

Assgnt 5.

1. $V_{in} = 125 \text{ V} @ 900 \text{ r/min.}$

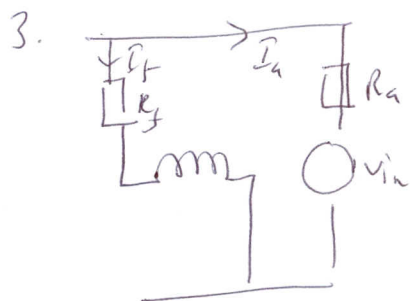
$$V_{in1} = k n_1$$

$$V_{in} = k n_2$$

$$V_{in2} = V_{in1} \frac{n_2}{n_1} = 125 \times \frac{1200}{900} = 167 \text{ V} \quad 30$$

2. $V_{in} = 144 \text{ V}, V_a = 120 \text{ V}$

$$V_a = V_{in} - I_a R_a \rightarrow I_a = \frac{V_{in} - V_a}{R_a} = \frac{144 - 120}{0.52} = 46.2 \text{ A} \quad 30$$



$$I_a R_a = 12 \text{ V}$$

$$V_{a1} = V_{in1} = 120 \text{ V}$$

$$V_{in2} = V_{in1} - I_a R_a = 120 - 12 = 108 \text{ V}$$

$$V_{in2} = \frac{n_2}{n_1} V_{in1}, \quad n_2/n_1 = 0.9$$

$$V_{in1} = k \phi_1 n_1$$

$$V_{in2} = k \phi_2 n_2$$

$$\frac{\phi_2}{\phi_1} = \frac{V_{in2}}{V_{in1}} \cdot \frac{n_1}{n_2} = \frac{108}{120} \cdot \frac{1}{0.9} = 1.0 \quad ; \quad \phi_2 = 1.0 \phi_1$$

$$\phi_1 = k_f I_{f1} = k_f \frac{V_{f1}}{R_{f1}}$$

$$\phi_2 = k_f I_{f2} = k_f \frac{V_{f2}}{R_{f2}}$$

$$\frac{\phi_2}{\phi_1} = \frac{R_{f1}}{R_{f2}} = 0.81$$

$$\text{Change in } R_f = \frac{1 - 0.81}{1} \times 100\% = 18.2\% \quad 40$$

OR. on Magnetisation curve!

$$R_{f1} = \frac{\Delta V_f}{\Delta I_f} = \frac{175}{0.75} = 233 \Omega \quad (20)$$

New magnetisation curve shifted by 0.9.

operating point produce $V_{in} = 132 \text{ V}$.

$$R_{f2} \approx \frac{132}{1.4} = 94 \Omega \quad (20)$$

$$\therefore 233 \Omega \rightarrow 94 \Omega$$