Code No: R21042 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, September - 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~

1. a) What are the various types of network elements? Explain their volt-ampere relationships.
   b) Find the current in 2 Ω resistance for the network shown in Figure 1 using mesh analysis. (6M+9M)

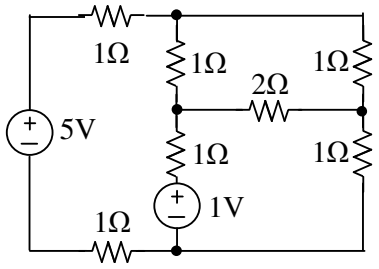

Figure 1

2. a) Draw duality of network shown in Figure 2(a). Explain the procedure adopted for duality.
   b) Find branch currents in the circuit shown in Fig. 2(b) using concept of tie-set matrix. (8M+7M)

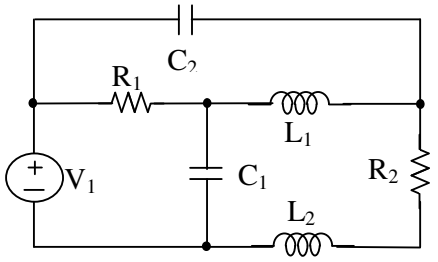

Figure 2(a)

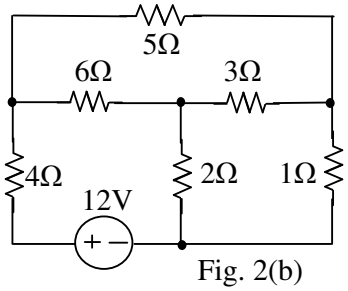

Fig. 2(b)

3. a) A metal filament lamp, rated at 750 Watts, 100V is to be connected in series with a capacitor across a 230V, 60 Hz supply. Calculate (i) The capacitance required (b) The power factor.
   b) A series RLC circuit consists of a resistance of 25Ω, inductance 0.4H, capacitance of 250 μF is connected a supply of 230V, 50 Hz. Find the total impedance, current, power, power factor, voltage across coil and capacitance? (6M+9M)

4. A parallel circuit has two branches: first branch has a resistance of 5 ohm connected in series with an inductance 10 mH and in the second branch consists only a capacitor. The total parallel circuit is connected across a 230 V, 50 Hz supply. If the circuit is to be in resonance, find the value of the capacitance. Find the current drawn from the supply and also find the currents in the two parallel branches. Draw the phasor diagram. (15M)
~~~~~~~~~~~~~~~~~~~~~

5. a) State and explain reciprocity theorem.
   b) Use Thevenin's Theorem find the current through (5+j4) ohms impedance, for the network shown in figure 4. (6M+9M)

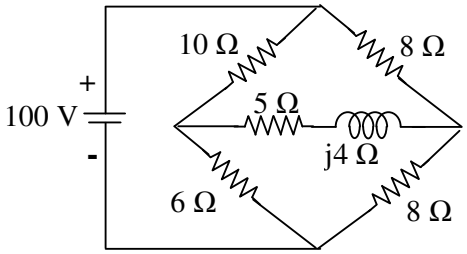

Figure 4

6. a) Obtain the admittance parameters of the network shown in Figure (5a) and there by obtain the A, B, C, D parameters?
   b) Calculate the Z-parameters for the lattice network shown in Figure (5b). (8M+7M)

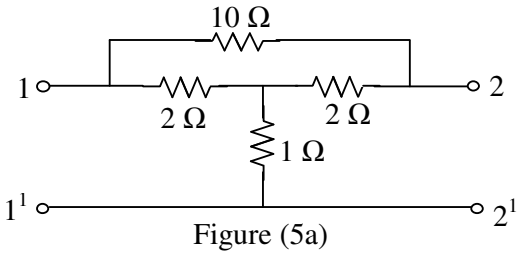

Figure (5a)

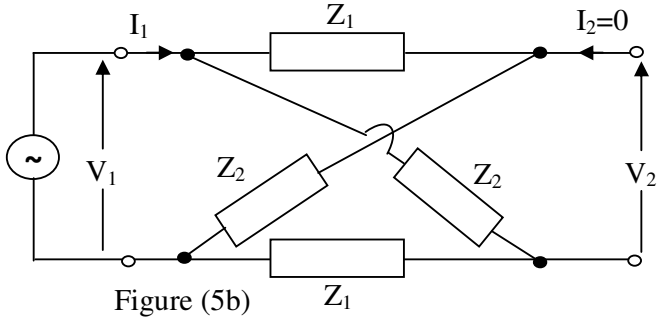

Figure (5b)

7. Using Laplace transformation techniques, find currents in each loop at $t=0^+$ after closing the switch K in circuit shown in figure 6. Assume that the network is previously de-energized. (15M)

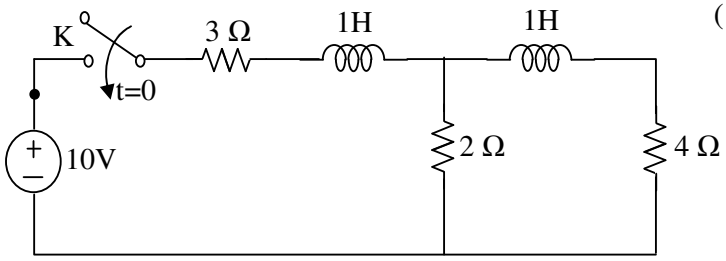

Figure 6

8. a) Explain the composite design of low pass and high pass filters.
   b) Design a low pass filter to have a cutoff at 796 Hz when terminated in a 600 Ω resistance, in both ' T ' and '∏' configurations. (7M+8M)

Code No: R21042 **R10** SET - 2

II B. Tech I Semester Supplementary Examinations, September - 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~

1. a) A circuit consisting of three resistances 12 ohm, 18 ohm and 36 ohm respectively joined in parallel is connected in series with a fourth resistance. The whole circuit is applied with 60V and it is found that the power dissipated in the 12 ohm resistor is 48 W. Determine the value of the fourth resistance and the total power dissipated in the circuit and current through each element.
   b) Using mesh analysis, determine the voltage across 10 ohm resistor in the network shown in Figure 1. (8M+7M)

2. For a resistive network shown in Figure 2, write a tie-set schedule and equilibrium equations on current basis. Determine branch currents and branch voltages. (15M)

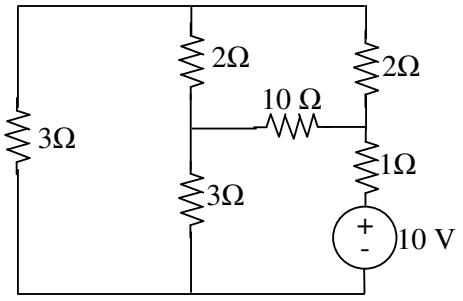

Figure 1

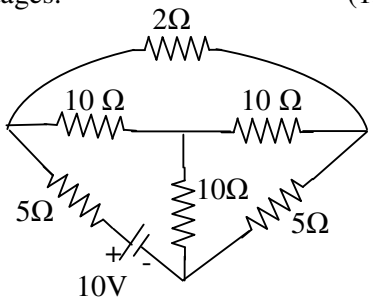

Figure 2

3. a) For the parallel network shown in figure 3(a), determine equivalent circuit impedance, supply current I and the currents I_1 and I_2.
   b) For the network shown in figure 3(b), use mesh analysis to determine the value of current I and the active power output of the voltage source. (8M+7M)

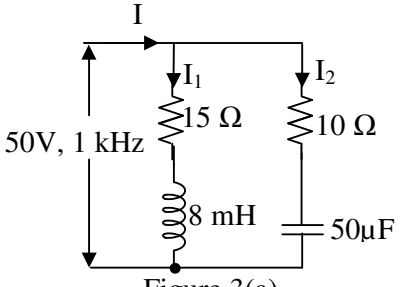

Figure 3(a)

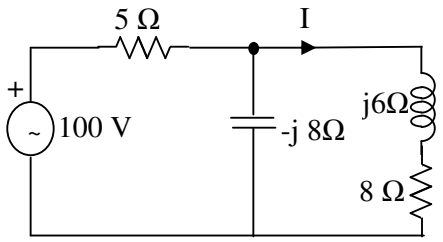

Figure 3(b)

|''|''|||''|'''|||'|
~~~~~~~~~~~~~~~~~~~~~~

4. a) Two magnetically coupled coils are having self inductances 'L_1' and 'L_2', mutual inductance 'M'. Determine the equivalent inductance when they are connected in series aid and series opposite condition.
   b) The current at resonance in a series L-C-R circuit is 0.2mA. If the applied voltage is 250 mV at a frequency of 100 kHz and the circuit capacitance is 0.04μF, find the circuit resistance and inductance. (8M+7M)

5. a) State and explain compensation theorem.
   b) Find the value of 'I' in the circuit shown in figure 4 using superposition theorem. (7M+8M)

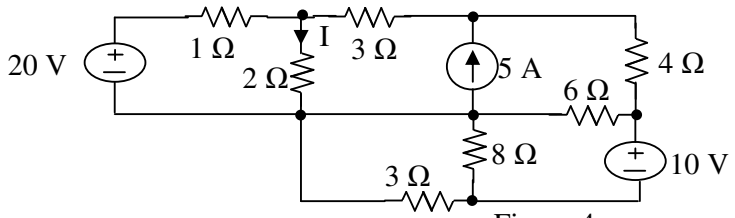

Figure 4

6. a) Express *z*-parameters in terms of *h*-parameters and *ABCD*-parameters.
   b) Find the Y-parameters of the circuit shown in figure 5. (7M+8M)

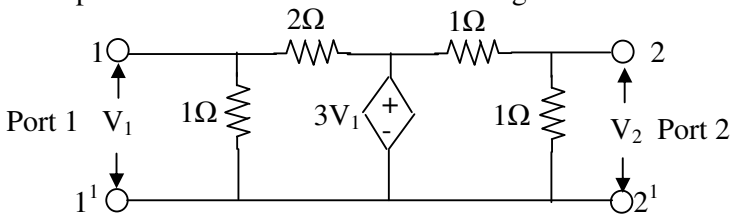

Figure 5

7. a) What are initial conditions? Explain how these are evaluated.
   b) Find current i(t) in the network shown in figure 6 for t>0. At $t=0^-$ the network was unenergized. (8M+7M)

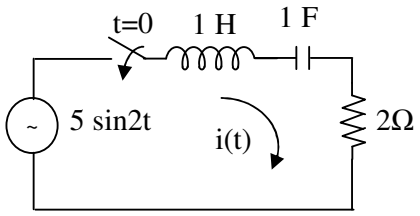

Figure 6

8. Design a T-type and π-type attenuator if the characteristic resistance is 200 ohms and the attenuation is 200 dB. (15M)

Code No: R21042 **R10** SET - 3

II B. Tech I Semester Supplementary Examinations, September - 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~

1. a) What are different types of sources? Explain their characteristics with suitable diagrams.
   b) Explain the source transformation with an example.
   c) Use nodal analysis technique to determine the current 'i' in the network shown in figure 1. (5M+4M+6M)

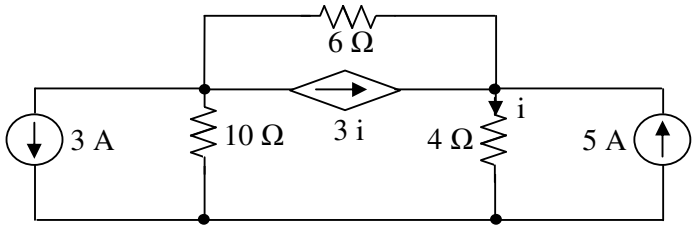

Figure 1

2. a) Define Average value, RMS value, Form factor, Peak factor of an alternating quantity.
   b) Define the terms branch, node, tree, planar, and non-planar graph.
   c) Find the form factor and peak factor for the wave form shown in figure 2. (4M+4M+7M)

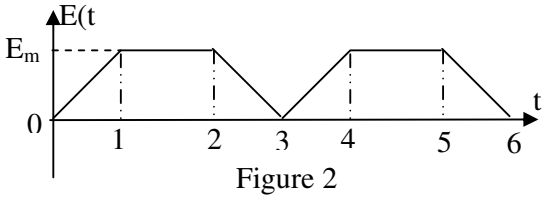

Figure 2

3. a) The resistor R in series with capacitance C is connected to a 50Hz, 240 V supply. Find the value of C so that R absorbs 300 watts at 100 volts. Find also the Maximum charge and the maximum stored energy in C.
   b) Show that average power consumed by a pure inductor and a pure capacitor is zero. (8M+7M)

4. a) Solve for the currents I_1 and I_2 in the circuit shown in figure 3. Also, find ratio of V_2/V_1. Assume ω=2 rad/sec.
   b) What is magnetic circuit? Compare magnetic circuit with electric circuit. (8M+7M)

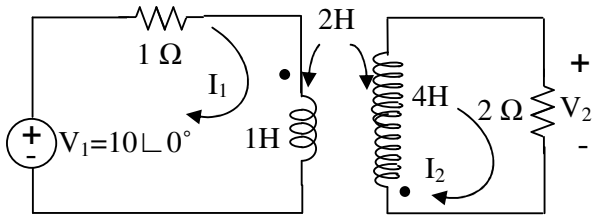

Figure 3

|''|''|||''|'''|||'|
~~~~~~~~~~~~~~~~~~~~~~

5. a) State and explain substitution theorem.
   b) Find current through R_L using Norton's theorem for the circuit shown below. (7M+8M)

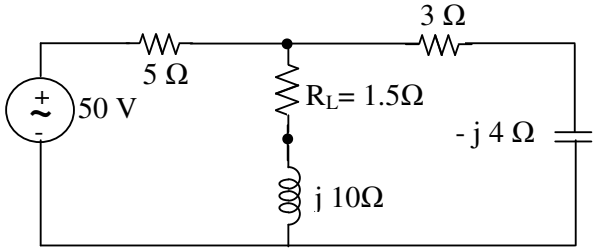

Figure 4

6. a) Express the Y-parameters in terms of ABCD and h-parameters.
   b) Find the z-parameters of the two port network shown in figure 5. (8M+7M)

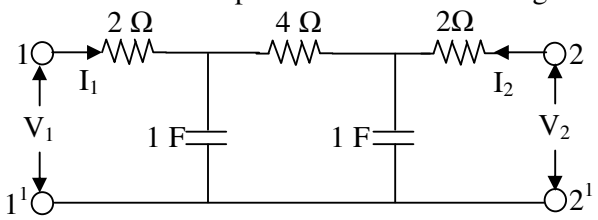

Figure 5

7. A 100V DC voltage source is connected to the network shown in figure 6, when the switch K is in open position. Now the switch K is closed at t = 0. Find the complete expression for the current. (15M)

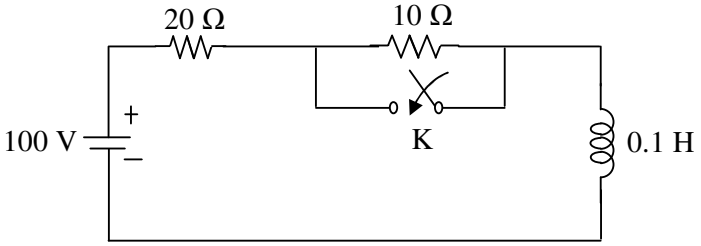

Figure 6

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 2000 Hz with very high attenuation at 1060 and 1200 Hz respectively. (15M)

Code No: R21042 **R10** SET - 4

II B. Tech I Semester Supplementary Examinations, September - 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~

1. a) The current wave form shown in figure 1(a) applied to a series R-L circuit with R =2 ohms and L =2 mH. Find the voltage across each element in the circuit and sketch the same.
   b) Find the power supplied by the 2V battery in the network shown below. (8M+7M)

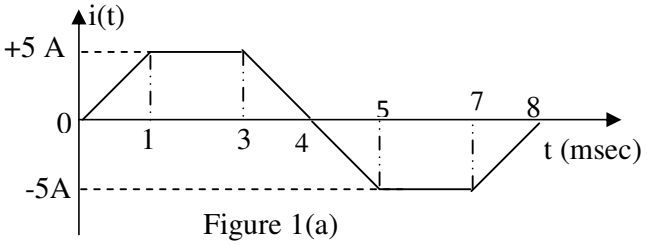

Figure 1(a)

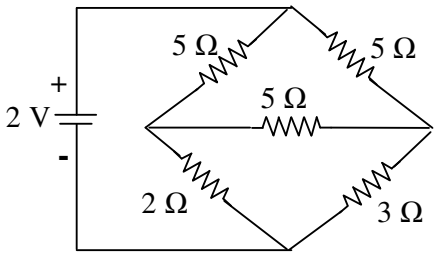

Figure 1(b)

2. a) Explain the procedure for obtaining fundamental cut-set matrix of given network.
   b) For the resistive network shown in Figure 2, write a tie-set schedule and equilibrium equations on current basis. Determine branch currents and branch voltages. (7M+8M)

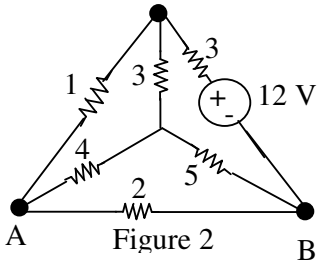

Figure 2

3. a) Obtain the expression for star-delta equivalence of impedance networks.
   b) A series RL circuit has R=25Ω and X_L=32Ω. It is connected in parallel to a capacitor of 100 μF and the combination is connected across a 200V, 50Hz supply. Find the current in each branch. Draw the vector diagram showing the total current (7M+8M)

4. a) Explain about the dot convention in magnetic coupled circuits.
   b) A series RLC circuit with voltages $3\angle 0^0$ V at a frequency of 8.2 kHz. The peak value of current is 400 mA at resonance and the bandwidth is 100 Hz. Determine R, L, C and cutoff frequencies. (7M+8M)
~~~~~~~~~~~~~~~~~~~~~~

5. a) Prove that the power transfer to the load becomes maximum when the load impedance is equal to the complex conjugate of the Thevenin's impedance.
   b) Find the voltage across -j2 Ω capacitor using superposition theorem in below Figure 3. All impedance values are in ohms. (7M+8M)

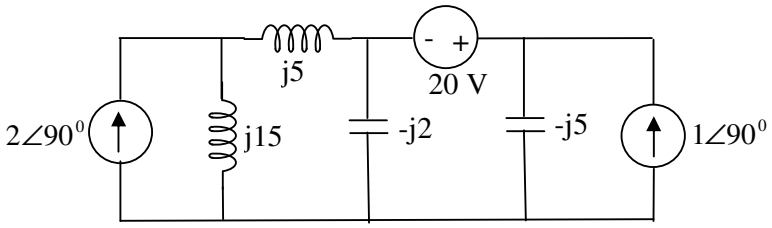

Figure 3

6. a) Determine the admittance parameters of the circuit shown in figure 4(a).
   b) Find the open circuit impedance parameters of the circuit shown in figure 4(b). (7M+8M)

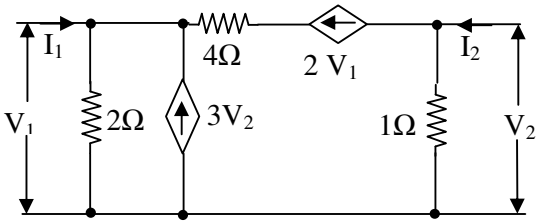

Figure 4**(a)**

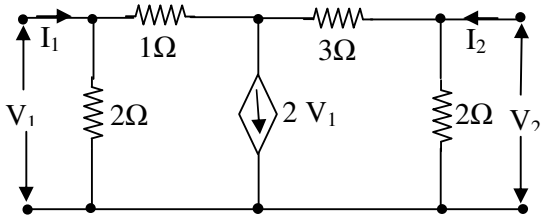

Figure 4**(b)**

7. a) A series R-L circuit has R=10 ohms and L=4 H. The circuit is connected across a DC voltage source of 150 V at t=0. Calculate the time at which the voltage drops across R and L are the same.
   b) For an RC series circuit, a sinusoidal voltage $v(t) = V_m \sin \omega t$ is applied at t=0. Find the expression for transient current. (7M+8M)

8. Design a T-type and π-type attenuator if the characteristic resistance is 200 ohms and the attenuation is 200dB. (15M)