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Assignment 2

Ans 1) $\omega_0 = 100$ rad/sec , $\theta = 10$, $L = 100$ H

(a) β (Bandwith) $= \frac{R}{L} = \frac{\omega_0}{Q} = \frac{100}{10} = 10$ rad/sec

$\Rightarrow \omega_2 = \omega_0 + \frac{\beta}{2} = 100 + 5 = 105$ rad/sec

&

$\omega_1 = \omega_0 - \frac{\beta}{2} = 100 - 5 = 95$ rad/sec

(b) $R = \beta \times L = 10 \times 100 = 1000\ \Omega$

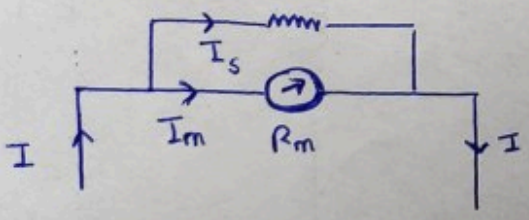
Now, $\omega_0 = \frac{1}{\sqrt{LC}} \Rightarrow \sqrt{LC} = \frac{1}{\omega_0}$

$= LC = \frac{1}{\omega_0^2}$

$\Rightarrow C = \frac{1}{L\omega_0^2} = \frac{1}{100 \times (100)^2} = 10^{-6}$

$\Rightarrow C = 1\ \mu F$

Ans 2)



Given $I = 100$ mA

$R_m = 500\ \Omega$

$I_m = 100\ \mu A$

$I_m R_m = I_s S$

$(I - I_m) S = I_m R_m$

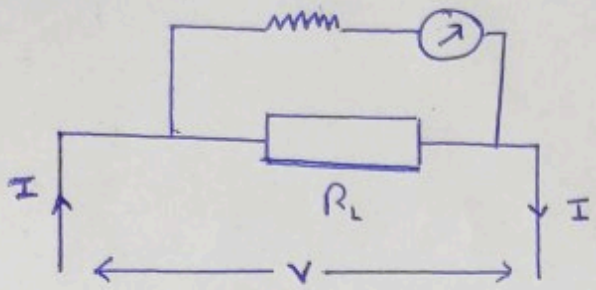
or

$S = \frac{I_m R_m}{I - I_m}$

$S = \frac{100 \times 10^{-6} \times 500}{(100 \times 10^{-3}) - (100 \times 10^{-6})}$

$= 0.005\ \Omega$

Ans 3)



$$V = I_m (R_s + R_m)$$

$$V = (I_m R_s + I_m R_m)$$

$$I_m R_s = V - I_m R_m$$

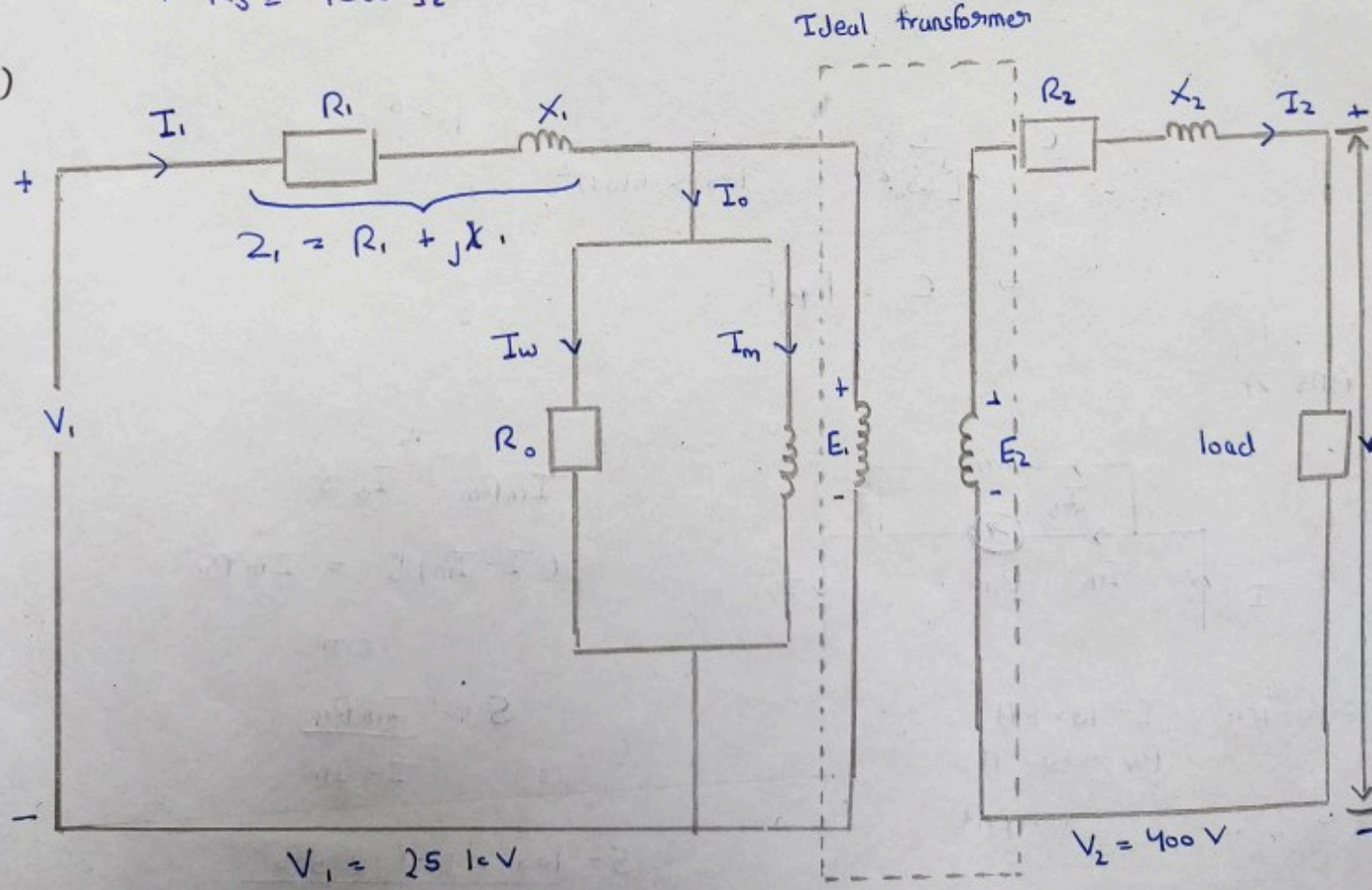
$$\boxed{R_s = \frac{V}{I_m} - R_m}$$

Given, $I_m = 1\,mA$, $R_m = 500\ \Omega$, $V = 10\ V$

$$R_s = \frac{10}{1 \times 10^{-3}} - 500 = 10000 - 500$$

$$\Rightarrow R_s = 9500\ \Omega$$

Ans 4)



Ans 5)

Given → 1<vA rating = 40 1<vA

$M_1 = 200$, $M_2 = 100$

$V_1 = 200\ V$ $f = 50\ H_2$

(a) $\frac{V_2}{V_1} = \frac{N_2}{N_1} = 1<$

$\frac{V_2}{V_1} = \frac{100}{200} \Rightarrow V_2 = V_1 \times \frac{1}{2}$

$V_2 = 200 \times \frac{1}{2}$

$\boxed{V_2 = 100\ V}$

(b) $I_1 = \frac{1<vA\ rating}{V_1} = \frac{40 \times 10^3}{200} = 200\ A$

$I_2 = \frac{1<vA\ rating}{V_2} = \frac{40 \times 10^3}{100} = 400\ A$

(c) $E = 4.44\ f\ N\ \phi_m$

$V_1 = 4.44\ f\ N_1\ \phi_m$

$\phi_m = \frac{V_1}{4.44\ f\ N_1} = \frac{200}{4.44 \times 50 \times 200}$

$\phi_m = 4.5 \times 10^{-3}$ Weber

$\phi_m = 4.5$ mWb