Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
ENG 302-2 Principles of Electricity (Repeat)

Time: Two (02) hours

Total 04 Questions
Answer **All** Questions

01)

I. Define Impedance of an electric circuit?

(10 marks)

II. Explain how the impedance of the following components varies with the increase of the Supply frequency.

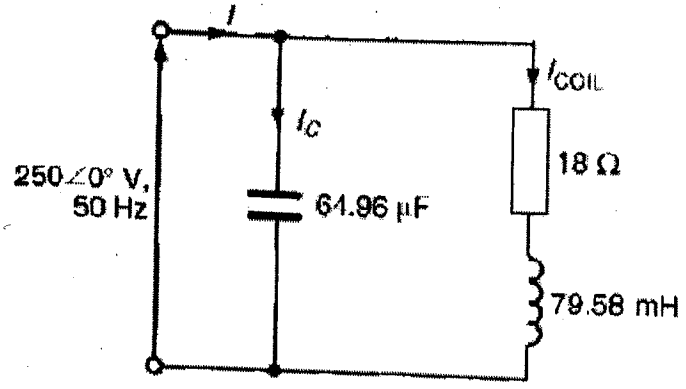
a) Inductor
b) Capacitor
c) Resistor

(15 marks)

III. An a.c. network consists of a coil, of inductance 79.58 mH and resistance 18 Ω, in parallel with a capacitor of capacitance 64.96 μF. if the supply voltage is 250< 0° V at 50 Hz determine

a.) The total equivalent circuit impedance
b.) The supply current
c.) The circuit phase angle
d.) The current in the coil
e.) The current in the capacitor

(75 marks)



02)

I. Explain why a network consists of diodes is not considered as a Bilateral Network.

(10 marks)

II. State Superposition theorem for an electric circuit

(20 marks)

III. For the a.c. network shown in Figure 2. determine, using the superposition theorem

a) The current in each branch

b) The magnitude of the voltage across the (6+J8)Ω impedance

c) The total active power delivered to the network

(70 marks)

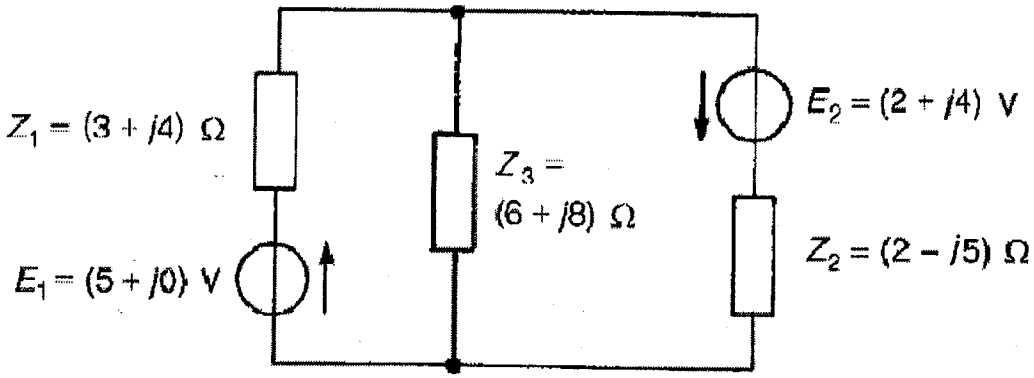


Figure 2

03)

I. What is a three phase system? Draw the phasor diagram for a balance three phase system and derive the equation for line voltage using phase voltage

(20 Marks)

II. What is an unbalanced three phase system? What can you say about the line current and line voltage in each phase in a unbalanced three phase system?

(20 marks)

III. Each phase of a star-connected load consists of a resistance of 30 Ω and 80 μF Capacitor in series. The load is connected to a star connected three phase supply with a line voltage 400V and frequency of 50 Hz.

a.) Draw the electrical circuit diagram of the above three phase system.

b.) Draw the single line equivalent circuit for the above system.

c.) Calculate phase current.

d.) The line current

e.) The total power dissipated

f.) Draw the complete phasor diagram for the load.

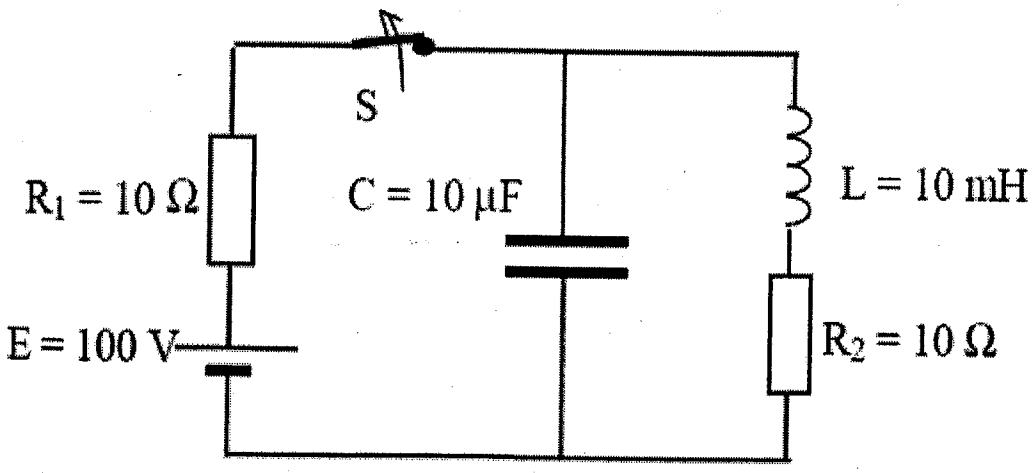
(60 marks)

04)

I. Explain how a Capacitor and an Inductor can be represented on a Laplace domain. Derive equation for each of the component

(30 marks)

II. Following Figure shows a circuit which has reached steady state with switch closed. If the switch S is opened at time t=0, obtain an expression for the current through the resistor using Laplace transform



(70 marks)