ELEC 316 Practice Exam #2 2013

Q1. Three single phase transformers with a **turns ratio of 1:1**, are connected to form a three phase transformer. The transformer input is a three-wire three-phase **120 V** (line-to-line) system. The transformer output supplies a 'Y" connected three-phase load with a phase impedance of **600 +j300 Ω**.

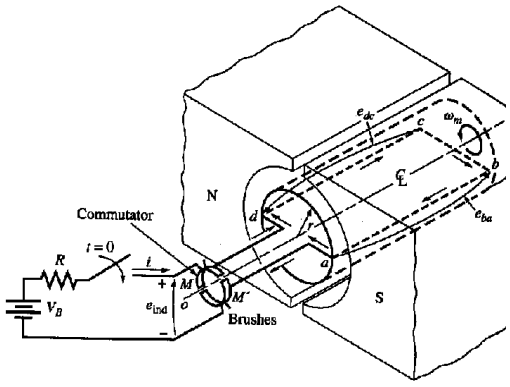
(a) Sketch a diagram of the system described above.

(b) For each of the transformer configurations in the table below, find the phase voltage, and phase current at the load, and the input power (real power) supplied by the source.

Part 'a' sketch here.

Input Side	**Output Side**	**Load V_Φ** (volts)	**Load I_Φ** (amps)	**Input P** (watts)
Y	Δ	40	0.06	6.4
Δ	Y	120	0.18	57.6

Q2 Consider the simplified DC machine shown below.



Given; R = 2.0 Ω, V_B = 25V,
K = 2, Φ = 0.5, l =0.5m,

a) What is the machines maximum starting current ($\mathbf{I_o}$)?

b) What is the no load armature current ($\mathbf{I_1}$)?

c) What is the full load current ($\mathbf{I_2}$) at an applied torque of **5 Nm**?

a) I_o = 12.5 A b) I_1 = 0 A c) I_2= 5 A

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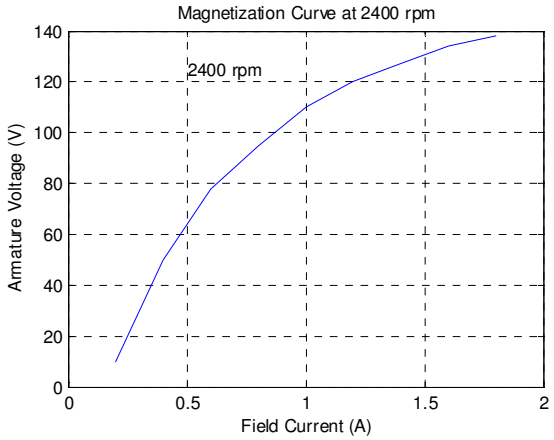
Q3. A **120V**, dc motor has shunt field windings of **500** turns and field resistance of $\mathbf{R_F = 100\ \Omega}$ and armature resistance of $\mathbf{R_A = 0.10\ \Omega}$. The full load current is **40 A**, and it produces an armature reaction of **100** A-Turns.



a) Equivalent circuit goes in this box.

(a) Sketch the DC motor equivalent circuit in the box above. Show all components and label currents and voltages.

(b) What is the full load speed ($\mathbf{N_{FL}}$) of this motor in rpm?

(c) What is the full load torque (**T**) available at the shaft?

b) $\mathbf{N_{FL}}$ = **2534 rpm**

c) **T** = **17 Nm**