Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
SCT 253-1 Applied Electricity

Time: One (01) hour

Total 04 Questions
Answer All questions.

1) a. Explain the terms reactance and impedance.
   b. What is meant by "True power" and "Apparent power" of *RLC* circuit?
   c. A coil of resistance 40Ω and inductance 25 mH in series with a 25 μF capacitor is connected to a sinusoidal voltage source of 250 V and frequency of 100 Hz as shown in Fig Q1.

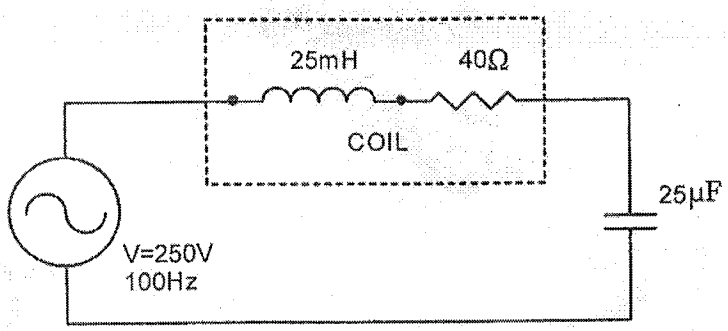

Fig Q1

Calculate

i. reactance of the coil
ii. reactance of the capacitor
iii. impedance of the circuit
iv. current
v. voltage across the coil
vi. voltage across the capacitor
vii. True power and power factor
viii. Draw the phasor diagram

(40 Marks)

2) a. What is a series resonant circuit?
   b. Obtain an expression for resonant frequency (f_0) of series L-C circuit.
   c. A circuit must be designed to have $f_0 = 9.00$ MHz. You have given a 33 pF fixed capacitor. What is the inductance of coil (L) will be needed to get the desired resonant frequency?

(20 Marks)

3) A coil is wound uniformly with 400 turns over a steel ring of relative permeability 900 having a mean circumference length of 50 cm and a cross sectional area of 5 cm^2 (Fig Q3). If the coil has a resistance of 125Ω and is connected to 250 V DC supply, calculate

a. Current through the coil
b. The coil m.m.f.
c. The coil magnetic field strength
d. Total magnetic flux
e. Reluctance of the ring
f. Permeance of the ring

Where permeability of free space is $4\pi \times 10^{-7}$ H/m

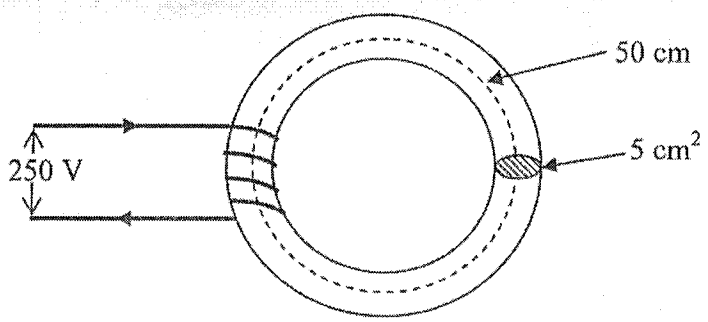

Fig Q3

(25 Marks)

4) a. What are the main types of Transformer losses?

b. The step-down transformer at a power factor of unity is designed to deliver 240 V to a load of 5 kW. The transformer's primary winding is connected to a 600 V source, Find the current in

i. the load
ii. the primary winding.

(15 Marks)