Code No: ZO422/R07 **Set No. 1**

I B.Tech Supplementary Examinations, January 2014
NETWORK ANALYSIS
(Common to ECE,EIE,BME,E.Con.E,ETE and ECC)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. For the circuit shown in figure 1 find the current I using Kirchoff's laws. [16]

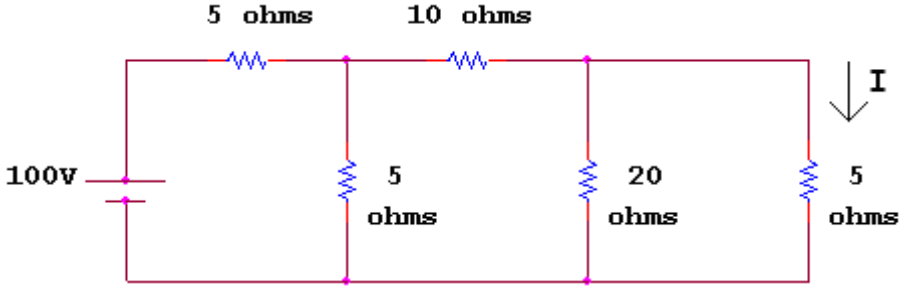

Figure 1

2. Write short notes on [4×4]
   (a) Flux linkage
   (b) Self-induction
   (c) Mutual inductance
   (d) Lenz's law.

3. A 3 phase, 400 V supply is given to a balanced star connected load of impedance 8 + j6 ohms in each branch. Find the line current, power factor and total power. [16]

4. In the network shown in figure 4 the numerical values of resistances also indicate the branch numbers. Write the oriented graph of the network. Select a tree with branches 1, 2, 3 as the tree branches, write tie-set and cut-set schedule. [16]

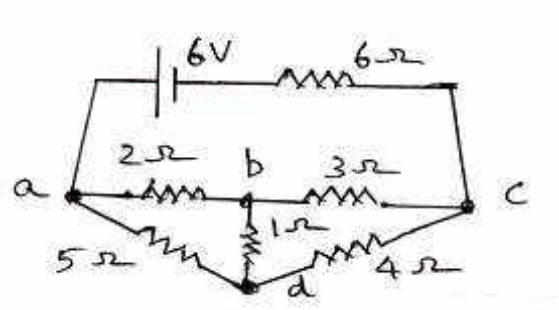

Figure 4

5. (a) State and explain Thevenin's Theorem.

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(b) What are the limitations of Thevenin's Theorem.

(c) Explain the steps to apply Thevenin's Theorem and draw the Thevenin's equivalent circuit. [6+4+6]

6. For the bridged T-network shown in the figure 6. Find the driving point admittance Y_{11} and transfer admittance Y_{21} with 2Ω load resistor connected across port - 2. [16]

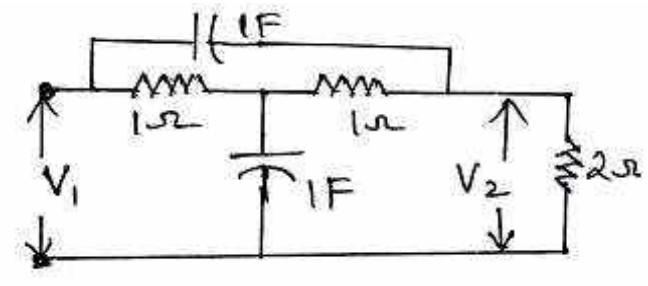

Figure 6

7. In the circuit shown in figure 7, E_g (t) = 2.5 t Volts. What are the values of i(t) and VL(t) at t = 4 seconds. [16]

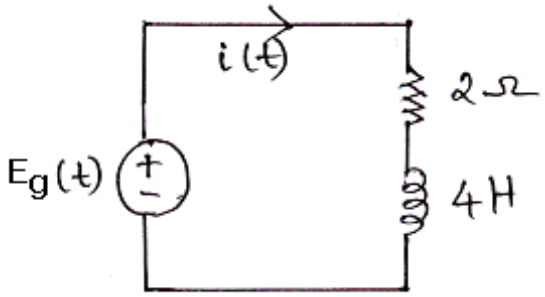

Figure 7

8. Design a BPF with characteristic impedance 100 ohm and a pass band from 48000 Hz and 5200 Hz. [16]

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Code No: ZO422/R07 **Set No. 2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. For the circuit shown in figure 1, find the current in each branch. [16]

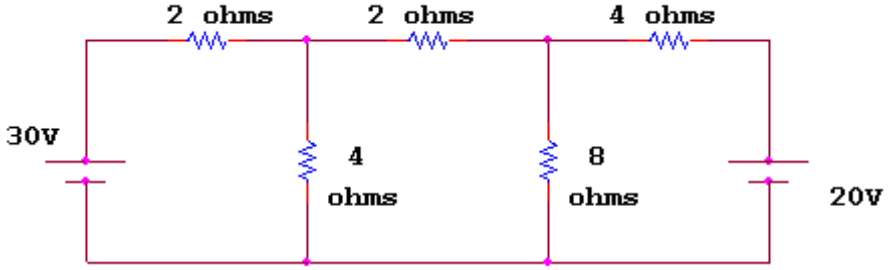

Figure 1

2. Derive expression for R.M.S. and average value of a sinusoidal alternating quantity. [16]

3. A RLC series circuit with a resistance of 10Ω, impedance of 0.2H and a capacitance of 40μF is supplied with a 100V supply at variable frequency. Find the following w.r.t. the series resonant circuit. [16]

   (a) the frequency at resonance
   (b) the current
   (c) Power
   (d) Power factor
   (e) voltage across R, L and C at that time
   (f) quality factor of the circuit
   (g) half power points
   (h) phasor diagram.

4. For the graph in the figure 4, write the cut set schedule and obtain the relation between tree branch voltages and branch voltages. [16]

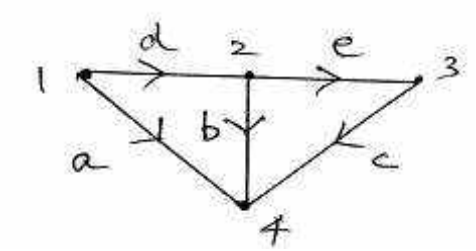

Figure 4

Code No: ZO422/R07 **Set No. 2**

5. (a) State and explain Thevenin's Theorem.
   (b) What are the limitations of Thevenin's Theorem.
   (c) Explain the steps to apply Thevenin's Theorem and draw the Thevenin's equivalent circuit. [6+4+6]

6. Two identical sections of the network shown in figure 6 are connected in parallel. Obtain the Y parameters of the resulting n/w and verify the result by direct calculation. [16]

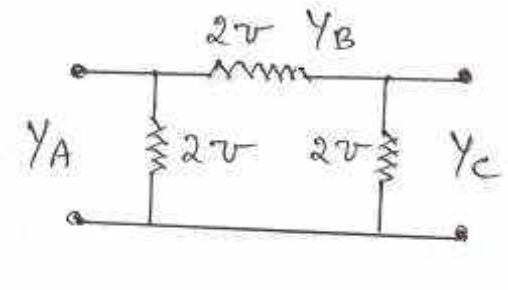

Figure 6

7. Derive the transient response of RLC series circuit with unit step input. [16]

8. Design a composite low pass filter to meet the following specifications. The filter is to be terminated in 500 ohms resistance and it is to have a cutoff of 1000 Hz with very high attenuation at 1065 and 1250 Hz. [16]

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Code No: ZO422/R07 **Set No. 3**

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Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. In the circuit as shown in figure 1 find the currents in all the resistors. Also calculate the supply voltage & power supplied by the source. [16]

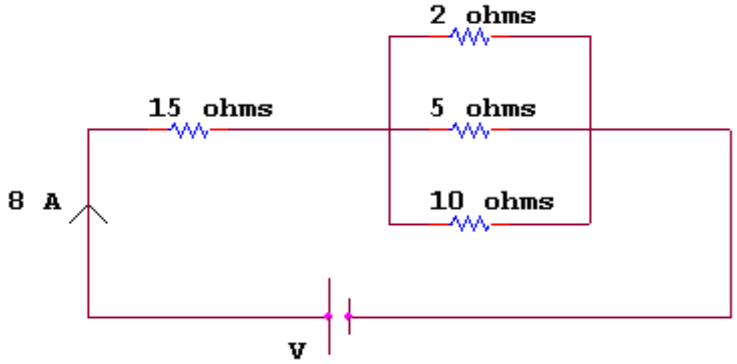

Figure 1

2. A series circuit consists of R and L and is supplied by a sinusoidal ac voltage source. Derive expressions for
   (a) impedance,
   (b) current,
   (c) power factor. Draw the vector diagram. [16]

3. An inductive coil of Resistance R and inductance L is connected in parallel with a capacitor C. Derive the expressions for resonant frequency and Q factor. [16]

4. Write the node voltage equations and determine the currents in each branch for the network shown in figure 4. [16]

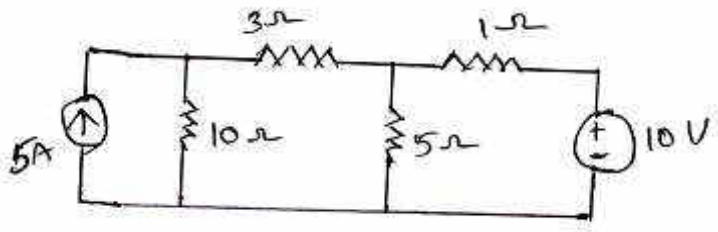

Figure 4

5. Find the Norton's equivalent across the terminals ab as shown in the figure 5. Hence find current through 10 ohms. [16]

Code No: ZO422/R07 **Set No. 3**

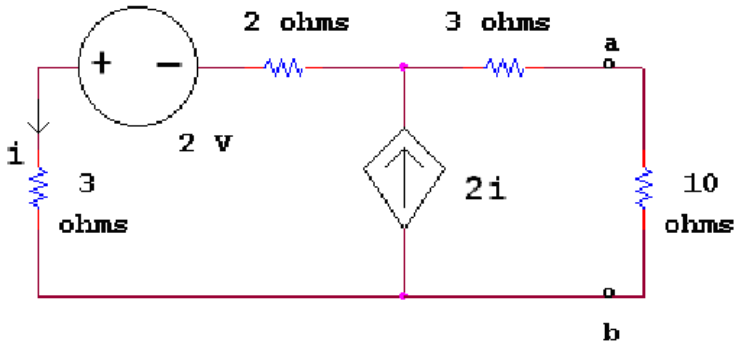

Figure 5

6. For the bridged T-network shown in the figure 6. Find the driving point admittance Y_{11} and transfer admittance Y_{21} with 2Ω load resistor connected across port - 2. [16]

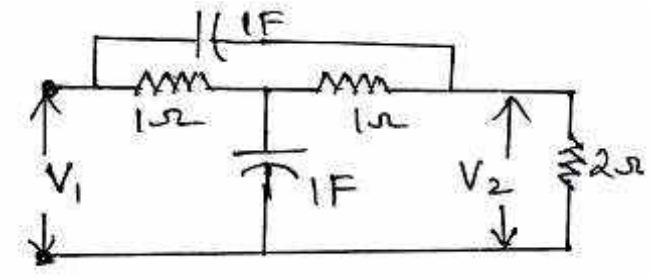

Figure 6

7. Derive the transient response of RLC series circuit with unit step input. [16]

8. Design a composite low pass filter to meet the following specifications. The filter is to be terminated in 500 ohms resistance and it is to have a cutoff of 1000 Hz with very high attenuation at 1065 and 1250 Hz. [16]

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Code No: ZO422/R07 **Set No. 4**

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1. Using star delta conversion find the current I in the circuit as shown in figure 1. [16]

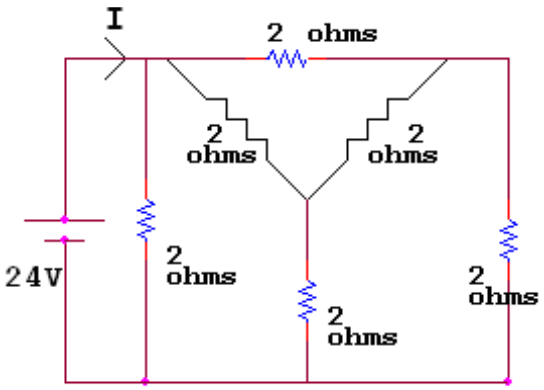

Figure 1

2. A series circuit consists of R and L and is supplied by a sinusoidal ac voltage source. Derive expressions for
   (a) impedance,
   (b) current,
   (c) power factor. Draw the vector diagram. [16]

3. Show that the resonant frequency of a series RLC circuit is $f_r = 1 / (2\pi \sqrt{LC})$. Also derive the expressions for Q factor. [16]

4. For the network shown in figure 4 draw oriented graph and draw all possible trees. [16]

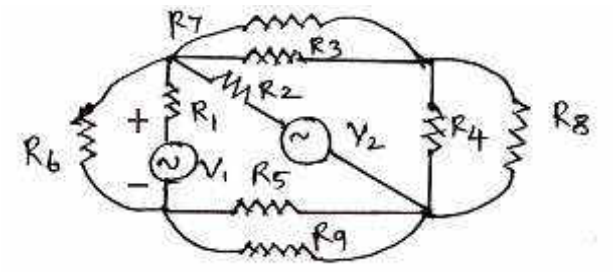

Figure 4

5. (a) State and explain Thevenin's Theorem.
   (b) What are the limitations of Thevenin's Theorem.

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(c) Explain the steps to apply Thevenin's Theorem and draw the Thevenin's equivalent circuit. [6+4+6]

6. For the two port network shown in the figure 6, the currents I_1 and I_2 entering at port 1 and 2 respectively are given by the equations.
   $I_1 = 0.5\ V_1 - 0.2\ V_2$
   $I_2 = -0.2V_1 + V_2$

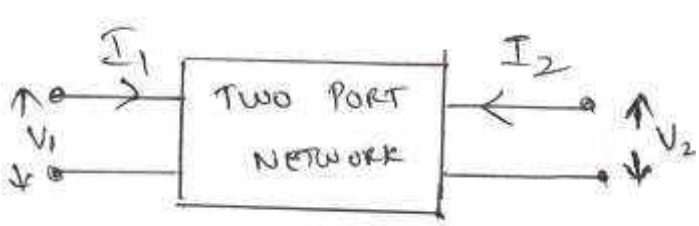

Figure 6

Where V_1 and V_2 are the port voltages at port 1 and 2 respectively. Find the Y, Z, ABCD parameters for the network. Also find its equivalent Π network. [16]

7. In the circuit shown in figure 7, E_g (t) = 2.5 t Volts. What are the values of i(t) and VL(t) at t = 4 seconds. [16]

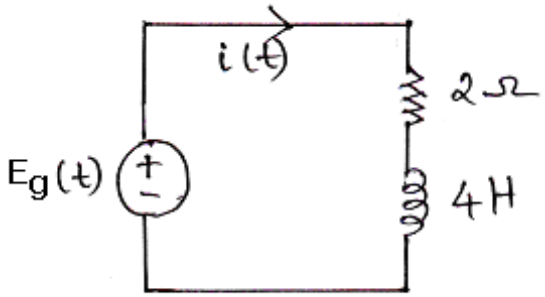

Figure 7

8. Obtain the constant low pass filter and high pass filter characteristics for the circuit, as shown in figure 8. [16]
   R = 1000Ω
   C = 10 μF
   F = 1 KHz
   Q = 5.

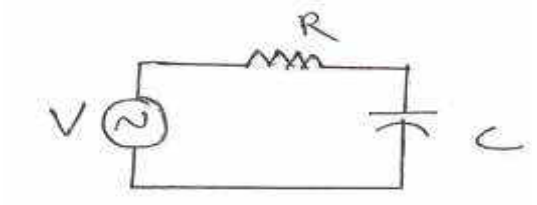

Figure 8

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