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

II B. Tech I Semester, Regular Examinations, Nov – 2012
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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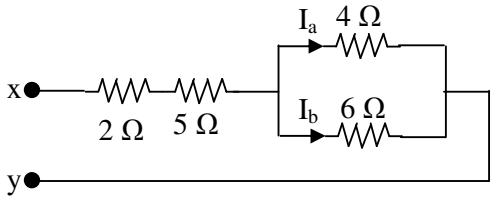
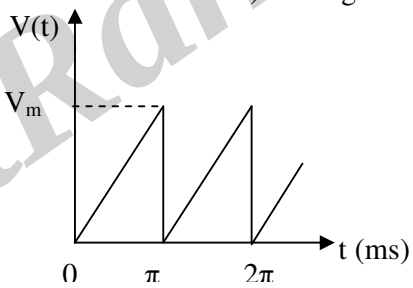
1. a) What are the types of sources? Explain them with suitable diagrams and characteristics?
   b) Calculate the voltage that is to be connected across terminals x-y is shown in below figure such that the voltage across the 2Ω resister is 10 V. Also find I_a and I_b .what is the total power loss in the circuit.



2. Explain the principles of duality? Write a graphical procedure to draw a dual network?
   A periodic voltage waveform has been shown in the below figure. Determine the following.
   i) Frequency of the waveform ii) Wave equation for 0< t <100 m sec
   iii) R.M.S. value and iv) Average value



3. a) Define the following
   i) Impedance ii) Phase angle iii) Power factor
   b) State and explain star-delta conversion in AC systems.
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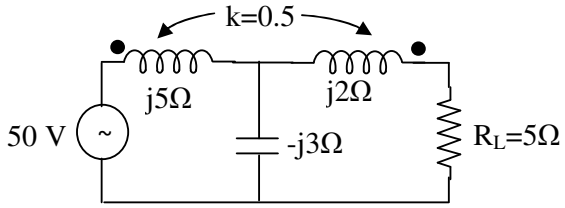
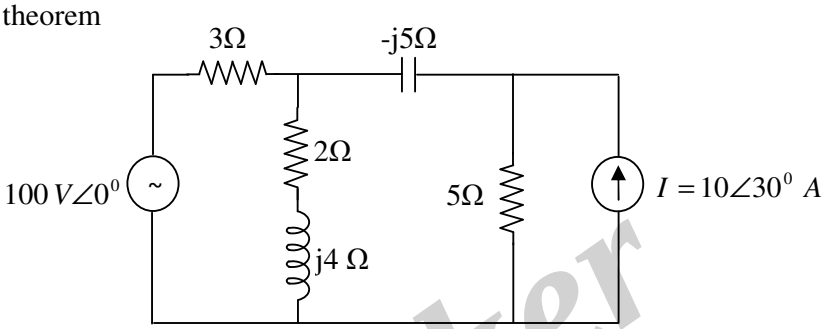
Code No: R21042 **R10** SET - 1

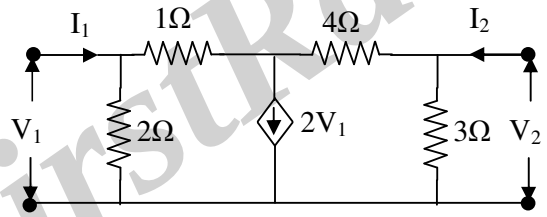
4. For the network shown in below figure, find the voltage across load resistance R_L.



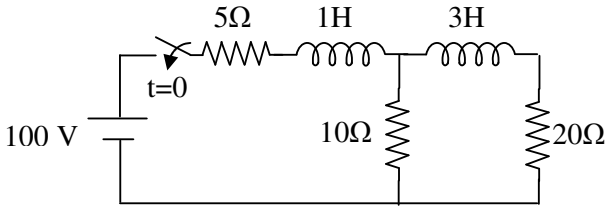
5. Find the current through the capacitor of –j5Ω reactance as shown in below figure using superposition theorem



6. Find the open circuit impedance parameters of the circuit shown in below figure. Also find the Y-parameters



7. In the network shown in below figure, the switch is closed at t= 0. Find the value of current in each loop.



8. a) What are the properties of filters
   b) Design an m-derived T-section low pass filter having cut off frequency, f_c=7000Hz, design impedance R_o=600Ω and frequency of infinite attenuation.

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

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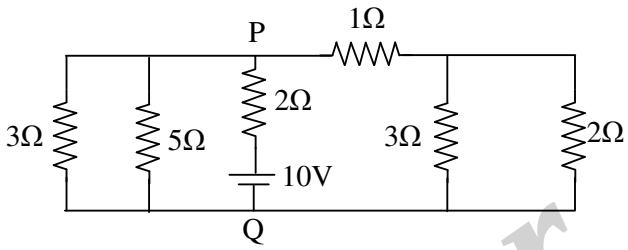
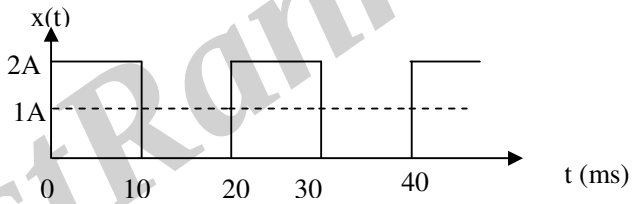
1. a) What are the network elements? Explain them
   b) What is the magnitude of current drained from the 10V source in the circuit shown below?



2. a) Define the following terms
   i) Node ii) Tree iii) Incidence matrix iv) Basic tie set
   b) A non-alternating periodic waveform has been shown in below figure. Find its form factor and peak factor



3. a) Obtain the expressions for star-delta equivalence of impedance network.
   b) A two element series circuit is connected across AC source $e(t) = 200\sqrt{2}\ sin(\ \omega t + 20^0\ )V$. The current in the circuit then found to be $i(t) = 10\sqrt{2}\ cos(\ \omega t - 25^0\ )A$. Determine the parameters of the circuit.

4. a) Derive the expression for bandwidth of series RLC circuit.
   b) Two coils with 300 turns and 700 turns are wound side by side on a closed magnetic circuit of area of cross section 400cm^2 and mean length 80 cm, the magnetic circuit has relative permeability of 4000. Determine the mutual inductance, self induced e.m.f and mutually induced e.m.f when the current in the coil with 300 turns grows from zero to 25A in a time of 0.3 sec
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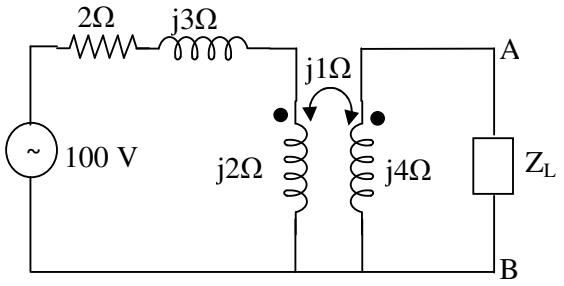
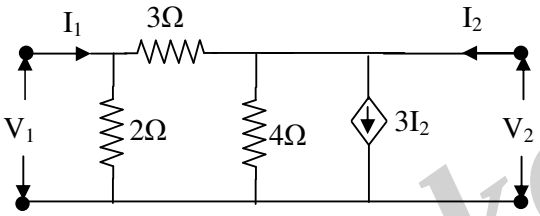
Code No: R21042 **R10** SET - 2

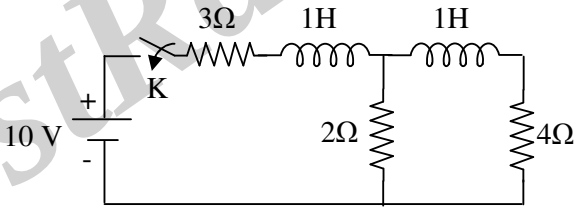
5. Obtain equivalent circuit across A-B terminals in figure shown below and find the value of Z_L to have maximum power.



6. Determine Y-parameters of the network shown in below figure



7. Using Laplace transformation technique, find current in each loop at $t = 0^+$ following switching at t = 0 of switch K is shown in below figure. Assume the network previously de-energized.



8. a) What are the classifications of filters? Discuss them briefly.
   b) Design a constant k-low pass filter having f_c = 2 kHz and design impedance R_o=600Ω. Obtain the value of attenuation at 4 kHz.

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

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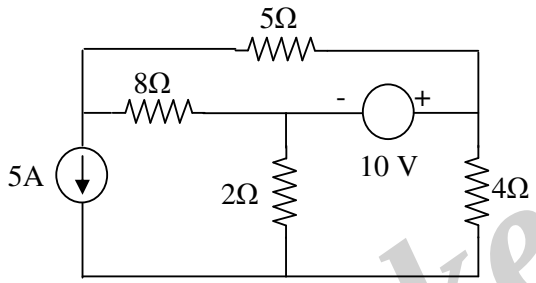
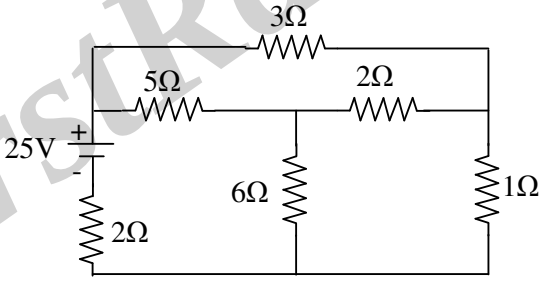
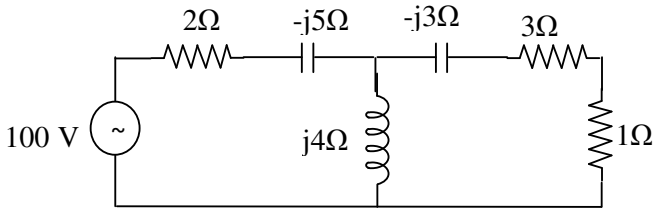
1. a) Explain the source transformation techniques with suitable circuits.
   b) Find mesh currents and determine voltage across each element in the circuit shown in below Figure.



2. a) Explain the RMS value and average value of alternating quantity. Derive its necessary expressions.
   b) Find the branch currents shown in below figure by using the concept of the tie-set matrix.



3. In the two-mesh network shown in below figure, determine the
   a) Mesh currents
   b) Power supplied by the source and
   c) Power dissipated in each resistor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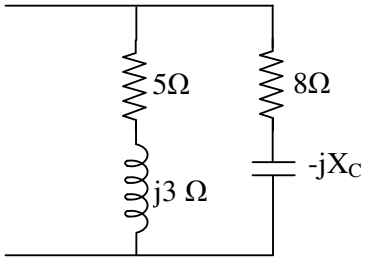
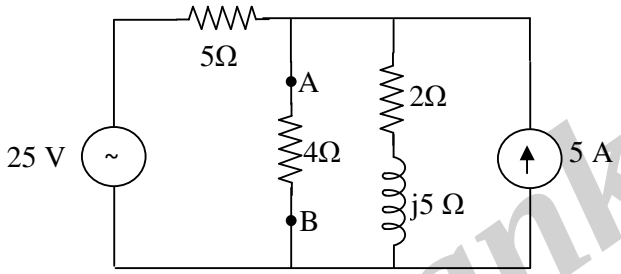
Code No: R21042 **R10** SET - 3

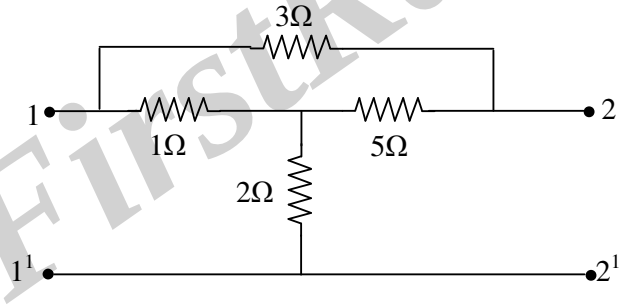
4. a) Determine the coefficient of coupling of two magnetically coupled coils of turns N_1 and N_2
   b) For the circuit shown in below figure, find the value of X_c in ohms at which the circuit under resonance



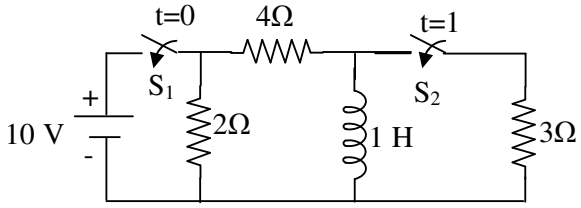
5. In the circuit shown in below figure, find the current through R_L connected across A-B terminals by utilizing Thevenin's theorem. Verify the results by Norton's theorem.



6. For the network shown in below figure, find ABCD parameters



7. In the network shown in below figure find the current through the inductor for all values of't'.



8. a) Explain the concept of m-derived filters.
   b) Design a prototype band stop filter section having cut-off frequencies of 2000 Hz and 5000 Hz and design resistance of 600Ω.

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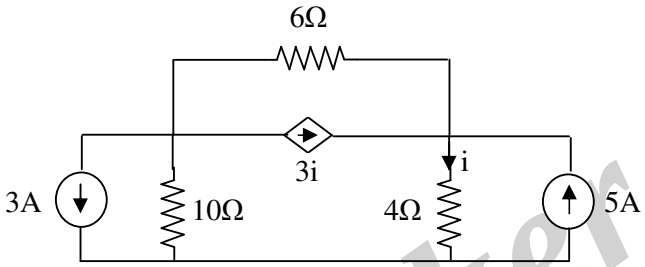
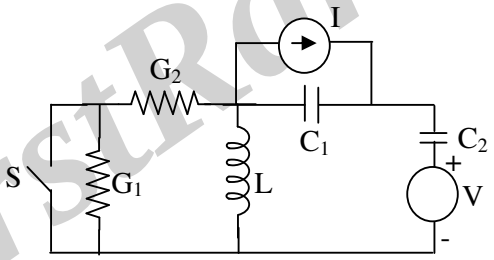
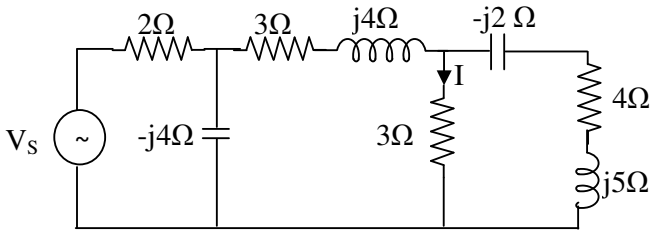
1. a) State and explain Kirchhoff's laws.
   b) Using nodal analysis techniques to determine current 'i' in the network shown in below figure.



2. a) Define the following
   i) Time period ii) Frequency iii) RMS value iv) Average value
   b) Draw the dual of the network shown in below figure and explain its procedure.



3. Find the source voltage 'V_s' by using nodal technique, assume I = 5 $\underline{/45^0}$ A.



4. a) Contrast between magnetic circuits and electrical circuits.
   b) A series RLC circuit has the following parameters. R = 15 ohms, L = 2H, C = 100 micro F. Calculate the resonant frequency. Under resonant condition, calculate current, power, and voltage drops across various elements, if the applied voltage is 100V.
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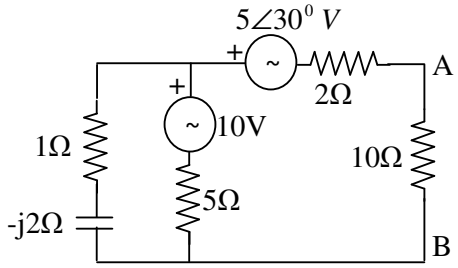
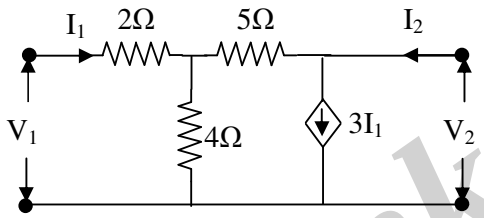
Code No: R21042 **R10** SET - 4

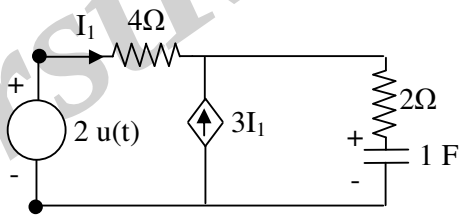
5. Find the current through the 10 ohm resistor in the following circuit using Norton's Theorem.



6. Obtain Z-parameters and transmission parameters of the network shown in below figure.



7. In the below figure, the initial voltage in the capacitor is 1V as the polarity shown. Find the voltage appearing across the capacitor with application of the step voltage



8. a) Explain the analysis of band pass filter.
   b) Design a T-section constant K-high pass filter having cut-off frequency of 10 kHz and design impedance R_0 = 600 ohms. Find its characteristic impedance and phase constant at 25 kHz.