

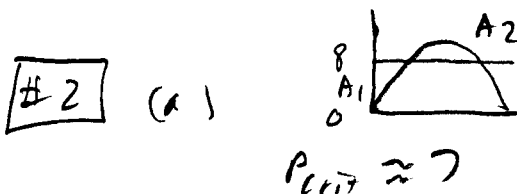
#1 $120 = k_f w_s \times 3$ $k_f w_s = 40 \Omega$, $40 \times 1 = 7 \times 5$ $X_s = \frac{40}{7} = 5.7 \Omega$

(a) $40 I_f \angle \delta = j \frac{40}{7} \times 7 \angle -26^\circ + 120 \angle 0$ $I_f \angle \delta = 3.44 + j0.9$ $I_f = 3.56 A$

(b) Lower - due to saturation

(c) Over-excited because it is delivering Q

(d) $V_f \rightarrow 0$



Cannot do it because $A_1 > A_2$



Can do it because $A_1 < A_2$

#3 $240 = 2 R_f$ $R_f = 120 \Omega$ $\gamma_{RW} + 0 = 12 + 0$ $\gamma_{RW} = 12 V$
 $12 + k_f^{SH} w \times 2 = 248$ $k_f^{SH} \times 1200 = 118$

(a) $(12 + 118 I_f) \frac{11}{12} = 4 I_f + 120 I_f$ $I_f = 0.696$

$V_f = 84 V$

(b) $(12 + 118 I_f) \frac{11}{12} = 4 I_f + 240$ $I_f = 2.198$ $R_f = 109$

Remove 11Ω

#4 (a) $(240 + 80 (I_f - 2)) \frac{10}{12} = 0 + 240$ $I_f = 2.6$

$R_f = 92 \Omega$

(b) $240 = I_a + (240 + 80 \times 0.6) \frac{RPM}{1200}$ $I_a = 10 - 2.6 = 7.4 A$

$240 = 7.4 + 288 \frac{RPM}{1200}$

$RPM = 969$

Bonus

Heat makes R_f increase which increases speed.