KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

Dr. Ibrahim O. Habiballah

EE 360

MAJOR EXAM # 1

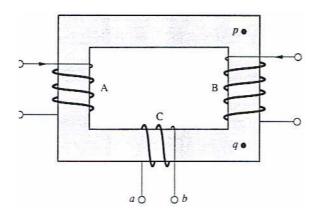**October 20, 2005**

1:30 – 2:30 pm

Section:

Student Name:

Student I.D.#

Serial #

Question # 1	
Question # 2	
Total	

Q. 1) The magnetic circuit shown below has a uniform cross-sectional area of 5×10^{-4} m^2 and a mean length of 0.4 m. Three coils (A, B, C) are wound on the cast steel core. Coil A has 200 turns and carries a current of 0.5 A. Coil B has 400 turns and carries a current of 0.75 A. Coil C has 100 turns. The relative permeability of the ferromagnetic material is 950.

a) Determine the **magnitude** and **direction** of the current flowing in coil C in order to produce a magnetic flux of 0.45×10^{-3} webers in a **counterclockwise** direction.

b) What should be the **magnitude** and **direction** of the current flowing in coil C in order to reverse the direction of the magnetic flux produced in part (a).

(50 Marks)

Q. 2) A 15-kVA, 2400/240 V, transformer has a series equivalent impedance of $Z_{e1} = 6 + j$ 8.5 Ohm referred to the high voltage side. The shunt magnatizing branches are $R_{c1} = 50$ kOhm, and $X_{m1} = 15$ kOhm referred to the high voltage side.

a) If the transformer delivers rated current to a load at 240 V and 0.8 lagging power factor, calculate the primary voltage of the transformer referred to the high voltage side.

b) If the transformer delivers rated current to a load at 240 V and 0.8 lagging power factor for 12 hours, and delivers 75% of the rated current to the same load for the remaing 12 hours. Calculate the daily kilowatthour energy consumbtion by the load.

(50 Marks)