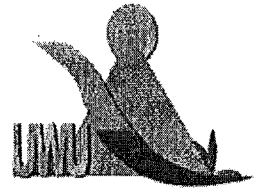


Uva Wellassa University, Sri Lanka
End Semester Examination – March 2011
SCT 362-2 Principles of Electricity



Time: Two (02) hours

Total 04 Questions
Answer All Questions

01)

I. What are the main advantages of sinusoidal varying voltage?

(10 marks)

II. Explain how the impedance of the following components can be represented in complex domain.

- a) Inductor
- b) Capacitor
- c) Resistor

(15 marks)

III. In the series-parallel network shown in Figure 1 the potential difference between point A and B is $50 \angle -68.13^\circ$ V. Determine

- a.) the supply current I
- b.) the equivalent input impedance
- c.) the supply voltage
- d.) the supply phase angle
- e.) the potential difference across point B and C
- f.) the value of currents I_1 and I_2

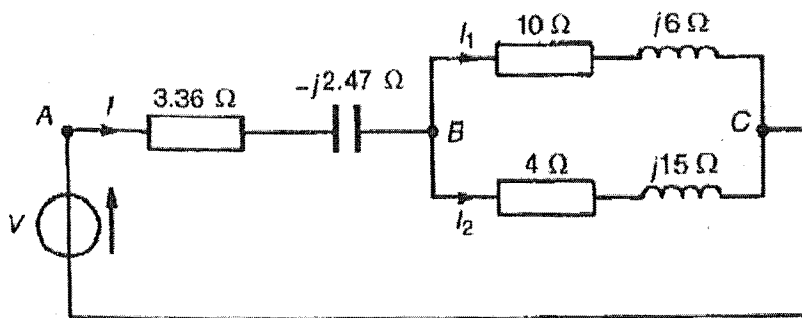


Figure 1

(75 marks)

02)

- I. State Norton's theorem for an electric circuit
(10 marks)
- II. Using a circuit diagram explain main steps in Norton's circuit analysis
(20 marks)
- III. For the bridge network shown in Figure 2. Use Norton's theorem to determine the current flowing in the $(4+j3)\Omega$ impedance and its direction. Assume that $20\angle 0^\circ$ source has negligible internal resistance.
(70 marks)

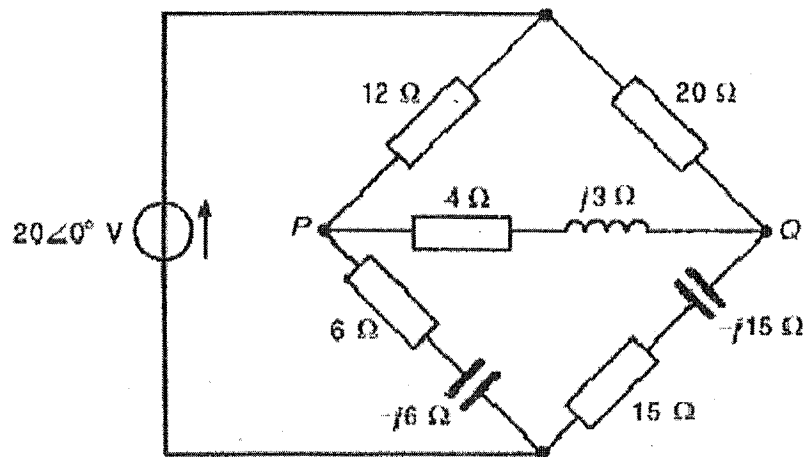
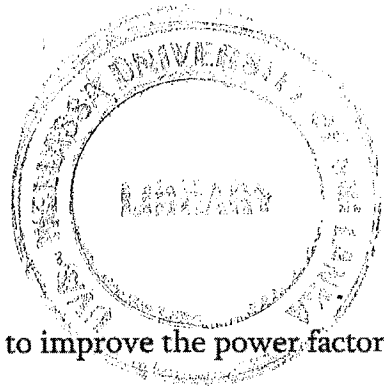


Figure 2

03)

- I. What are the advantages of three-phase system over single phase supplies?
(20 Marks)
- II. Prove that for both delta and star connected balanced load power dissipation is $3V_L I_L \cos \phi$, where V_L is line voltage, I_L is line current and ϕ is the phase angle.
(20 Marks)
- III. A 3-phase, star-connected alternator supplies a delta connected load, each phase of which has a resistance of 15Ω and inductive reactance 20Ω . If the line voltage is 400 V, calculate followings neglecting any losses between the load and the alternator.

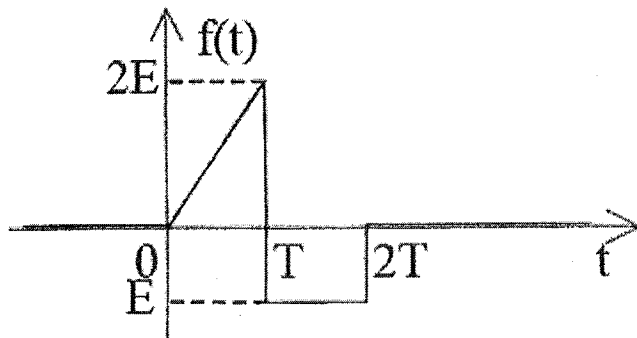


- a.) The current supplied by the alternator.
- b.) The output power by the alternator.
- c.) The KVA rating of the alternator.
- d.) The value of the capacitor needed in order to improve the power factor by 5%.

(60 marks)

04)

I. Find the Laplace transform of the following voltage signal



(30 marks)

II. In the R-C series circuit shown in following Figure 3, a ramp voltage V is applied to the input. Determine time domain expressions for

- a.) current i
 - b.) capacitor voltage V_c
- using Laplace transform. Assume zero initial conditions.

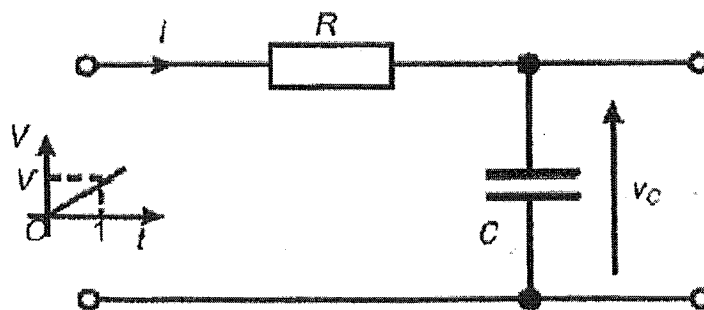


Figure 3

(70 marks)