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

II B. Tech I Semester Regular Examinations, March – 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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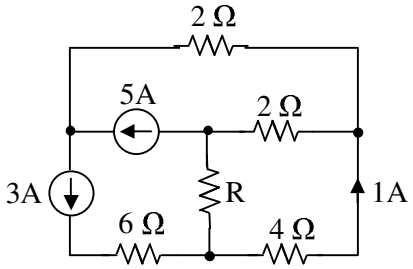
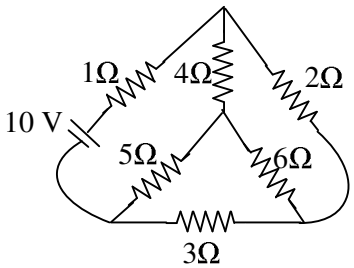
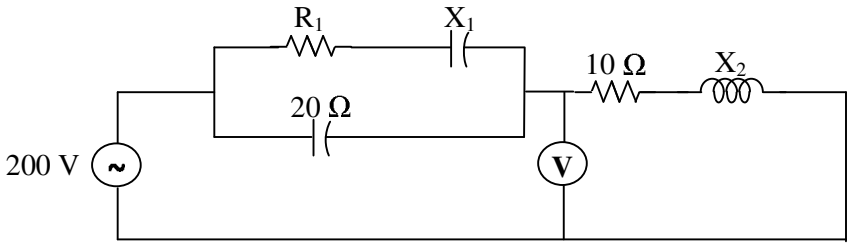
1. a) Compare the ideal and practical voltage sources.
   b) In the circuit shown below, find the value of R using mesh analysis. (7M+8M)



2. a) Define average value, RMS value, form factor and peak factor.
   b) Draw the oriented graph and obtain the tie-set matrix (Consider 4Ω, 5Ω and 6Ω branches as tree branches). (8M+7M)



3. a) Derive an expression for power in a series RL circuit excited by a sinusoidal voltage $v(t)=V_m \sin \omega t$.
   b) The circuit shown below takes 12A at a lagging power factor and dissipates 1800 W. The reading of the voltmeter is 200V. Find R_1, X_1 and X_2. (7M+8M)



4. a) Explain the concept of dot convention for coupled circuits.
   b) A RLC series circuit of 8Ω resistance should be designed to have a band width of 50Hz. Determine the values of L and C so that the system resonates at 250Hz. (7M+8M)

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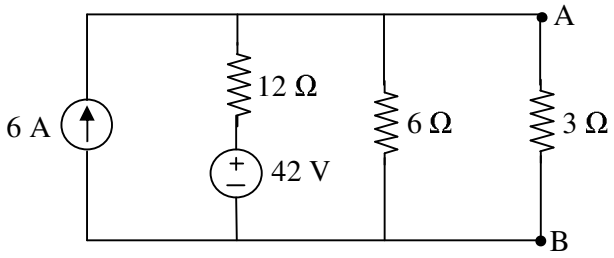
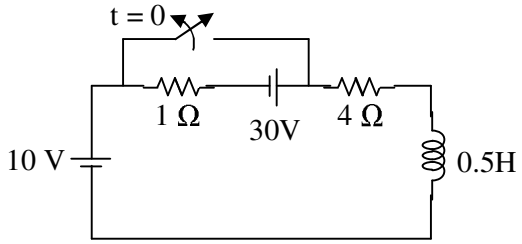
5. a) State and explain the Millman's theorem.
   b) In the circuit shown below, find the current in the 3 ohms resistor using Thevenin's theorem. (7M+8M)



6. a) Express Z-parameters in terms of ABCD-parameters for a two-port network.
   b) Find the condition for reciprocity and condition for symmetry of a two-port network in terms of ABCD parameters. (7M+8M)

7. a) Derive the equation for the transient current i(t) in a series RC circuit excited by a DC input of V volts at time t=0. Assume zero initial conditions.
   b) In the circuit shown below, the switch is initially in closed position for a long time and opened at time t=0. Find the current i(t) for t>0. (7M+8M)



8. a) Briefly explain the important properties of filters?
   b) Design an m-derived low pass filter having cutoff frequency of 1 kHz, resonant frequency 1100 Hz and design impedance of 400 Ω. (7M+8M)

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

II B. Tech I Semester Regular Examinations, March – 2014
NETWORK ANALYSIS
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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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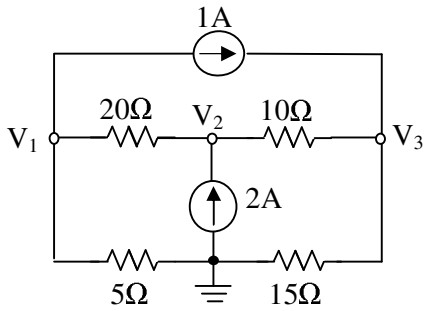
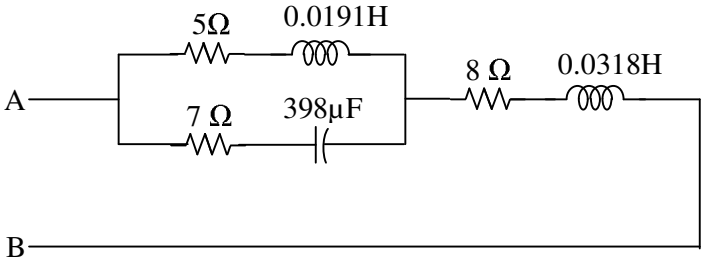
1. a) Explain the source transformation technique with an example.
   b) Find the nodal voltages and the power delivered by the 2A current source in the circuit shown below, using the nodal analysis. (7M+8M)



2. a) Explain the terms: Node, Subgraph, Graph, Tree and Co-tree.
   b) Explain the procedure to obtain dual of a circuit. (8M+7M)

3. a) Derive the expression for power in a single phase AC circuit.
   b) In the circuit shown below, what 50 Hz voltage must be applied across terminals A and B to have 10 A current in the capacitor. (7M+8M)



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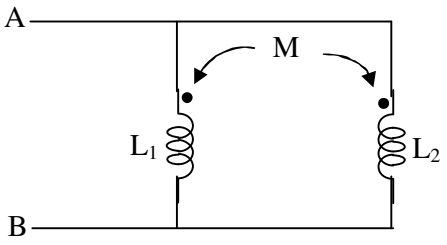
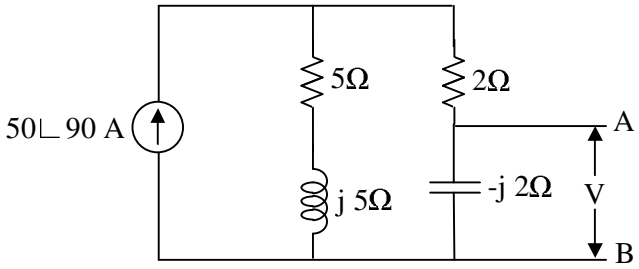
4. a) Define the Q-factor and derive an equation showing the relation between Q-factor, Band width and selectivity at resonance.
   b) Obtain the equivalent inductance of the circuit shown below between the terminals A and B. (7M+8M)



5. a) State and explain the Norton's theorem
   b) Verify the Reciprocity theorem by finding the voltage V across the terminals A and B of the network shown below. (7M+8M)



6. a) Find the condition for reciprocity and condition for symmetry of a two-port network in terms of Z parameters.
   b) Explain the cascade connection of two 2-port networks. (8M+7M)

7. a) Derive the equation for the transient current i(t) in a series RC circuit excited by a sinusoidal input of $v(t)=V_m \sin \omega t$, at time t=0. Assume zero initial conditions.
   b) A series RLC circuit with R=10 ohms, L=0.1 henries and C=20 microfarads has a constant voltage of 100 Volts applied at time t=0. Determine the transient current i(t) using Laplace transform techniques. Assume zero initial conditions. (7M+8M)

8. a) Explain the constant-K Low Pass Filter in detail.
   b) Design a m-derived High Pass Filter with a cut-off frequency of 10 KHz. Design impedance of 500Ω and m = 0.4 (7M+8M)

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

II B. Tech I Semester Regular Examinations, March – 2014
NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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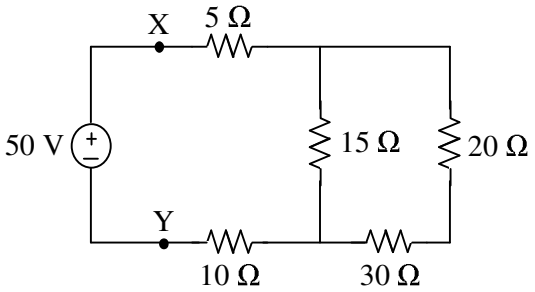
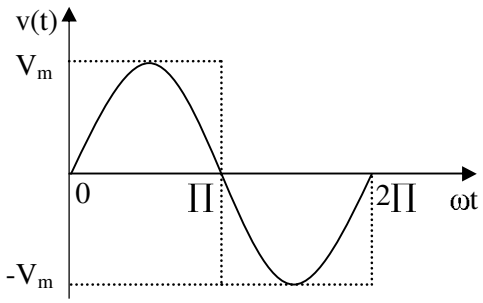
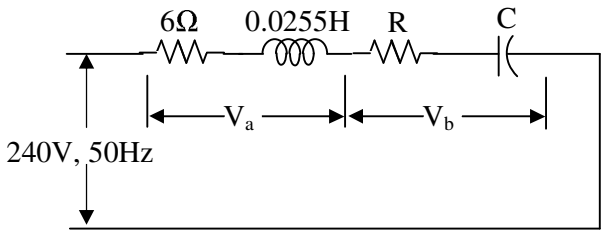
1. a) Explain the terms: Unilateral and bilateral elements; Active elements and Passive elements.
   b) Find the resistance across the terminals X-Y and hence find the current in each branch of the circuit shown below. (8M+7M)



2. a) Explain the terms: Graph, Tree, Co-tree and Incidence matrix with an example.
   b) Find the ratio of R.M.S. values of the two voltage wave forms of equal peak value, one sinusoidal and the other rectangular in shape as shown below. (8M+7M)



3. a) Derive the equations to transform star connected impedances into delta connected impedances
   b) Find the values R and C so that $V_a=3V_b$, V_a and V_b are in quadrature. (7M+8M)



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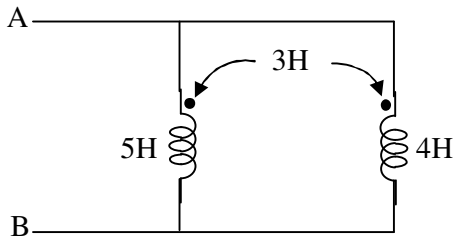
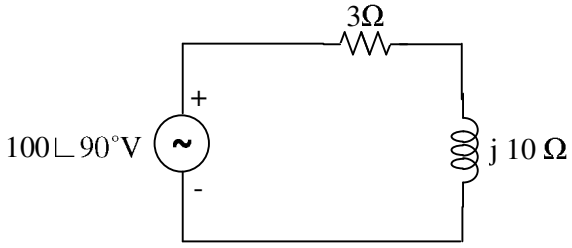
4. a) Show that the resonant frequency is the geometric mean of two half power frequencies.
   b) Derive the necessary equation and obtain the equivalent inductance L_{eq} between terminals A and B in the network shown below. (7M+8M)

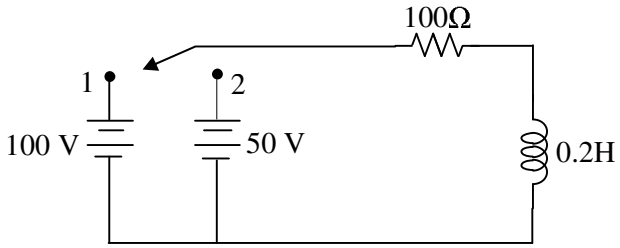


5. a) State and explain the Superposition theorem.
   b) In the circuit shown below, find the change in current using Compensation theorem when the j10Ω reactance is changed to j5Ω. (7M+8M)



6. a) Express h-parameters in terms of Z-parameters for a two-port network.
   b) Explain the series connection of two 2-port networks. (7M+8M)

7. a) Derive the equation for the transient current i(t) in a series RL circuit excited by a sinusoidal input of $v(t)=V_m \sin \omega t$ at time t=0. Assume zero initial conditions.
   b) In the circuit shown below, the switch is closed on position 1 at t=0 there by applying the 100V source to the R-L branch, and at t=500 microseconds, the switch is moved to position 2.Obtain the equations for the current in both intervals. (7M+8M)



8. a) Briefly explain the various types of filters?
   b) Design an m-derived Low Pass Filter having cutoff frequency of 1.5 kHz, resonant frequency of 1600 Hz and design impedance of 600 Ω. (7M+8M)

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

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NETWORK ANALYSIS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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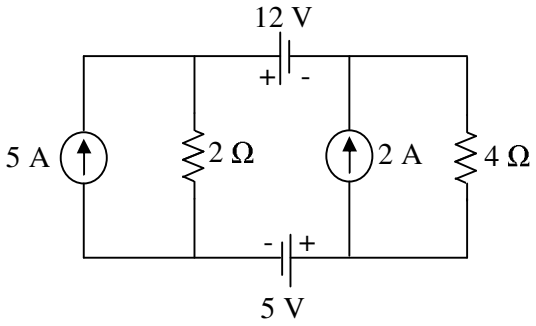
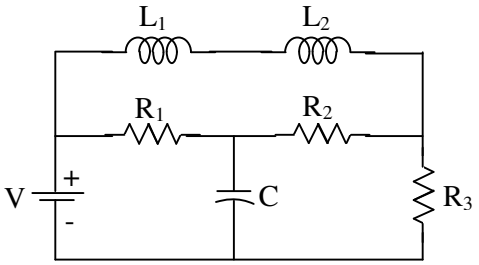
1. a) State and explain the Kirchhoff's laws.
   b) Find the current in the 4 ohms resistor using source transformation techniques. (7M+8M)



2. a) Obtain average value, RMS value, form factor and peak factor of a sinusoidal voltage $v(t)=V_m \sin \omega t$.
   b) Draw the dual circuit for the circuit shown below. (8M+7M)



3. a) Derive the equations to transform delta connected impedances into star connected impedances
   b) The current in a circuit is given by I= (3+j5) A when the applied voltage is V= (150+j150)V. Determine the impedance, power factor and the real power. (8M+7M)

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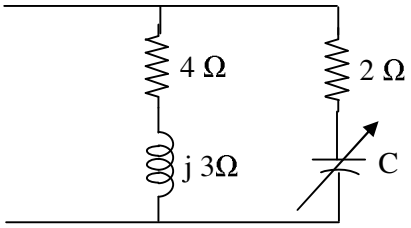
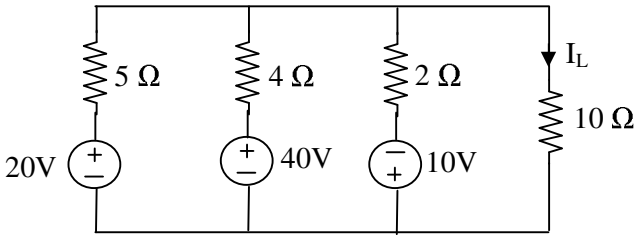
4. a) Define coefficient of coupling K and derive the relation between self inductances L_1, L_2, mutual inductance M and coefficient of coupling K.
   b) Find the value of C at which the circuit shown below resonates at a frequency of 1000 radians/sec. (7M+8M)



5. a) State and explain Reciprocity theorem.
   b) Find the current I_L using Millman's theorem. (7M+8M)



6. a) Express Y-parameters in terms of Z-parameters for a two-port network.
   b) Explain the Parallel connection of two 2-port networks. (7M+8M)

7. a) Derive the equation for the transient current i(t) in a series RL circuit excited by a DC input of V volts at time t=0. Assume zero initial conditions.
   b) A series RLC circuit with R=10 ohms, L=0.1 henries and C=0.25 farads has a constant voltage of 50 Volts applied at time t=0. Determine the transient current i(t). Assume zero initial conditions. (7M+8M)

8. a) What is constant k-Filter? What is the difference between constant k-filter and m-derived filter? What are the limitations of constant 'K' filters?
   b) Design a m-derived High Pass Filter with a cut-off frequency of 10 KHz. Design impedance of 600Ω and m = 0.3 (7M+8M)

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