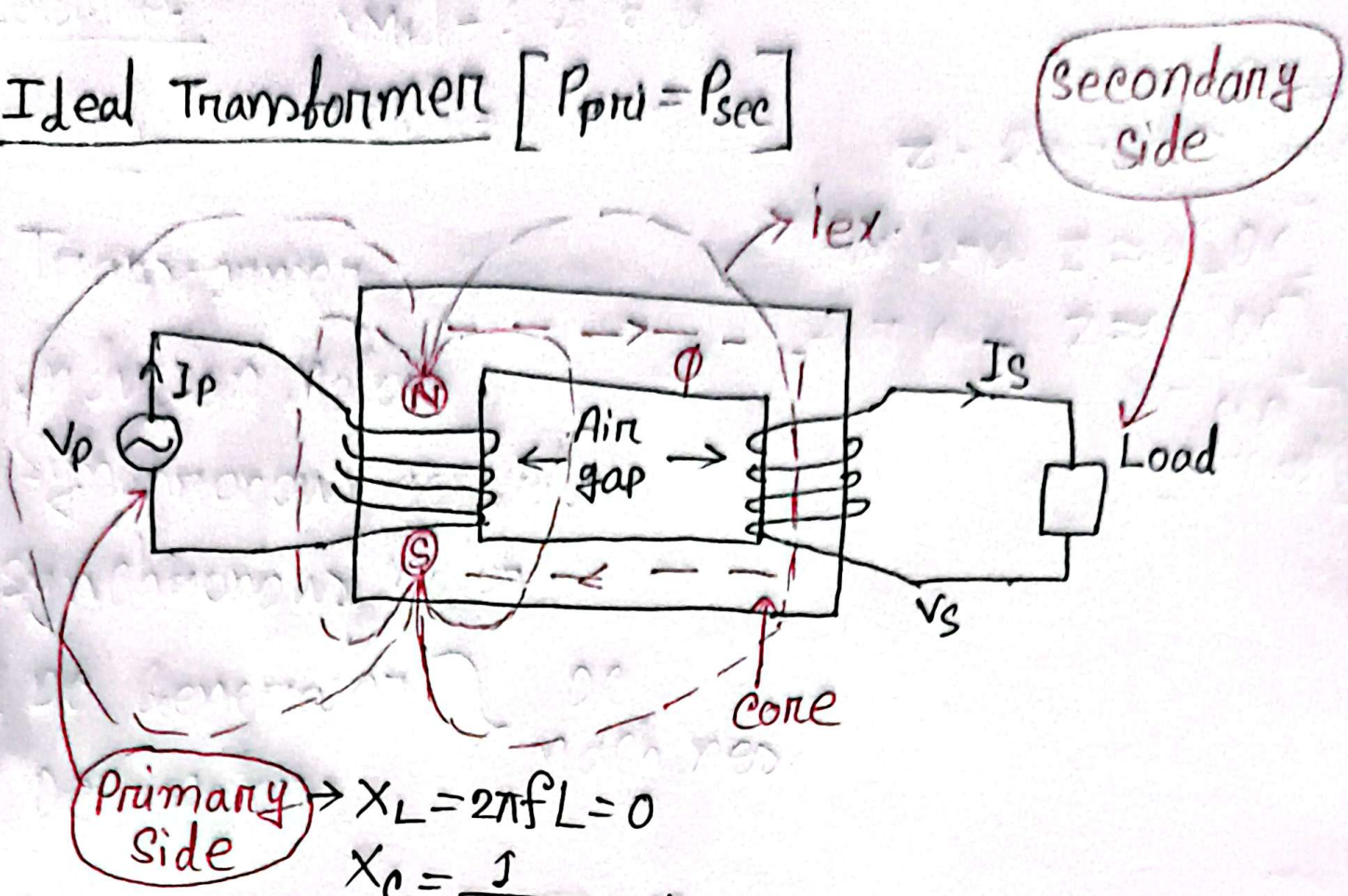
Turn Ratio

$$a = \frac{N_P}{N_S}$$

N_P = Number of primary turns

N_S = " " secondary "

Ideal Transformer [$P_{pri} = P_{sec}$]



$X_L = 2\pi f L = 0$

$X_C = \frac{1}{2\pi f C} = \infty$

secondary side

$N \uparrow \; V \uparrow \; I \downarrow \Rightarrow \frac{N_p}{N_s} = \frac{V_p}{V_s} = \frac{I_s}{I_p}$

Case-1 [a > 1]

$a \uparrow \; \frac{N_p}{N_s} \uparrow$

$N_p > N_s$
$V_p > V_s$
$I_p < I_s$

} {Step Down}

Case-2 [a < 1]

$a \downarrow \; \frac{N_p}{N_s} \downarrow$

$N_p < N_s$
$V_p < V_s$
$I_p > I_s$

} {Step Up}

Case-3

$a = 1$