KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
Electrical Engineering Department
EE 306(071): Electromechanical Devices
Quiz #1
Instructor: Dr. Zakariya Al-Hamouz

A balanced 3-phase Y-connected load with phase impedance of $20 + j15\,\Omega$ is connected to a 400 V 3-phase, 50 Hz supply. Calculate:
a) the line current
b) the real and reactive power supplied by the source.

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Quiz #2
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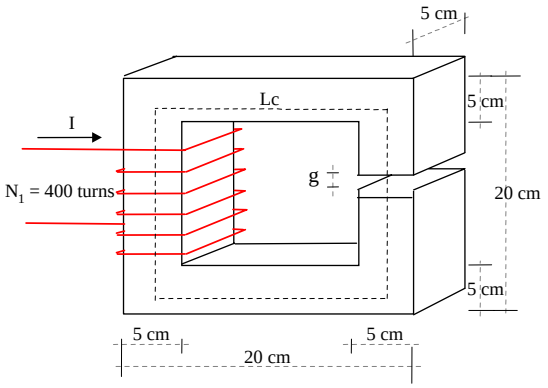
The figure shows a ferromagnetic core with an air gap of 0.05 cm. The relative permeability of the core is 2000.

a) draw an equivalent magnetic circuit.
b) Calculate the current I needed to produce a flux density of 0.4 Tesla in the air gap.



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Quiz #3
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A 15-kVA 2300/230 –V single phase transformer has the following parameters referred to the high voltage side:

$$R_{eq} = R_1 + a^2 R_2 = 4.45\Omega; \quad X_{eq} = X_1 + a^2 X_2 = 6.45\,\Omega$$
$$X_M = 11\,\mathrm{k}\Omega; \quad R_C = 105\,k\,\Omega$$

Using the approximate equivalent circuit, calculate the full load voltage regulation at 0.8 pf leading.

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Quiz #4
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A 220 V shunt motor having an armature resistance of 0.2 Ω and a field resistance of 110 Ω takes 4 A of line current while running on no load. When loaded, the motor runs at 1000 rpm while taking 42 A of line current. Calculate the no load speed.