Uva Wellassa University, Sri Lanka
End Semester Examination – March/April 2013
SCT 362-2 Principles of Electricity

Time: Two (02) hours

Total 04 Questions
Answer All Questions

01)

I. Name two (02) energy storage elements used in electronic circuits other than batteries.

(02 marks)

II. What might be the independent sources used in electronic engineering? You may discuss these using relevant figures.

(04 marks)

III. Calculate the total energy dissipated from the resistor of 0.5 S which is connected to 3.5V battery.

(05 marks)

IV. An alternating voltage V= 250 sin (800t) volts is applied across a series circuit containing a 30 Ω resistor and a 50 μF capacitor. Calculate the following.

a) RMS value of the supplied voltage in polar coordinates
b) The circuit impedance
c) RMS value of the current flowing in polar coordinate
d) The phase angle between the current and the voltage
e) Potential difference across the resistor
f) Potential difference across the capacitor
g) Draw the phase diagram for the circuit

(14 marks)

16

02)

I. What do you mean by a bilateral network in electrical networks?

(02 marks)

II. When a maximum power is transferred from the source to the load what might be the voltage applied across the load?
Prove your answer using necessary equations.

(08 marks)

III. For the network shown in Fig.Q2-1 determine the following using delta-star transformation.

a. Equivalent impedance across AB
b. Equivalent impedance across BD
c. Current flowing through (0+j10) Ω impedance

(15 marks)

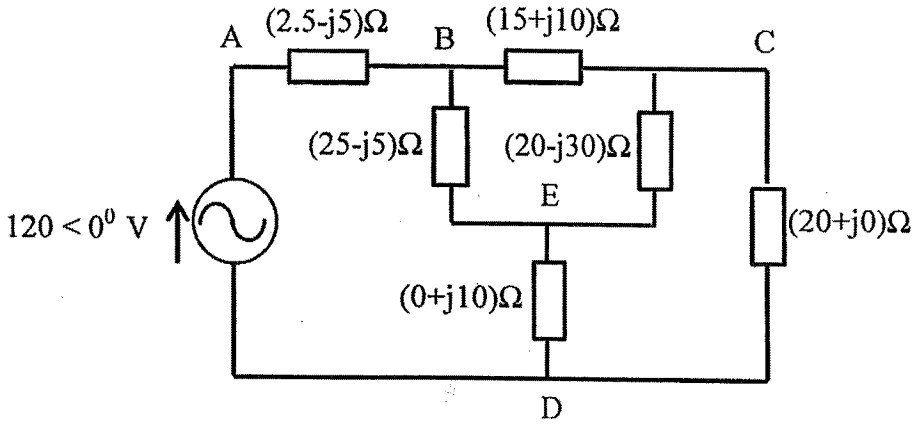

Fig.Q2-1

03)

I. What do you mean by a three phase balanced system? Draw a three phase system including a three phase star connected supply connected to a three phase star connected load.

(04 marks)

II. A balanced, three (3) wire, star connected, three phase load has a phase voltage of 240 V, a line current of 5A and a lagging power factor of 0.966. Determine the phase angle between the voltage and current and draw the complete phasor diagram.

(05 marks)

III. Three (03) identical coils, each of resistance10 Ω and inductance 42 mH are connected in star to a 415 V 50 Hz supply. Determine the following.

a.) The phase impedance
b.) Line voltage
c.) Phase voltage
d.) Line current
e.) Phase current
f.) Power factor
g.) Power dissipated
h.) Apparent power

(16 marks)

04)

I. What might be the major differences that you have noticed of transient representation of an electrical network over its s-domain representation?

(05 marks)

II. Explain how a Resistor and an Inductor can be represented on Laplace domain. Derive equations for each of the component.

(06 marks)

III. An inductor of 20 mH is connected in series with a 20 μF capacitor. Initially the capacitor is charged to a voltage of 1.5 V and the inductor does not carry any current. At time t = 0, a step voltage of magnitude 6 V is applied to the network. Using Laplace transformation determine the transient voltage across the inductor.

(14 marks)

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