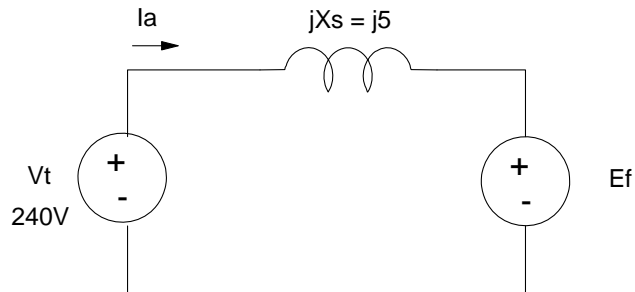


ECE 331 - Test #3:

Assume a 3-phase 60Hz, 2 pole, AC synchronous motor with a reactance of $X_s = j5$ Ohms connected to a



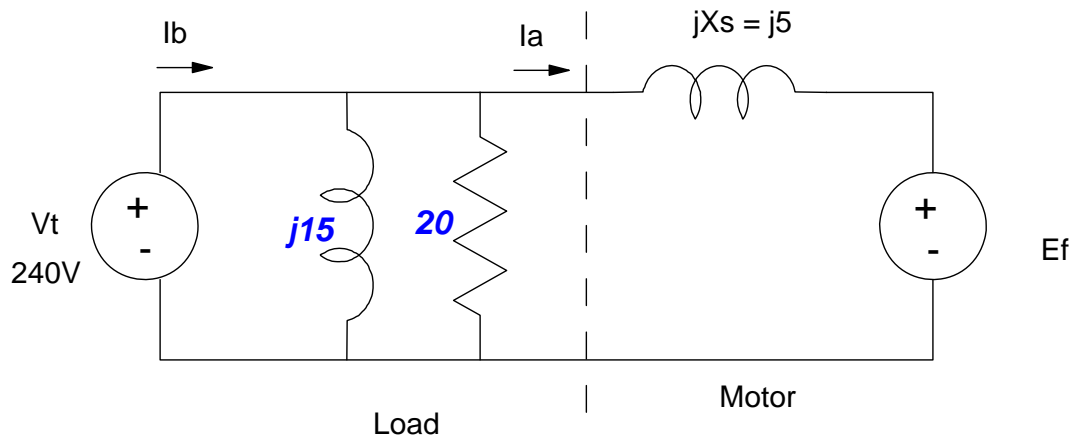
240V_{LN} bus:

$$P = |V_t| |I_a| \cos \theta$$

$$P = \frac{-|V_t| |E_f| \sin(\delta)}{|X_s|}$$

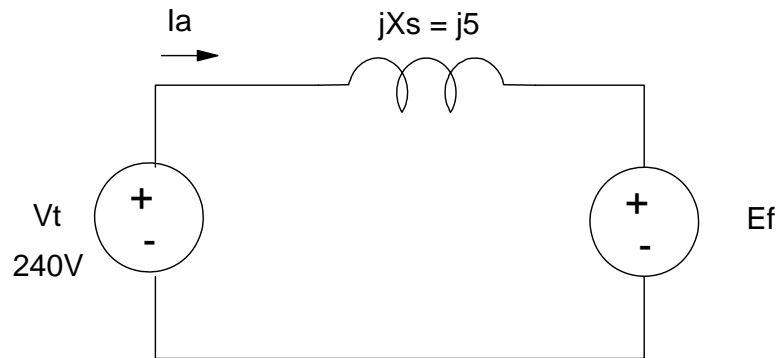
1) Assume this motor draws 10kW with a power factor of 0.7 lagging. Find the excitation voltage (E_f) and the slip angle (δ)

2) Assume a 3-phase AC synchronous motor is being used as a capacitor (there is has no load). The per-phase model is as follows:

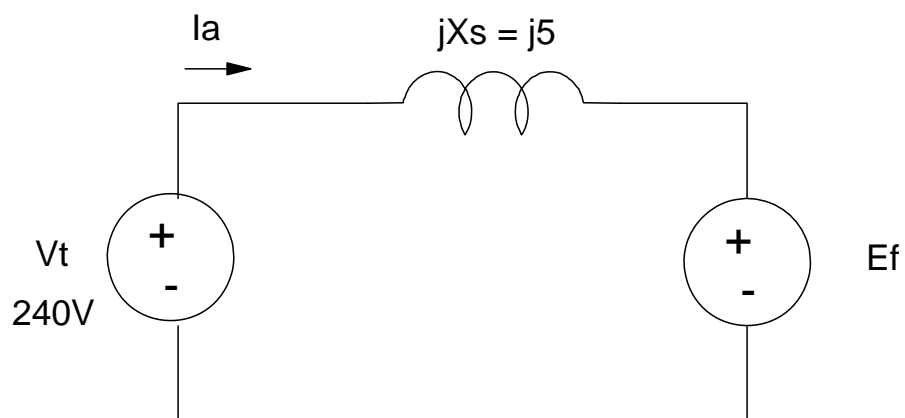


Determine the excitation voltage (E_f) and the slip angle (δ) so that the source (I_b) sees a power factor of 1.00.

3) Assume a 3-phase AC synchronous generator which is connected to a $240V_{LN}$ infinite bus. Assume the generator is producing $20kW$ per phase ($60kW$ total) with an excitation voltage of $E_f = 250V$. Find the resulting current, I_a , and the power factor for this generator.



- 4) Assume a 3-phase AC synchronous generator. Assume the current produced, $-I_a$, is
 $-I_a = 15 + j10$ Amps



Find the excitation voltage (E_f) and the slip angle (δ) to produce $15+j10$ Amps.

