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Uva Wellassa University, Sri Lanka
End Semester Examination – March 2011
SCT 253-1 Applied Electricity

Time: One (01) hour

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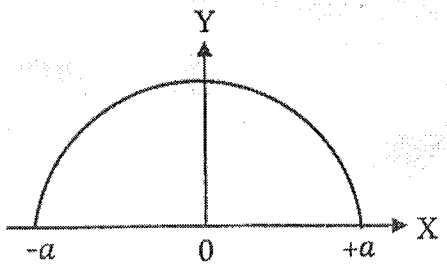
Total 04 Questions
Answer All questions.

1) a. Define the following terms with reference to sinusoidal alternating current.
   i. Average value
   ii. rms value
   iii. Form factor
   iv. Peak factor

   b. Determine the rms value of a semi-circular current wave which has a maximum value of a.



(20 Marks)

2) a. Explain the terms "Reactance" and "Impedance".
   b. Show if an AC circuit of frequency $f = {}^{\omega}/_{2\pi}$ contains resistance R, inductance L and capacity C in series, the maximum EMF, E_m is given by,

$$I = \frac{E_m}{\left[R^2 + \left(L\omega - \frac{1}{\omega C}\right)^2\right]^{1/2}}$$

   c. A series resonant circuit has a 0.1 H inductance, a 1.013 μF capacitor and a 5 Ω resistor connected across a 50 V, 500 Hz supply line. Calculate
      i. inductive reactance
      ii. capacitive reactance
      iii. impedance
      iv. current
      v. voltage across each part of the circuit
      vi. True power and power factor
      vii. Draw the phasor diagram

(35 Marks)

3) A 120 V; 60 W lamp is to be operated on 220 V, 50 Hz supply mains.

a. Calculate what value of

i. non-inductive resistance

ii. pure inductance

iii. pure capacitance

would be required in order to lamp is run on correct voltage.

b. Which method is preferable and why? (Draw relevant phasor diagrams)

(20 Marks)

4) a. Briefly explain 3-phase current and 3-phase circuits?

b. Deduce the relations between line voltage and phase voltage and the line current and the phase current in the 3-phase star and delta connected balanced system.

c. Three coils are connected in delta to a 3-phase 3-wire, 415 V, 50 Hz supply and take a line current of 5 A at 0.8 power factor lagging.

i. Calculate resistance, inductance of the coils.

ii. If the coils are star-connected to the same supply, calculate the line current and total power.

(25 Marks)