

Code No:- R21042

**R10****SET - 1****II B. Tech I Semester, Supplementary Examinations, May - 2012****NETWORK ANALYSIS**  
(Com. to ECE, EIE, ECC)

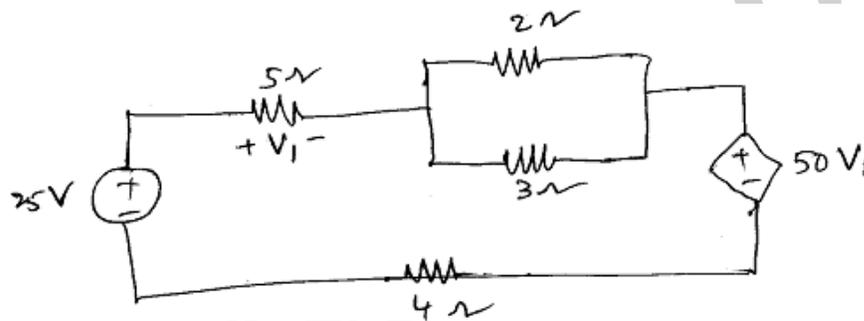
Time: 3 hours

Max Marks: 75

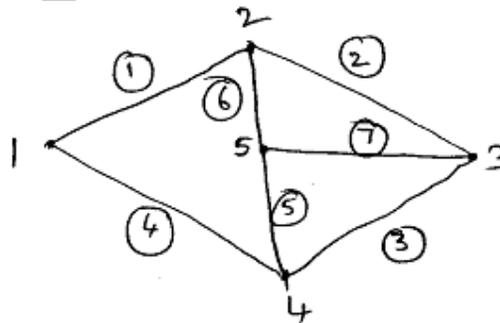
Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

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- What are the various types of sources? Briefly discuss them with necessary circuit diagram and characteristics.
  - For the circuit shown in below figure, determine voltage  $V_1$  and current flowing in each branch.



- Define the following
    - Angular frequency
    - RMS value
    - Average value
    - phase angle
  - Develop the fundamental cut-set and tie set matrices for the graph shown in below figure.

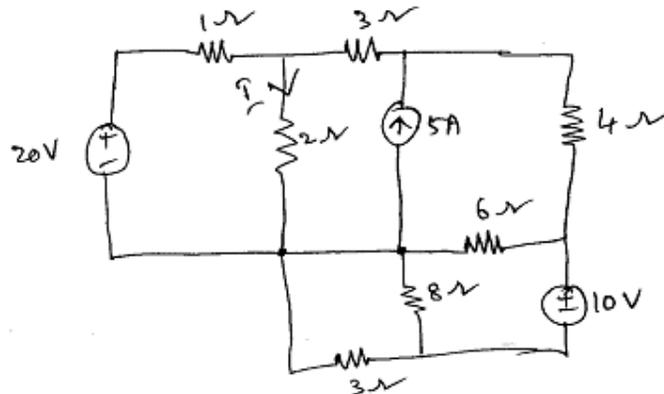


- Explain the following factors.
    - Impedance
    - Reactance
    - phase difference
    - Power factor
  - In a series LCR circuit, the maximum inductor voltage is twice the capacitor voltage maximum. However, the circuit current lags the applied voltage by  $30^\circ$  and the instantaneous drop across the inductance is given by  $V_L = 100 \sin 377t$  volts. Assuming the resistance being  $20\Omega$ , find the values of the inductance and capacitance.

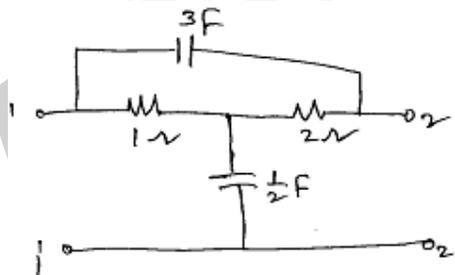
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**R10****SET - 1**

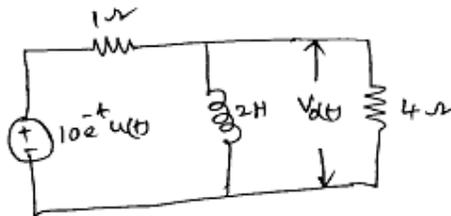
4. a) Explain dot convention in magnetic coupled circuits  
 b) A series RLC circuit with voltages  $3\angle 0^\circ$  v at a frequency of 8200 Hz. The peak value of current is 400 mA at resonance and the band width is 100 Hz. Determine R, L, C and cutoff frequencies.
5. Find the value of I in the circuit shown in below figure using superposition theorem.



6. Determine the ABCD parameters of the network shown in below figure.



7. Assuming the initial current to be 2A through the inductor, find  $V_0(t)$  in below figure. What will be  $V_0(t)$ , if the supply is  $10 e^{-t} u(t)$ .



8. a) Explain the all pass proto type filters design  
 b) Design T and  $\Pi$  section of M-derived high pass filter having design impedance of 600  $\Omega$  cut-off frequency 4 k Hz and infinite attenuation at 3.6 k Hz.

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**R10****SET - 2****II B. Tech I Semester, Supplementary Examinations, May - 2012****NETWORK ANALYSIS**

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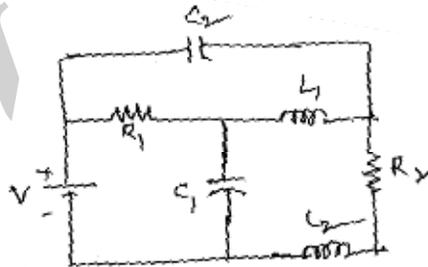
Time: 3 hours

Max Marks: 75

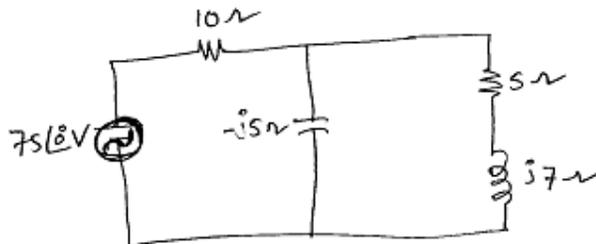
Answer any **FIVE** Questions  
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- What are the network elements? Briefly discuss them.
  - A wheat stone bridge network ABCD has the following resistors in the various branches  $AB = 100\Omega$ ,  $BC = 150\Omega$ ,  $CD = 200\Omega$ ,  $DA = 175\Omega$  and  $BD = 125\Omega$ , A 25 V battery with negligible internal resistance is connected across AC. Find the current in the branch B D.
- Define the following terms.
    - RMV value
    - Average value
    - Form factor
    - Peak factor
  - Draw the duality of the network shown in below figure. Explain the procedure adopted for duality.



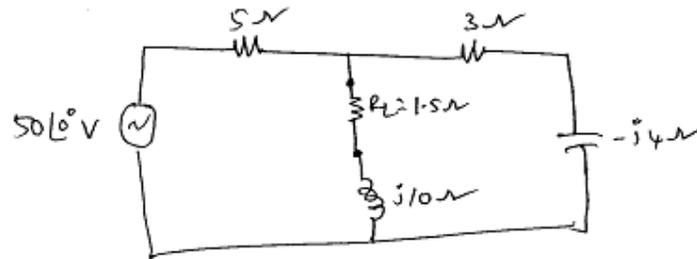
- Write the sinusoidal response of a series R-L-C circuit and derive the expression for  $i(t)$
  - Find the power output of the voltage source in the circuit shown in below figure. Also determine the power in the circuit resistors.



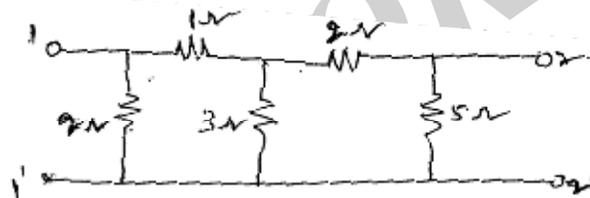
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**R10****SET - 2**

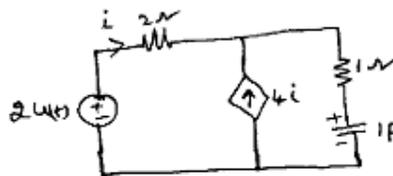
4. a) Compare and contrast electric and magnetic circuits  
 b) An impedance coil having  $R=20\ \Omega$  and a 50 Hz inductive reactance of  $22\ \Omega$  is connected to 125V, 60 Hz source. A series circuit consisting of resistor  $R=10\ \Omega$  and variable capacitor is then connected in parallel with coil.  
 i) For what value of C will the circuit be in resonance?  
 ii) Calculate two line currents at resonance.
5. Find current through  $R_L$  using Norton's theorem for the circuit shown in below figure.



6. Find the Z – parameters of the two port network shown in below figure.



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



8. a) What are the classification of filters? Briefly discuss them.  
 b) Design a T and  $\Pi$  section constant-K high pass filter having cut-off frequency of 12 k Hz and nominal impedance  $R_0 = 500\ \Omega$ . Also find its characteristic impedance and phase constant at 24 k Hz .

Code No:- R21042

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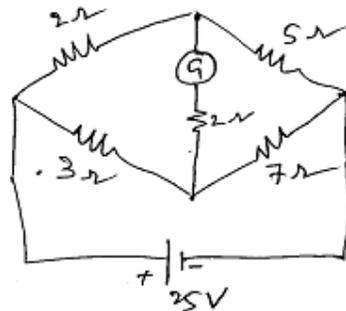
Time: 3 hours

Max Marks: 75

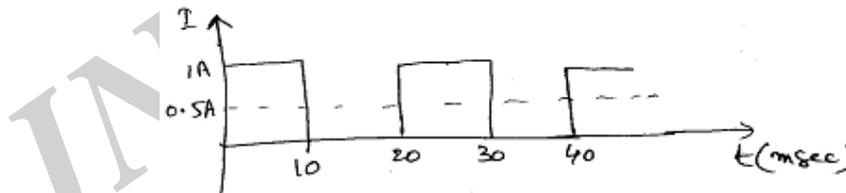
Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

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1. a) Explain the source transformation technique with necessary sketches.  
b) Find the current through the galvanometer of internal resistance  $2\Omega$  in an unbalanced Wheatstone bridge network shown in below figure.



2. a) Define the following terms.  
i) branch      ii) tree      iii) path      iv) sub graph  
b) A non- alternating periodic wave form has been shown in below figure. Find its form factor.



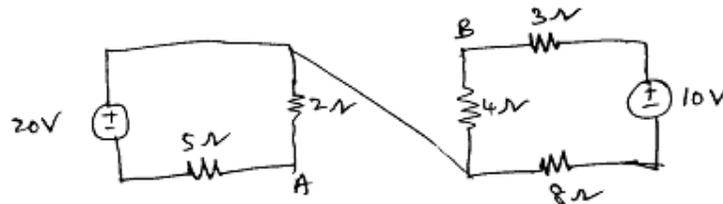
3. a) Obtain the expressions for star-delta equivalence of impedance networks.  
b) A series RL circuit has  $R=25\Omega$  and  $X_L=32\Omega$ . It is connected in parallel to a capacitor of  $100\mu F$  and the combination is connected across a 200 V, 50Hz supply. Find the current in each branch. Draw the vector diagram showing the total current.
4. a) Compare and contrast series and parallel resonance circuits.  
b) A mild steel ring has a mean circumference of 1000 mm and a uniform area of cross section of  $600\text{ mm}^2$ . Calculate the MMF required to produce a flux of 500 n wb, assuming permeability of mild steel as 1200. An air gap of 2mm in length is now cut in the ring. Determine the flux produced, if the MMF remains constant.

Code No-: R21042

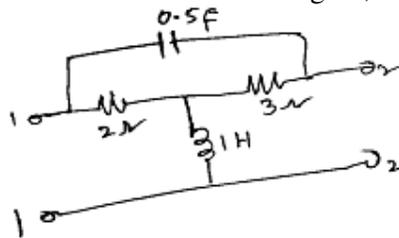
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SET - 3

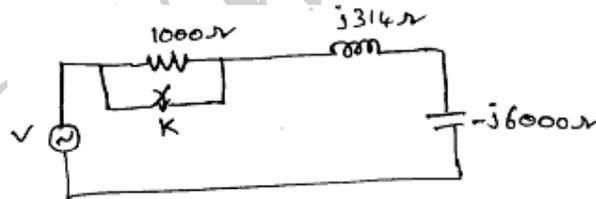
5. Determine Thevenin's equivalent circuit across terminals AB for the circuit shown in below figure.



6. For the following two port network shown in below figure, determine h-parameters.



7. For the circuit shown in below figure with switch open, steady state is reached with  $v=100 \sin 314 t$  volts. The switch is closed at  $t=0$ . The circuit is allowed to come to steady state again. Determine the steady state current and complete solution of transient current.



8. a) What are the draw backs of constant K-filters?  
 b) Design m-derived low pass filter having cut-off frequency 40 k Hz and resonant frequency 65 K Hz with design impedance of  $600 \Omega$ .

Code No:- R21042

**R10****SET - 4****II B. Tech I Semester, Supplementary Examinations, May - 2012****NETWORK ANALYSIS**

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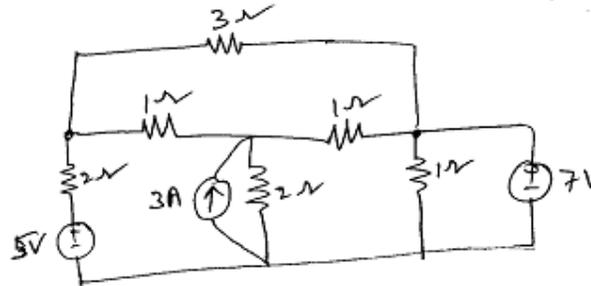
Time: 3 hours

Max Marks: 75

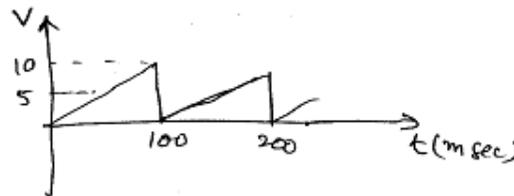
Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

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1. a) State and explain the Kirchhoff's laws?  
b) Determine all branch currents of the circuit shown in below figure.



2. a) Define the following terms  
i) Oriented graph    ii) tree of a graph    iii) cut set    iv) tie-set  
b) A periodic voltage waveform has been shown in below figure. Determine the following.  
i) Frequency of the waveform    ii) wave equation for  $0 < t < 100 \text{ msec}$   
iii) RMS value    iv) form factor

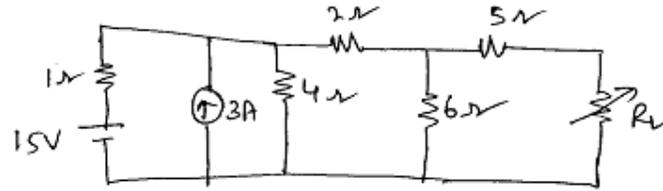


3. a) Write the sinusoidal response of a series R-C circuit and derive the expression for  $i(t)$ .  
b) A coil takes a current of 5A lagging by  $45^\circ$  behind the applied voltage of 230V, 50Hz. Calculate the inductance and resistance of the coil. Also determine the power consumed when it is connected across the 150V, 25 Hz.
4. a) Define the following  
i) MMF    ii) reluctance,    iii) magnetizing force and    iv) permeance  
b) A series resonant circuit has a resistance of  $7\Omega$  and Q of  $2\pi$ . If the resonant frequency is 120 Hz, calculate  
i) The other elements  
ii) Pass band and half power frequencies. Also, find the value of the reactive element that needs to be connected across this circuit so that the system has unity p.f when a current of 1.5A flows. Also calculate the source voltage when the combination is connected to a 50 Hz source.

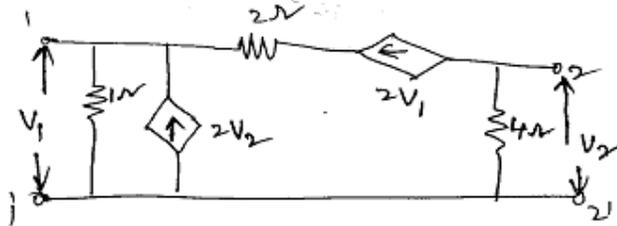
Code No:- R21042

**R10****SET - 4**

5. Obtain the conditions for the maximum power transferred to load and also find the maximum power of the circuit shown in below figure.



6. Find Y-Parameters of the circuit shown in below network.



7. A DC voltage of 100V is suddenly applied in the network shown in below figure. Find the transient currents in both the loops and obtain the transient voltage across the capacitor.



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 the T and Π configurations.