

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
ELECTRICAL ENGINEERING DEPARTMENT**

EE360-05

Electromechanical Devices

071

October 24, 2007

Time: 6:30-8:00 PM

[MAJOR EXAM # 1]

Instructor: Dr. Mahmoud Kassas

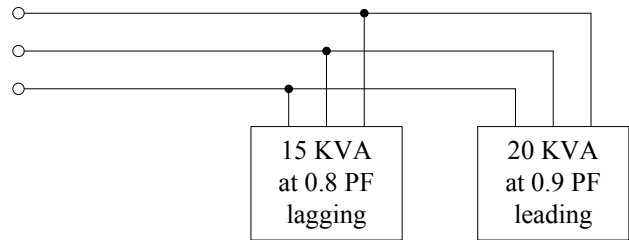
Name:	
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Section	

PROBLEM #	SCORE	MAXIMUM
1		18
2		12
3		20
TOTAL		50

Problem 1:

Two balanced wye-connected loads are connected in parallel with the first draws 15KVA at 0.8 PF lagging, and the second requires 20KVA at 0.9 PF leading. The two loads are supplied by a balanced three-phase, wye-connected, 2400-V source.

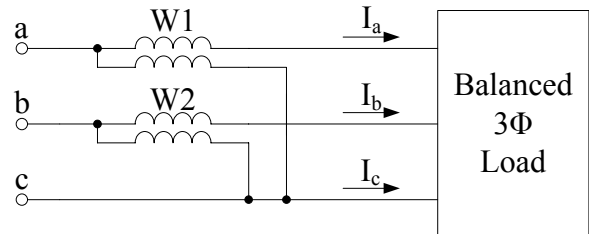
- (a) Determine the phasor current drawn by each load.
- (b) Find the real and reactive power absorbed by each load.
- (c) Compute the phasor current supplied by the source.
- (d) Calculate the total real and reactive power drawn by the combined load.
- (e) What the overall power factor?



Problem 2:

The two-wattmeter method is applied to measure the total power consumed by a three-phase Δ -connected inductive load at 240-V. With the meter connected to line A & B, $W_1 = 920$ W and $W_2 = 460$ W, find the following:

- (a) Draw the phasor diagram for the system.
- (b) Write the two-wattmeter equations.
- (c) The load power factor.
- (d) The phase impedance of the balanced load.



Problem 3:

A ferromagnetic core with a relative permeability of 2500 is shown in Fig. 2. The dimensions are shown in the diagram, and the depth of the core is 5 cm. The air gaps on the center and the right sides of the core are 0.2 and 0.1 cm, respectively. Because of the fringing effects, the effective area of the air gaps is 5% larger than their physical size. If there is 500 turns in the coil wrapped around the center leg of the core and the current in the coils is 1 A:

- Calculate the flux in each of the left, center, and right legs of the core.
- Determine the flux density in each air gap.

