Code No: R05010401 **Set No. 1**

I B.Tech Regular Examinations, Apr/May 2007
NETWORK ANALYSIS
(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Electronics & Telematics and Electronics & Computer Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State and Explain the Volt-Ampere relation Ships for R,L and C Parameters.
   (b) Draw the Wave forms for i_R, i_L, i_c for the Circuit show in figure. When it is excited by a Voltage source having a Waveform shown in Figure 1b. [6+10]

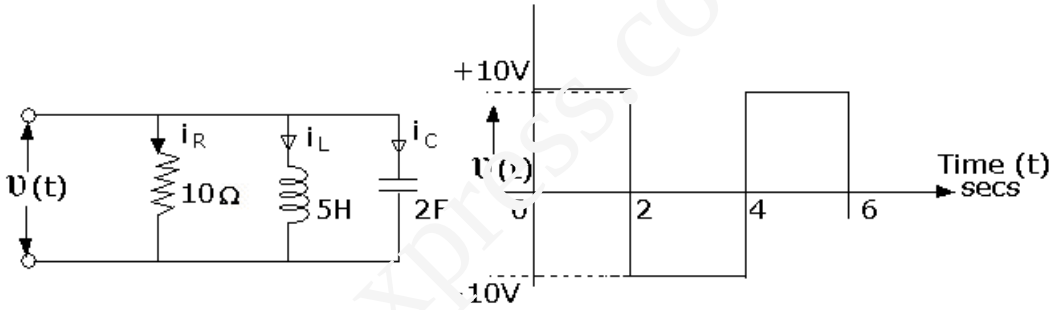

Figure 1b

2. (a) Obtain the Equivalent 'T' for magnetically Coupled circuit shown in Figure 2a.

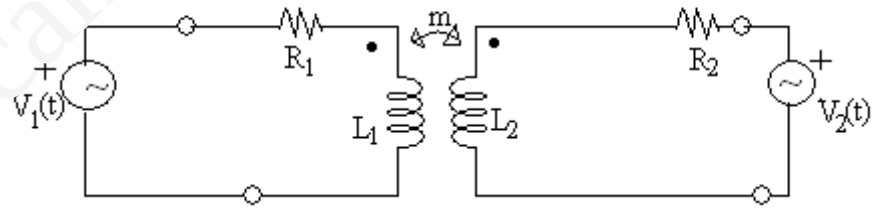

Figure 2a

   (b) A coil of 500 turns is wound uniformly over a wooden ring having a mean circumference of 50cms and a cross sectional area of 500mm^2.If the current through the coil is 3Amps, Calculate
      i. The magnetic field strength
      ii. the flux density and
      iii. the total flux.
   (c) Write down the Loop Equations for the network shown in Figure 2. [6+6+4]

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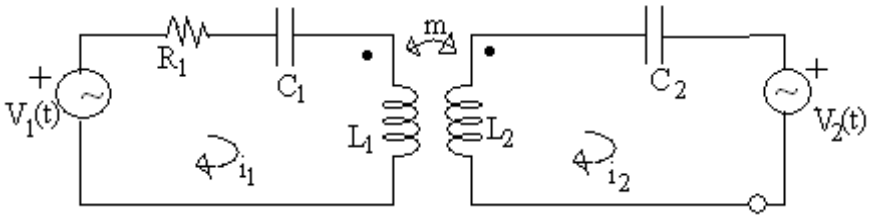

Figure 2

3. (a) For the current shown in Figure 3a, the switch 'S' is closed at t=0. Determine $i(0^+)$, $di/dt(0^+)$, $d^2i/\ dt^2(0^+)$

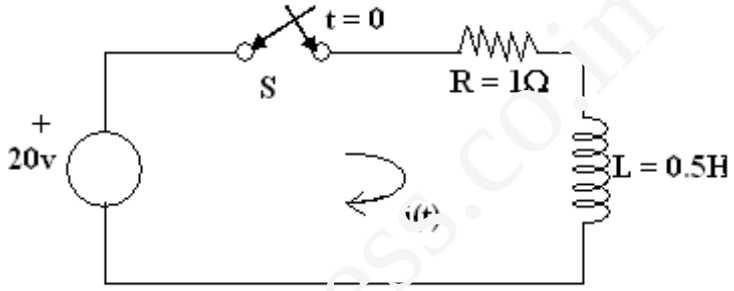

Figure 3a

(b) A Series R-L-C circuit with R=100, L=0.5H and C=40μF has an applied voltage of 50v with variable frequency. Calculate

i. Resonance frequency
ii. Current at resonance
iii. Voltage across R, L and C
iv. Upper and Lower half frequencies
v. Band width
vi. Q-factor of the circuit

(c) In an A.C circuit, Explain what you understand by Real power, Reactive power, apparent power. What is relation between above quantities. [5+8+3]

4. (a) The switch in the circuit (Figure 4a) shown is closed at t=0.The excitation $V(t)=0.1\ e^{-3t}u(t)$. Assuming relaxed conditions, for the circuit, determine i(t) for t >0 Use LaplaceTransform method.

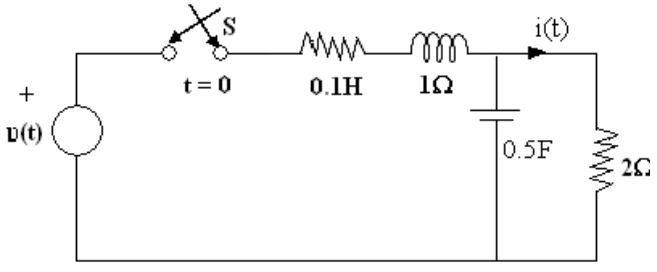

Figure 4a

(b) Find the RMS and Average values of the wave form it V_m =100Volts.(Figure 4) [8+8]

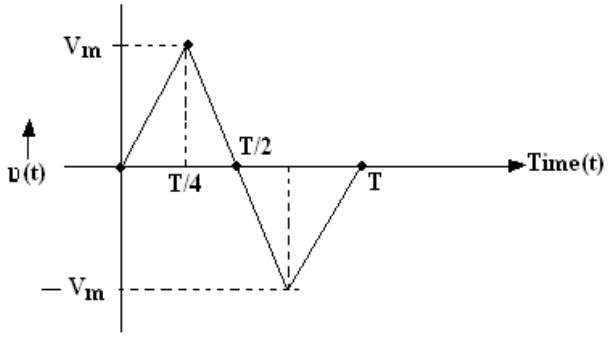

Figure 4

5. (a) Explain reciprocity theorem. What is its importance with reference to a two-port network.

   (b) Verify reciprocity theorem as applied to the network shown in Figure 5. [6+10]

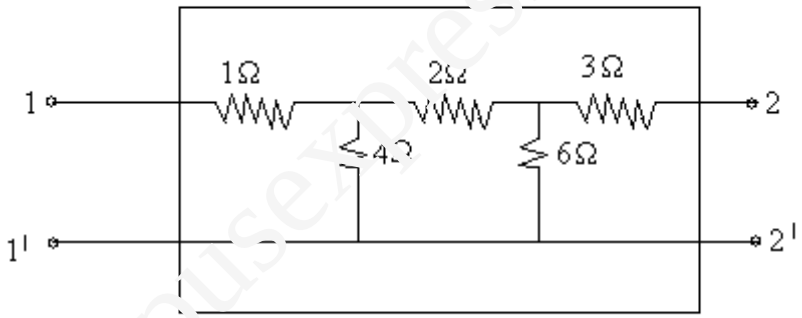

Figure 5

6. (a) What are the necessary conditions for transfer functions.

   (b) Calculate the y-parameters for the network shown in Figure 6. [6+10]

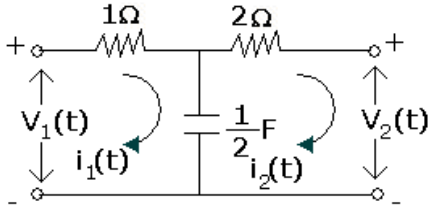

Figure 6

7. (a) An attenuator is composed of symmetrical T-section having series arm each of 175Ω and shunt arm of 350Ω. Derive expression for and calculate the characteristic impedance of this network and attenuation per section.

   (b) Design an unbalanced asymmetrical Π-attenuator with loss of 40 dB to operate between 200Ω line and 800Ω line. [8+8]

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8. What is high pass filter? In what respects it is different from a low pass filter? Derive the equation to find the inductances and capacitances of a constant k high pass filter? [16]

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Code No: R05010401 **Set No. 2**

I B.Tech Regular Examinations, Apr/May 2007
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Time: 3 hours **Max Marks: 80**

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⋆ ⋆ ⋆ ⋆ ⋆

1. (a) For the given network (Figure 1a) graph, Construct the Basic cutest incidence matrix , tracking elements 1,6,8,3 as tree branches. Express the link branch Voltage in terms of tree branch voltages.

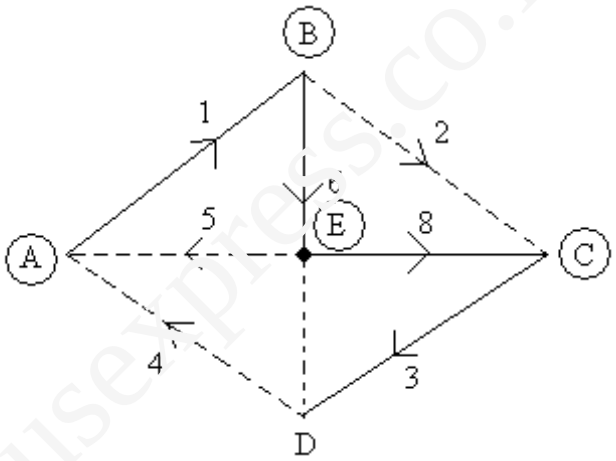

Figure 1a

(b) Using source Transformation, reduce the network between A & B into an equivalent voltage source. (Figure 1b)

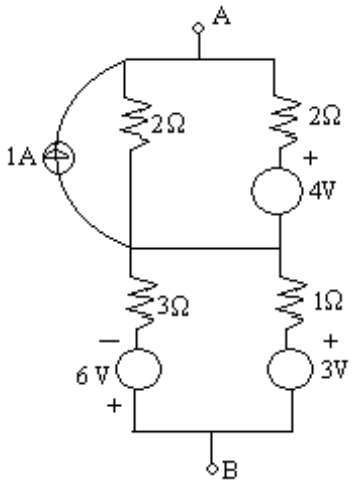

Figure 1b

(c) What is Duality ? Explain the procedure for drawing the dual of given network with an example. [6+6+4]

Code No: R05010401 **Set No. 2**

2. (a) Explain the Dot Convention and mark the dotted ends for the arrangement of coils shown in Figure 2a.

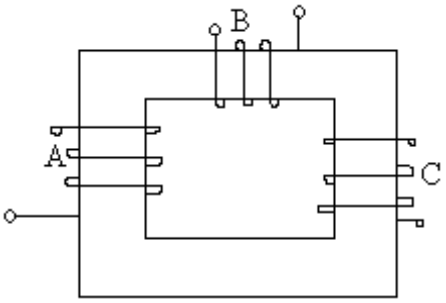

Figure 2a

(b) In the circuit shown in Figure 2b, find the voltage across the terminals A & B if the current changes at the rate of 100 A /sec. The values of L_1, L_2 and M are 1H,2H,and 0.5H respectively.

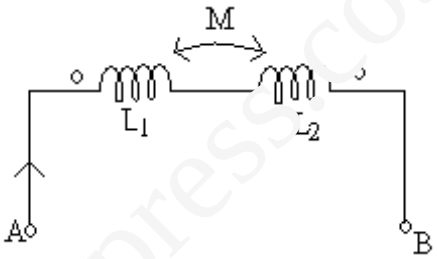

Figure 2b

(c) An Iron ring has a mean diameter of 25cms and a area of c.s. of 5 $cm^2$and is wound with a coil of 1000 turns. Determine the current in the coil to establish a flux density of 0.8wb/m^2in the ring. Take the relative permeability of iron as 500. In case if an iron gap of 2mm is cut in the ring, what is the current in the coil to establish the same flux density. [5+5+6]

3. (a) Derive the expression for the current i(t) in a series R-L circuit When the switch s is suddenly transferred from position 1 to position 2 at t=0, Also determine the expressions for $V_R(t)$ and $V_L(t)$. (Figure 3a)

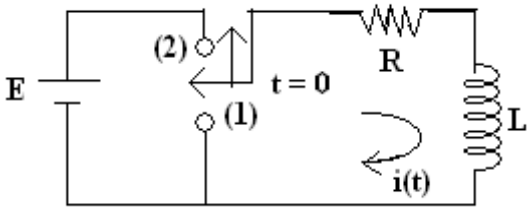

Figure 3a

(b) A two element series circuit is connected across an A.c source given by $V=200\sqrt{2}\sin(314t+20^0)$. The current in the circuit is found to be $i=10\sqrt{2}\cos(314t-25^0)$. Determine the parameters of the circuit . Also Determine the power factor, Real power and Reaction power taken by the circuit.

(c) Derive the expression for "Band Width" in a series R-L-C circuit. [6+6+4]

4. (a) Define RMS value, Average and form factor for a periodic quantity. Find the RMS values of

i. V(t)=25Coswt+15Sinwt and

ii. I(t)=100Sinwt-10Cos2wt

(b) In the Network shown in the Figure 4b the switch is closed at t=0 and there is no initial charge on either of the Capacitors. Find the current I(t) by Laplace Transform method. [6+10]

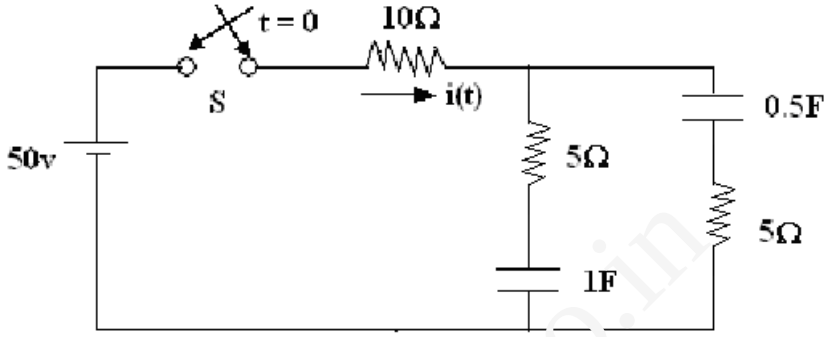

Figure 4b

5. (a) Determine the current through 1 Ω resistor for the circuit shown in Figure 5a by using Thevenin's theorem.

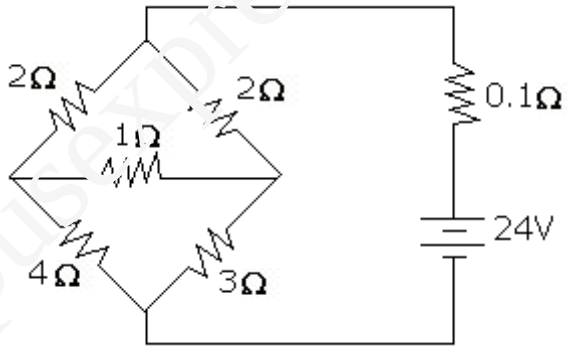

Figure 5a

(b) Determine the current in Resistor 4 Ω using superposition theorem as shown in Figure 5b. [8+8]

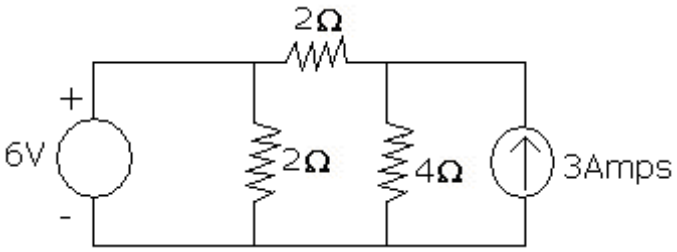

Figure 5b

6. (a) Why Z-parameters are known as open circuit parameters?

(b) What is meant by port? Explain two port network?

(c) Find the y-parameters for the network shown in Figure 6. [3+3+10]

Code No: R05010401 **Set No. 2**

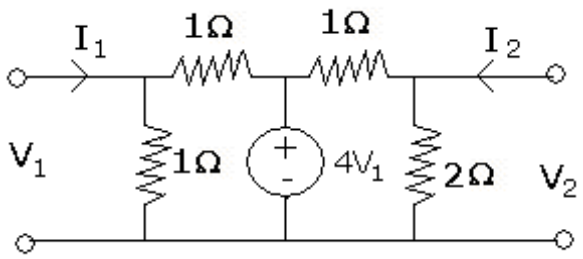

Figure 6

7. (a) Draw the circuit of an asymmetrical L-attenuator working between two equal impedances with a given loss. Derive the design equations for the circuit elements in terms of
   i. the iterative resistance R_i, and
   ii. the current ratio N.

   (b) Design an asymmetrical L-attenuator to operate into a resistance of 300Ω and to provide attenuation of 30 DB. [10+6]

8. (a) Explain m derived low pass T-section and Π section and in detail.

   (b) What is filter? Explain various types of filters? [10+6]

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Code No: R05010401 **Set No. 3**

I B.Tech Regular Examinations, Apr/May 2007
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1. (a) Distinguish between
   i. Active and Passive elements
   ii. Independent and dependent sources
   (b) Find I_1 ,I_2 and V in the network shown in Figure 1b Using nodal analysis.

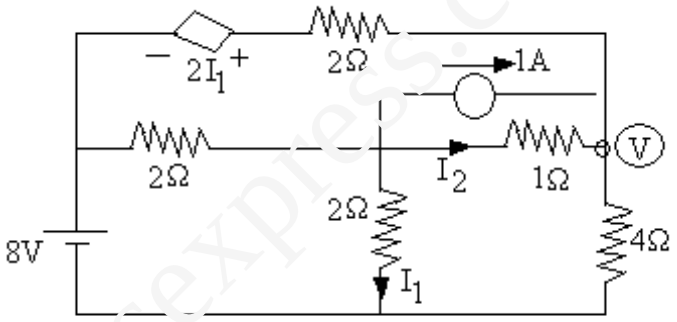

Figure 1b

   (c) Obtain the basic cutset matrix for the network graph shown in Figure 1 and hence write down the network equations,Take 1,2,3 as Tree branches. [4+8+4]

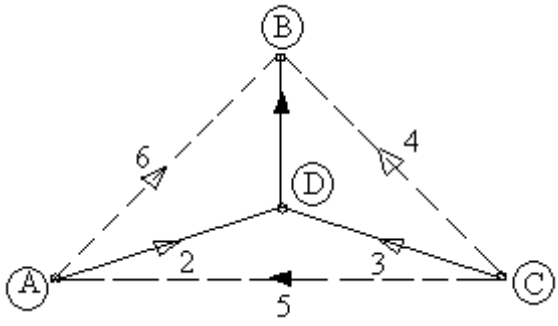

Figure 1

2. (a) Obtain expression for reflected impedance for the coupled circuit shown in Figure 2a.

Code No: R05010401 **Set No. 3**

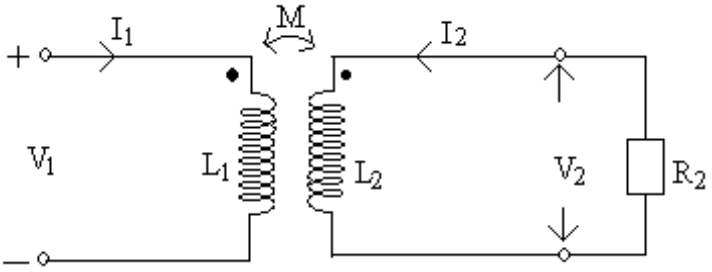

Figure 2a

(b) Obtain the dotted Equivalent of the coupled network, and write down the loop Equation. (Figure 2b)

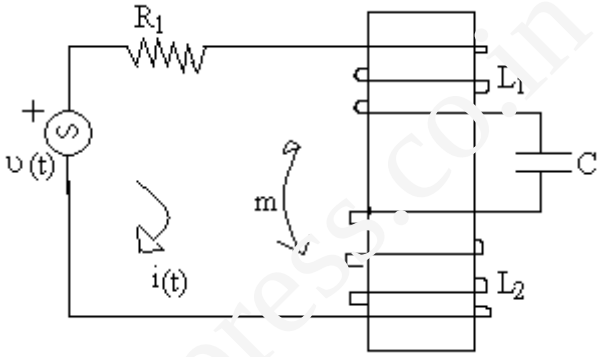

Figure 2b

(c) Define magneto motive force, Magnetic flux density, Magnetizing force and reluctance in a magnetic circuit. [6+6+4]

3. (a) A series R-L-C circuit has a resistance of 8Ω and resonates at 250Hz. Bandwidth of the circuit is 50Hz. Determine the values of L and C in the circuit.

(b) A sinusoidal voltage 25sin 10t is applied at Time t=0 to a series R-L circuit having R=5Ω and L=1H Find i(t) and sketch it .Assume Zero current through the inductor before applying the voltage. [6+10]

4. (a) Define RMS value, Average and form factor for a periodic quantity. Find the RMS values of

   i. V(t)=25Coswt+15Sinwt and

   ii. I(t)=100Sinwt-10Cos2wt

(b) In the Network shown in the Figure 4b the switch is closed at t=0 and there is no initial charge on either of the Capacitors. Find the current I(t) by Laplace Transform method. [6+10]

Code No: R05010401 **Set No. 3**

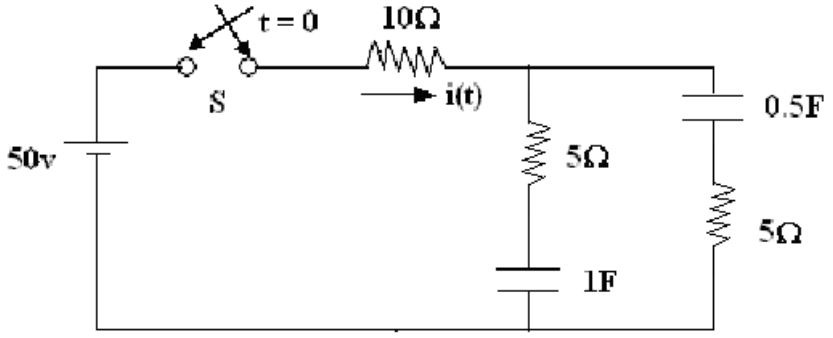

Figure 4b

5. (a) Find the dual of the network shown in Figure 5a.

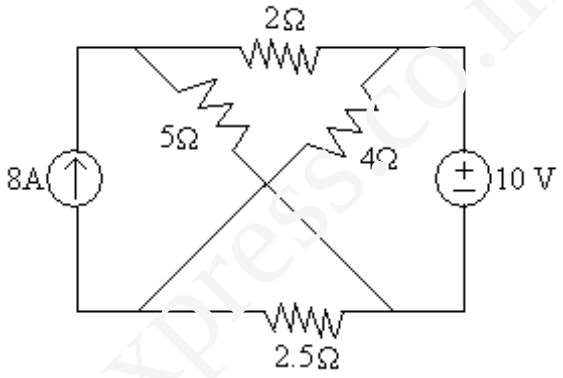

Figure 5a

(b) By applying Millman's theorem, find the current in resistor R_3 in Figure 5b.

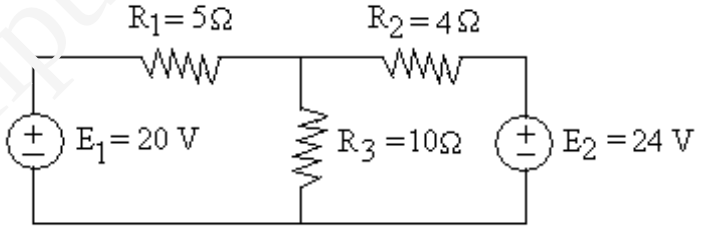

Figure 5b

(c) Determine the value of R_L in the circuit shown in Figure 5c for max. power transfer. [6+6+4]

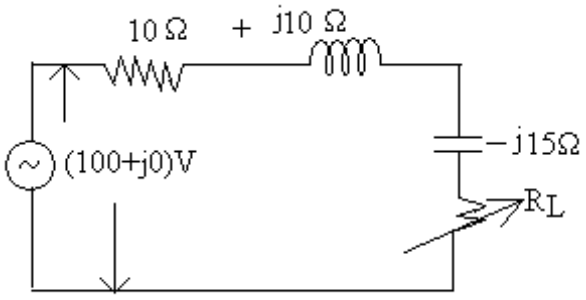

Figure 5c

Code No: R05010401 **Set No. 3**

6. (a) A typical two-port network is characterized by the equation $2V_1+4I_2=I_1$ and $V_2+6V_1=8I_2$. Determine the values of
   i. y_{11}
   ii. z_{21} and
   iii. h_{21}

   (b) Obtain the input and output impedances of an amplifier having $h_{11}=2\Omega$; $h_{12}=1\Omega$; $h_{21}=5$ and $h_{22}=2\Omega$, if it is driven by a source having an internal resistance of 4Ω and is terminated through a load which draws maximum power from the amplifier. [6+10]

7. (a) Show that the propagation constant for Π network is $\gamma_A = \cosh^{-1}\left[1+\frac{z_1}{2z_2}\right]$

   (b) Write short note on iterative and image impedances in symmetrical networks. [8+8]

8. What is composite filter? Draw its circuit diagram? Give a general procedure for its design? [16]

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Code No: R05010401 **Set No. 4**

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1. (a) State and Explain the Volt-Ampere relation Ships for R,L and C Parameters.
   (b) Draw the Wave forms for i_R, i_L, i_c for the Circuit show in figure. When it is excited by a Voltage source having a Waveform shown in Figure 1b. [6+10]

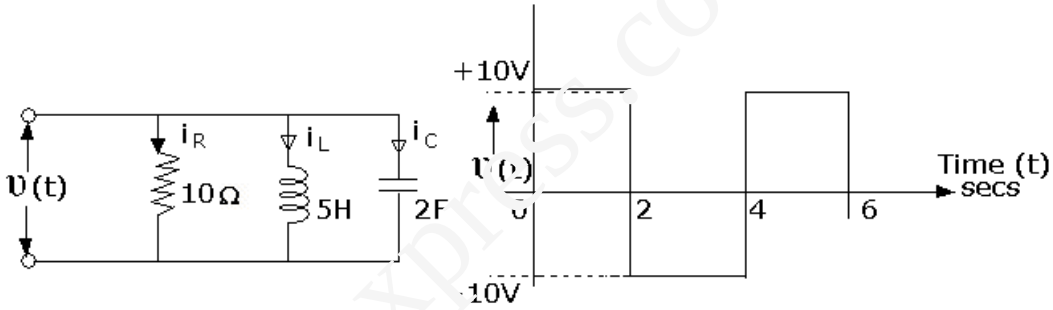

Figure 1b

2. (a) Obtain expression for reflected impedance for the coupled circuit shown in Figure 2a.

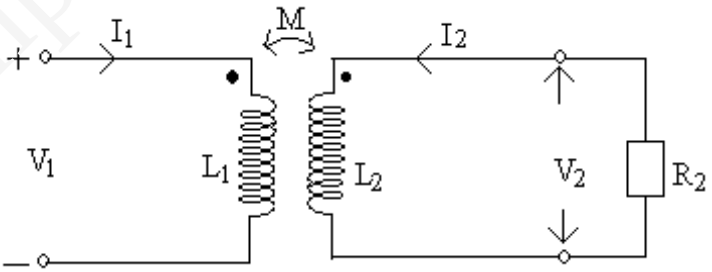

Figure 2a

   (b) Obtain the dotted Equivalent of the coupled network, and write down the loop Equation. (Figure 2b)

Code No: R05010401 **Set No. 4**

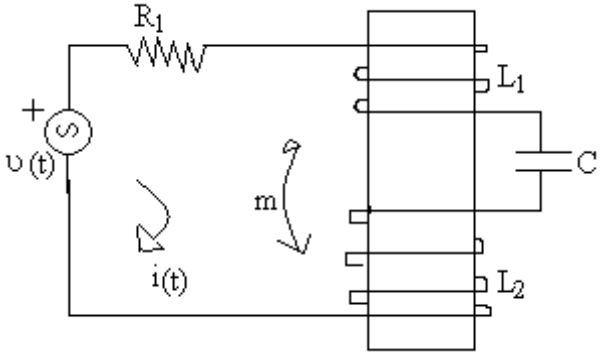

Figure 2b

(c) Define magneto motive force, Magnetic flux density, Magnetizing force and reluctance in a magnetic circuit. [6+6+4]

3. (a) The switch in the current (Figure 3a) shown is closed on position 1 at t=0 and then moved to 2 after one time constant T=250μsec obtain the current i(t) for t>0 and draw the response i(t).

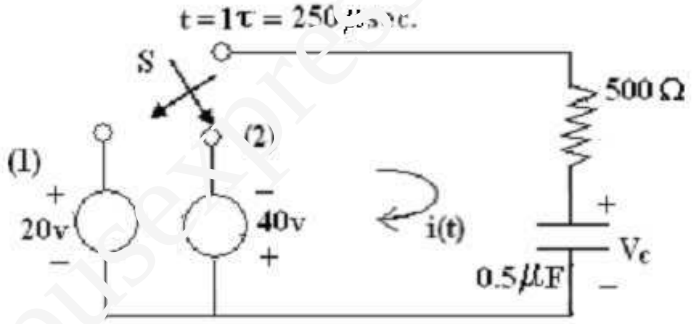

Figure 3a

(b) Two circuits having the same numerical ohmic impedance value are joined in parallel. The power factor of one circuit is 0.8 and the other is 0.6, Both lagging . Calculate the power factor of the combination.

(c) Prove that average power in A.C circuit is equal to VIcosØ and explain the significance of cos Ø in the expression. [8+4+4]

4. (a) Determine $V_C(t)$ and $i_L(t)$ in the circuit shown in the Figure 4a. Assume Zero initial conditions. Use Laplace Transform method.

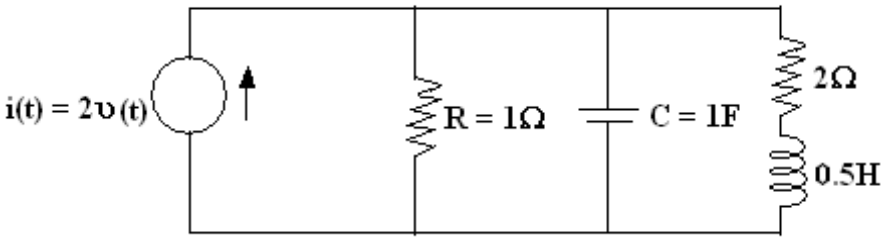

Figure 4a

(b) Obtain the S-Domain Equivalent for the following elements

i. Resistance R
ii. Inductance with initial current-I_0
iii. Capacitors
iv. Capacitors with initial Voltage V_0 give the relevant equations. [8+8]

5. (a) State and explain reciprocity theorem.
   (b) Calculate the current i_y in the network of Figure 5b using superposition theorem. [6+10]

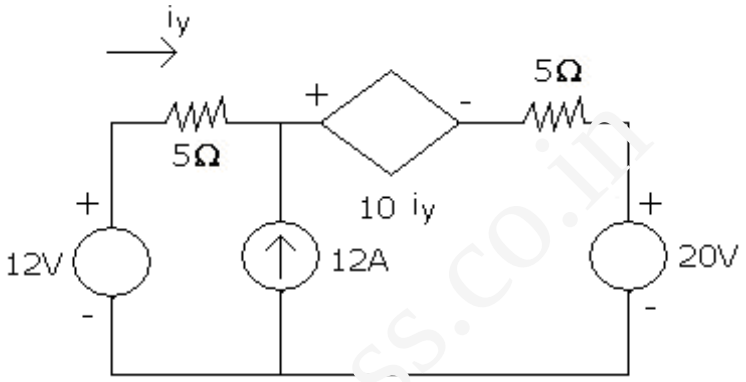

Figure 5b

6. (a) What do you understand by poles and zeros of a network function?
   (b) Discuss the restriction on location of poles and zeros of a driving point function?
   (c) Plot the poles and zeros of the network function given by
   $$F(s) = \frac{s(s^2+2)}{(s+3)(s^2+4s+5)}$$ [5+6+5]

7. (a) Draw the circuits of symmetrical lattice attenuator. Derive the design equations for the circuit resistances in terms of
   i. the characteristic impedance R_0 and
   ii. the current ration N.
   (b) Design a symmetrical lattice attenuator to have attenuation of 20 DB and characteristic impedance of 500 Ω. What will be its equivalent T-structure. [10+6]

8. (a) Explain m derived low pass T-section and Π section and in detail.
   (b) What is filter? Explain various types of filters? [10+6]

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