Uva Wellassa University, Sri Lanka

Btech..Degree Programme

End Semester Examination- Semester 1

December -2008

ENG 302-2 – Principles of Electricity

Answer four (4) questions only **Time: Two (02) hours**

Question1.

1) Explain active circuit elements and passive circuit elements. Give two examples for each?
2) What are the advantages of sinusoidal varying voltages?
3) A 5 pF capacitor is connected series with a coil having internal resistance of 50 Ω and 150 μH inductance across an alternating voltage of V= 212.1 $\sin(\pi 10^6 t + \pi/4)$ Volts. Calculate
   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 Circuit phase angle,
   e) Voltage across the resistor,
   f) Voltage across the inductor,
   g) Draw the phase diagram for the circuit,

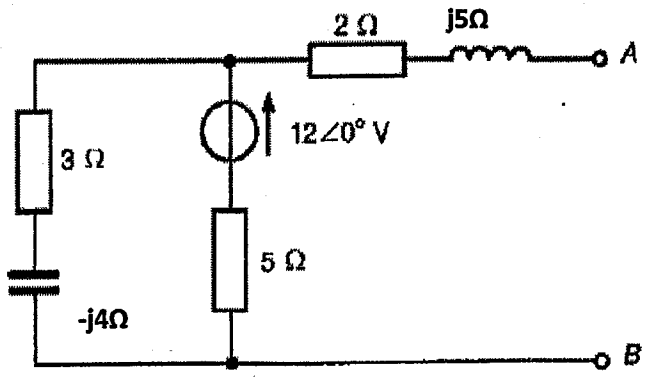
Question2.

1) What is a bilateral network?
2) State Thevinin's theorem and Nortan's theorem?
3) For the network shown in figure, derive
   a) The Thevinin's equivalent circuit.
   b) The Nortan's equivalent circuit.

If a 6 Ω resistance is connected across A and B. Determine the current flowing in 6 Ω resistance

c) Using Thevinin's theorem.

d) Using Nortan's theorem.



Question3.

1) What are the advantages of transmitting power in three phases?
2) What is a balance three phase system? What can you say about the line current and line voltage in each phase in a balance three phase system?
3) A three phase star connected alternator supplies a delta connected load, each phase of which has a resistance of 30 Ω and inductive reactance 40Ω. If the line voltage is 400V then
   a) Convert the delta connected load to a star connected load and draw the single circuit of the three phase system.

Using the single circuit of the three phase system calculate

   b) The line current supplied by the alternator.

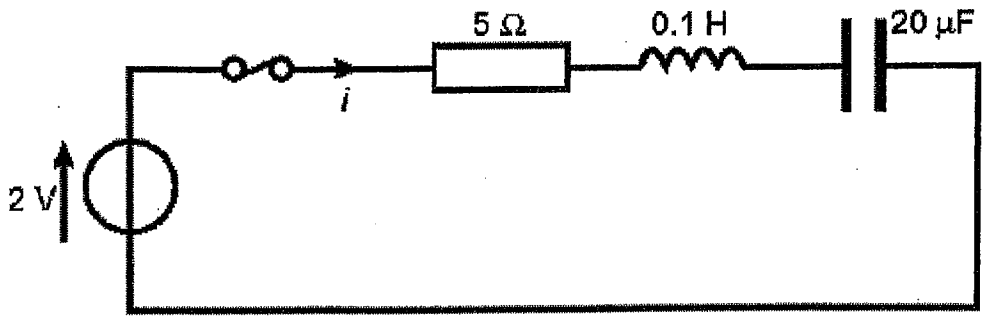
   c) Active power and the KVA of the alternator, neglecting losses in the line between the alternator and load.

Question4.

1) Explain what is meant by transient condition of an electric circuit?

2) What are the advantages of using Laplace transform for analyzing transient conditions of an electric circuit?

3) For the circuit shown in the following figure obtain an equation which shows how current varies with time using Laplace Transform. Assume zero initial conditions when the switch is closed.



Question5.

1) Explain resonance in an electric circuit?
2) What are the three main method of defining resonance condition in an electric circuit? Explain behavior of impedance, current and voltage for each case.
3) Find the followings for the circuit in the figure
    a) Unity power factor resonance frequency?
    b) Resonance frequency when the circuit impedance becomes maximum?

R= 20 Ω , L =10 mH , C= 4μF