Subject: BEEE

Subject code:- EEC103

Solution key 2:- SK2025

Q.1 A) Thevenin Theorem statement - 3M

Example - 2M

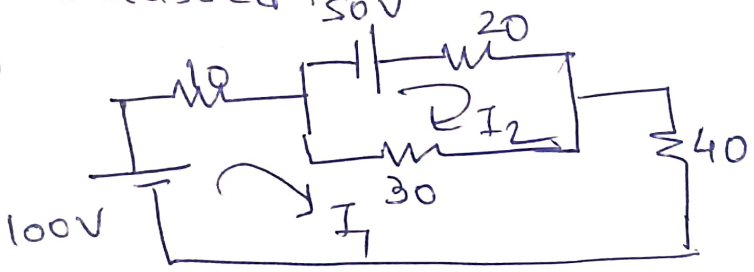
Q 1 B) Construction - 2M

Working principle - 2M

Application of zener diode - 1M

Q.1 C) Comparision of core type and shell type. Atleast 7 to 8 points should be discussed. 5M

Q. 1 D)



$\Rightarrow -80I_1 + 30I_2 = -100$ - (1)

$30I_1 - 50I_2 = -50$ - (2) } 4M

$I_1 = 2.096\ A$

$I_2 = 2.25\ A$

$\therefore \boxed{I_{20\Omega} = 2.25\ A}$ - 1M.

Q 2 A) Construction with diagram - 5M.

Working Principle - 5M.

(Q 2 B) For coil A

PF = 0.8

$\phi_A = 36.87$

$Z_A = 10/_2 = 5\Omega$

$\frac{r_A}{Z_A} = 0.8$

$r_A = 4\ \Omega$ — 3M

$Z_A = \sqrt{r_A^2 + X_A^2}$

$X_A = 3\ \Omega$

For coil B.

PF = 0.7

$\phi_B = 45.57^0$

$Z_B = 5/_2 = 2.5$

$r_B/Z_B = 0.7$

$r_B = 1.75$ — 3M

$Z_B = \sqrt{r_B^2 + X_B^2}$

$X_B = 1.79\ \Omega$

Total Impedance with A & B coil.

$Z = \sqrt{(r_A + r_B)^2 + (X_A + X_B)^2}$

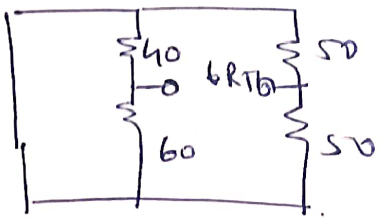
$Z = 7.48\ \Omega$ — 2M

$V = I \cdot Z = 14.96\ V$

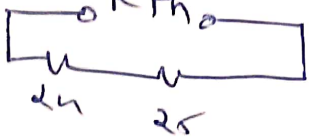
$(PF)_{ckt} = \frac{r_A + r_B}{Z} = \frac{4 + 1.75}{7.48}$

$= 0.77$ lagging. — 2M

(Q.2 C) For R_{Th}



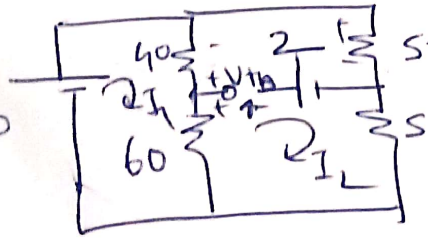
$\frac{40 \times 60}{100} = \frac{2400}{100} = 24$



$R_{Th} = 49\ \Omega$ — (3M)

$\frac{50 \times 50}{100} = \frac{2500}{100}$

= For V_{Th}



$-100 I_1 + 100 I_2 = -100$ — (1)

$100 I_1 - 200 I_2 = 0$

$I_1 = 2A,\ I_2 = 1A$

$-V_{Th} - 2 + 50 I_2 + 40(I_2 - I_1) = 0$ —

$V_{th} = -2 + 50 \times 1 + 40(1-2)$ — 4M

$= -2 + 50 - 40$

$= 8\ V$

$P_{max} = V_{th}^2 / 4R_{th} = 64/4\times 49 = 0.326$ Watts — 3M

(Q 2 D) for star $I_L = I_{ph}$

$V_L = \sqrt{3}\, V_{ph}$.

$Z_{ph} = R_{ph} + jX_{ph}$

$V_L = 440\ V$, $f = 50$ Hz, $P = 1.5$ kW

$V_{ph} = \frac{440}{\sqrt{3}} = 254.03\ V$. — 2M

$P = \sqrt{3}\, V_L I_L \cos\phi$

$I_L = 9.84\ A = I_{ph}$ — 3M

$Z_{ph} = V_{ph}/I_{ph} = 25.82\ \Omega$ — 1M

$\phi = 78.46^\circ$ — 1M

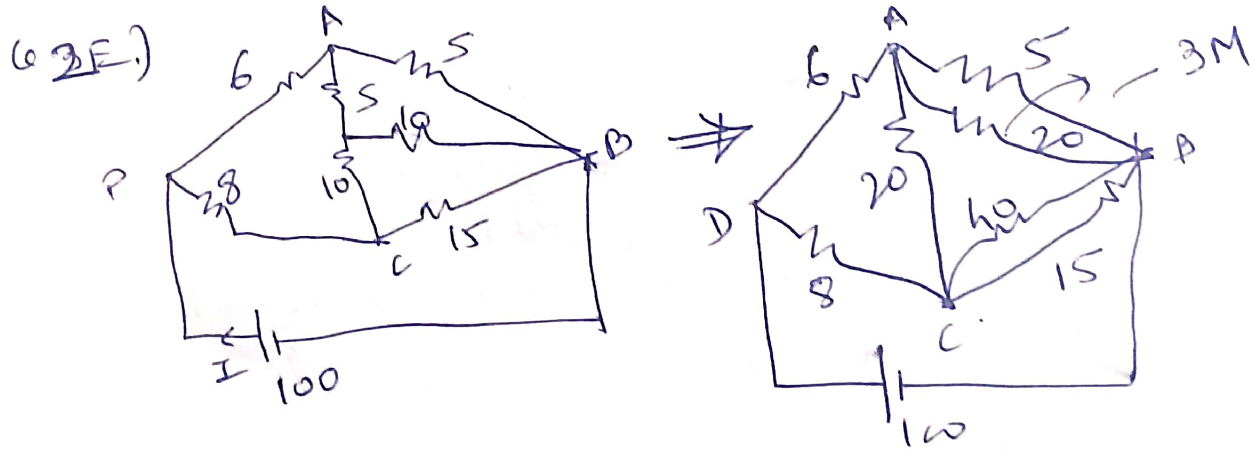
$Z_{ph} = 25.82 \angle 78.26^\circ = 5.17 + j25.3\ \Omega$

$R = 5.17\ \Omega$

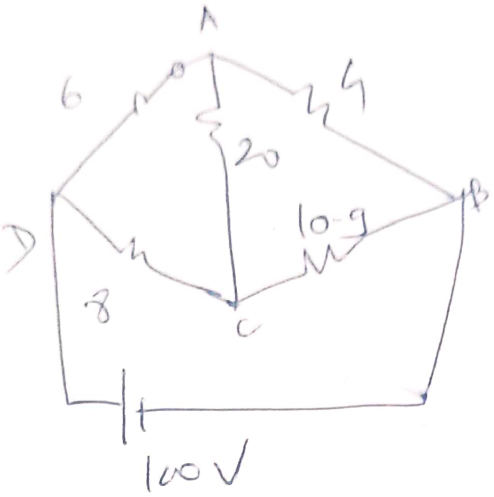
$X_L = 25.3$ — 3M

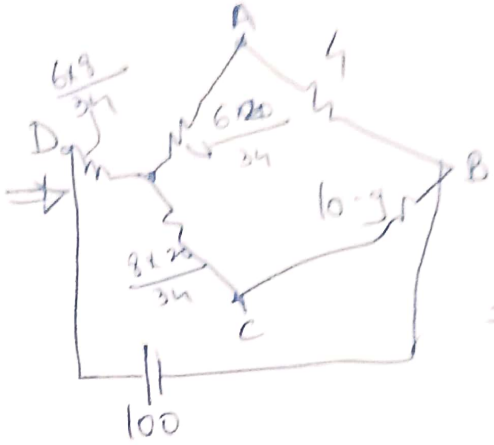
$L = 0.08\ H$.

(Q 2 E.)



— 3M





⇒ 3M

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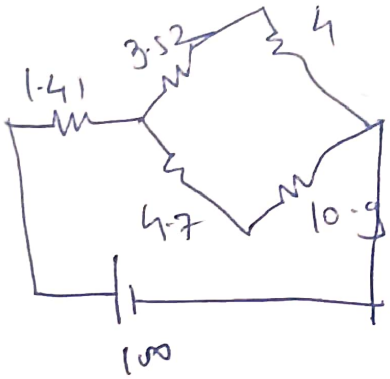

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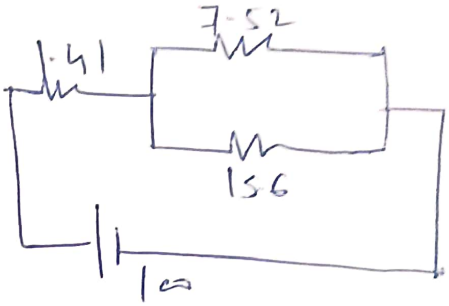
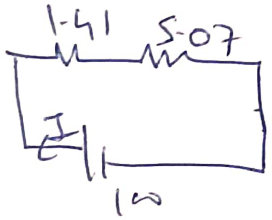


= 3M



$$I = \frac{100}{1.41 + 5.07} = 15.4\ A$$ — 1M

Q 3A) Derivation - Rms value — 5M.

$I_{rms} = 0.707 I_m$

Q 3B). Two losses - [Core or Iron
[Copper & winding in details

— 5M

Q 3C) $P_\Delta = 3 P_{star}$ — 3M.

$P = \sqrt{3} V_L I_L \cos\phi$ W, $Q = \sqrt{3} V_L I_L \sin\phi$ VAR

$S = \sqrt{3} V_L I_L$ VA — 2M

Q 3D) Compare FET with BJT

- Compare atleast 6 to 7 points of comparison — 5M.