1. $N_m = \dfrac{120 F_e}{P}$ ← electrical Frequency in Hz ← Poles

↑ mechanical speed in rpm

a. $P = \dfrac{120\,(60)}{1800} = 4$

b. $P = \dfrac{120\,(60)}{720} = 10$

2. Solution 1 : Rotate CW

Solution 2 : Reverse any two phases

3.

a. $N_m = \dfrac{120 F_e}{P} = \dfrac{120\,(60)}{4} = 1800 \text{ rpm}$

b. $\tilde{E}_a = \tilde{V}_{as} + (r_s + jX_s)\,\tilde{I}_{as}$

$\tilde{E}_a = 120V\angle 0^\circ + (10 + j120)\,(0.7A\angle -36.87^\circ)$

$\tilde{E}_a = 186.94V\angle 19.7^\circ$ Thus $\delta = +19.7^\circ$

c. $|\tilde{E}_a| = E_a = \dfrac{L_{SF} I_F \omega_e}{\sqrt{2}} = 186.94$

$\rightarrow I_F = \dfrac{\sqrt{2}\,(186.94)}{0.8H\,(2\pi\,60)} = 877mA$ DC

d. $P_{3P} = 3|\tilde{V}_{as}|\,|\tilde{I}_{as}|\cos(\angle\tilde{V}_{as} - \angle\tilde{I}_{as}) = 3(120)(0.7)\cos(36.87^\circ)$

$= 201.6W$

$Q_{3P} = 3|\tilde{V}_{as}|\,|\tilde{I}_{as}|\sin(\angle\tilde{V}_{as} - \angle\tilde{I}_{as}) = 3(120)(0.7)\sin(36.87)$

$= 151.2VAR$