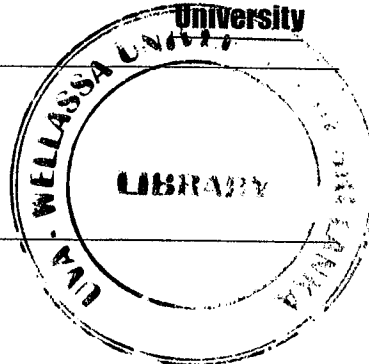


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Uva Wellassa University of Sri Lanka  
Faculty of Science and Technology  
Department of Computer Science and Technology  
300 level 1<sup>st</sup> Semester Examination – Sept. / Oct. 2015  
SCT 362-2 Principles of Electricity



Instructions to candidates

Duration: 02 hours

Number of questions: 04

Mark allocation: 100 mark

- 1.
- a. State Kirchhoff's Laws. (03 mark)
- b. Three resistors  $6\Omega$ ,  $9\Omega$  and  $15\Omega$  are connected in parallel to a 9V supply. Calculate ,
- The total effective resistance of the network.
  - The supply current
  - Current in each branch of the network
- (15 mark)
- 2.
- a. Using first principles, obtain an expression for the root-mean-square (RMS) value for a sinusoidal voltage,  $V(t) = V_m \sin(\omega t)$  (07 mark)
- b. Two coils which are connected in series have e.m.f.s with peak values of 50V and 20V respectively. But the e.m.f. with the peak value 20V, has a  $30^\circ$  phase shift from the first e.m.f.
- Using the phasor representation, find the resultant e.m.f of the circuit
  - Find the peak and the RMS values of the resultant e.m.f.
- (25 mark)

3.

- a. Derive an expression for the total power for both star and delta connected balanced systems, in terms of line voltage, line current and power factor.

(07 mark)

- b. The voltages of an unbalanced system are,

$$V_A = 2 \angle 0^\circ$$

$$V_B = 2\sqrt{3} \angle -120^\circ$$

$$V_C = 5 \angle 90^\circ$$

Find the symmetrical components of the unbalanced system.

(20 mark)

4.

- a. Find the time domain signal,  $x(t)$  of the following Laplace transform.

$$X(S) = \frac{S}{S^2 + 5S + 6}$$

(08 mark)

- b. Find the output voltage  $y(t)$  across the  $200\mu\text{F}$  capacitor, using Laplace transform assuming that,

$$x(t) = 0.6 e^{-2t} u(t), R = 1\text{k}\Omega \text{ and } y(0) = -2.$$

(15 mark)

