Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 Level 1st Semester Examination – June / July 2017
SCT 363-2 Electrical Systems

Uva Wellassa University

Instructions to candidates
Duration: Two (02) hours.
Number of questions: Four (04) Essay Questions.
Mark allocation: 100 marks.
Answer all Questions.

1.

a. What are the characteristics of a sine wave? (05 marks)
b. What are the advantages of having a sinusoidal waveform over other waveforms? (05 marks)
c. What is a phasor diagram? Draw a phasor diagram for a RLC circuit. (05 marks)
d. Determine the output voltage of the following circuit shown in the figure 01. (10 marks)

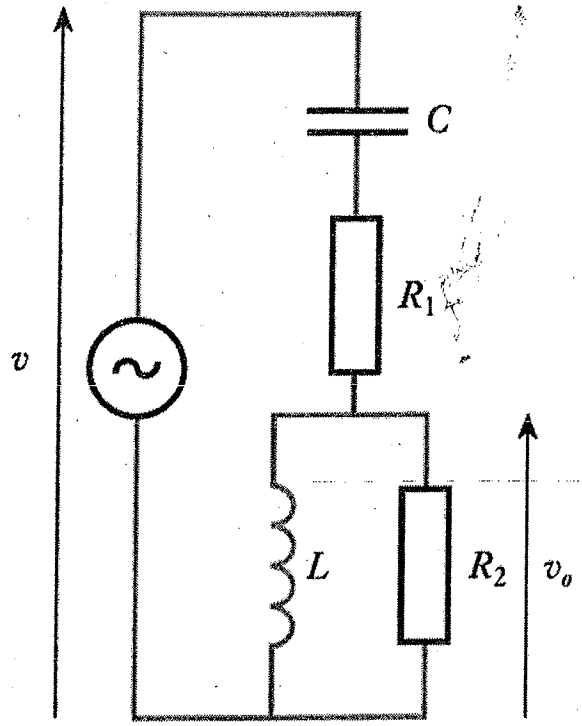

Figure 01

2.

a. What is power factor correction and why is it necessary? (06 marks)
b. Explain the significance of a rectifier circuit in electronic equipment. (06 marks)
c. Draw a bridge rectifier circuit and explain the function of the circuit. Derive necessary equations. (08 marks)

886

d. Compare the half wave rectification and the full wave rectification. (05 marks)

3.

a. State the superposition theorem. (05 marks)

b. Find the value of the voltage measured by the voltmeter shown in the figure 02. (10 marks)

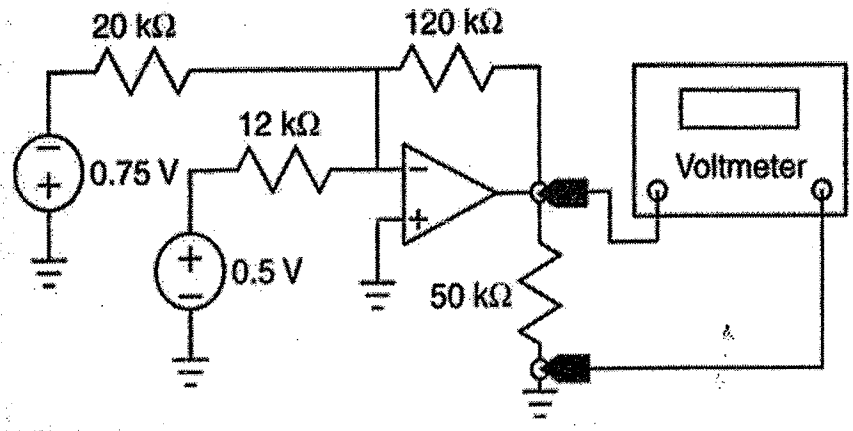

Figure 02

c. A series *RLC* circuit with L =160 mH, C = 100 μF, and R = 40.0 Ω is connected to a sinusoidal voltage $V(t) = (40.0V)\sin(\omega t)$, where ω = 200 rad/s .

i. What is the impedance of the circuit?

ii. Let the current at any instant in the circuit be $I(t) = I_0 \sin(\omega t - \phi)$. Find I_0.

iii. What is the phase constant ϕ ? (10 marks)

4.

a. A three phase 400 V, 50 Hz balanced supply feeds a balanced load consisting of three equal single phase loads of (40 + 30 j) Ω connected in star, and a three phase heating load (purely resistive) of 1.8 kW. Determine the supply current, supply power factor, active and reactive power supplied and the value of capacitance that must be connected in delta to improve the overall power factor to 0.95 lag. Obtain the result using one phase of the three phase system. (10 marks)

b. For the given circuit in the figure 03 below, calculate the initial charging current of capacitor using LaplaceTransformation technique. (7.5 marks)

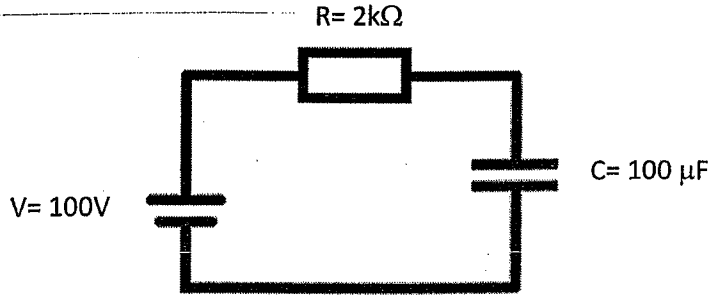

Figure 03

c. Solve the electric circuit shown in the figure o4 below by using Laplace transformation for final steady-state current.
(7.5 marks)

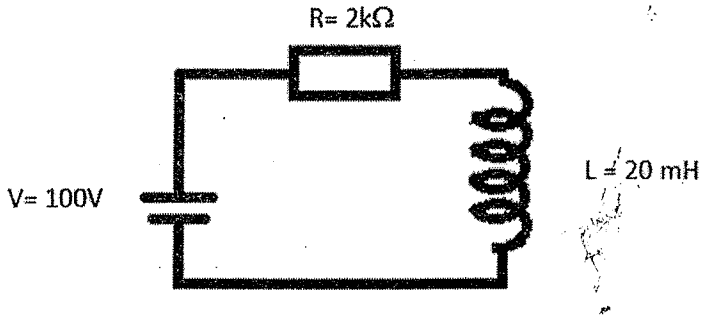

Figure 04