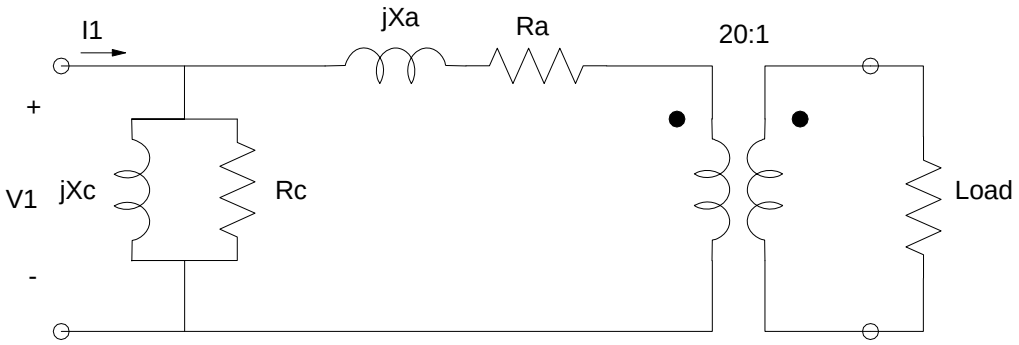
ECE 331 - Final Exam: Name _____

Closed Book. Closed Notes. Calculators permitted

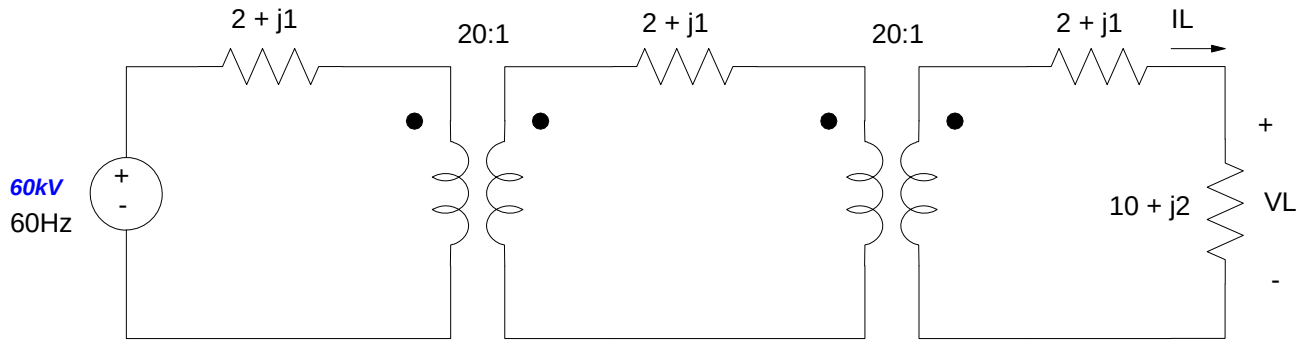
1) Transformers: Determine the parameters for a transformer with the following test data:

Open Circuit Test (Load = infinite): V1 = 120V, 60Hz. I1 = 2.4A, pf = 0.3 lagging

Short Circuit Test: (Load = 0 ohms): V1 = 10V, 60Hz. I1 = 3.8A, pf = 0.9 lagging.



2) Transformers. Two 20:1 step down transformers deliver 60kV to a customer as shown below. Determine the voltage, current, and power delivered to the load:



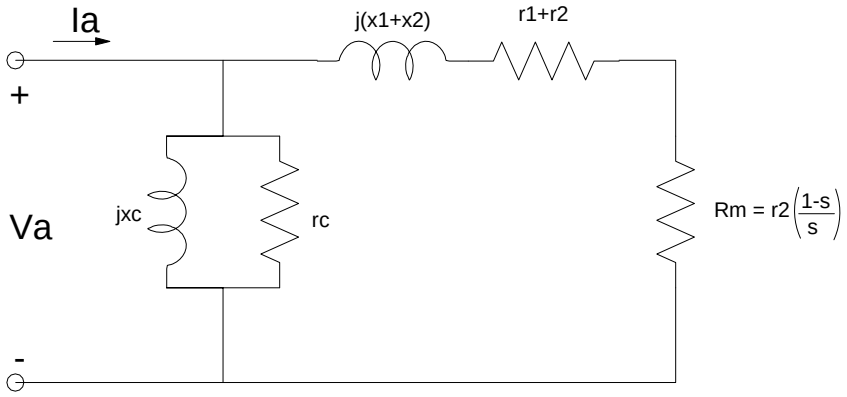
VL	
IL	
Power to the load	

3) AC Asynchronous Motors: Determine an electrical model for a 3-phase AC induction motor with the following measurements. All voltages are line-to-neutral

DC Test: Va = 4V, Ia = 1A

Locked Rotor Test (s=1): Va = 60V, Ia = 9A, pf = 0.7 lagging

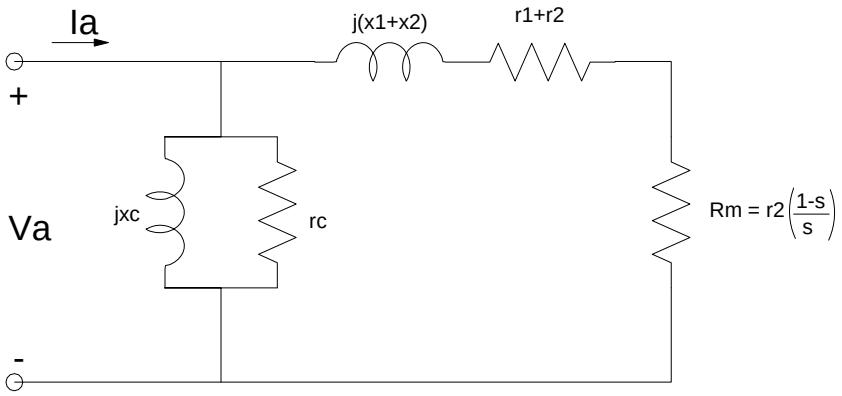
No-Load Test (s=0): Va = 200V, Ia = 0.6A, pf = 0.15 lagging



4) 3 phase AC Induction Motor: Assume a 3-phase AC induction motor has the following paramters:

r1 = 0.7 Ohms, jx1 = j2.0 Ohms r2 = 1.8 Ohms jx2 = j2.8 Ohms

rc = 200 Ohms jxc = j90 Ohms slip = 0.02

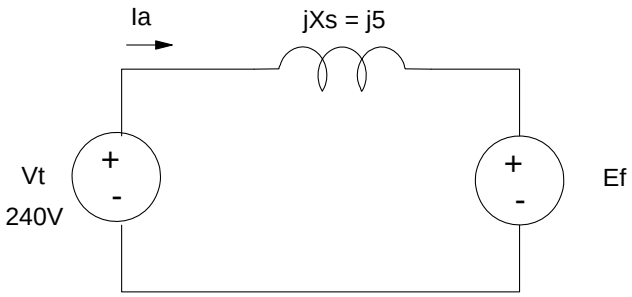


2a) Determine the electrical power in and the power factor assuming Va = 120VAC.

2b) Determine the mechanical power out (power to Rm)

5) AC Syhchronous Motor: Assume a 3-phase AC synchronous motor with the following specifications:

- 3 phase
- 2 pole
- 60Hz
- Vt = 300V line to neutral
- Xs = 5 Ohms
- Ea = 350V.
- Load = 8kW



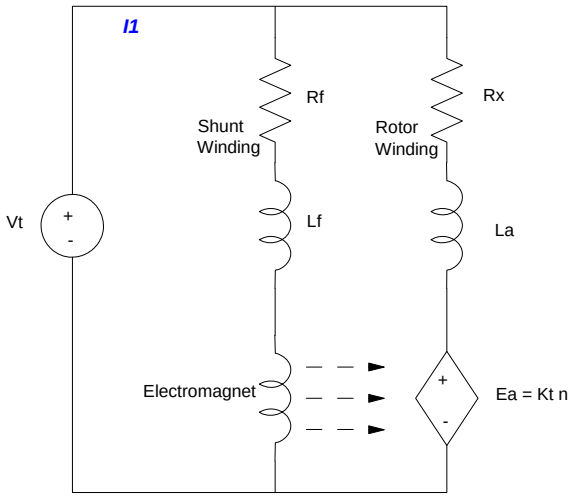
Find the slip angle, the input current, Ia, and the power factor:

Slip Angle (δ)	
Ia (Amps)	
Power Factor	

6) DC Motor. Assume a DC shunt motor with Rf = 200 Ohms, Rx = 1.5 Ohms, Vt = 120V.

At no load, If = 1.00A and the motor spins at 1500 rpm.

Determine the following when the load is increased to T = 15Nm:



Torque Constant, Kt	
If	
Back EMF: Ea	
Speed (rad/sec)	
Power Out	
Efficiency	

Godzilla Monster Bonus: Match the names with the following faces:

Braaten, Gigan, Ghidorah, Hedorah, Megalon, Rodan