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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Distinguish between
   i. Active and Passive elements
   ii. Linear and Non Linear elements and
   iii. Unilateral and Bilateral elements.

   (b) Determine the Currents through the resistances in the following network (Figure 1b) using source Transformation.

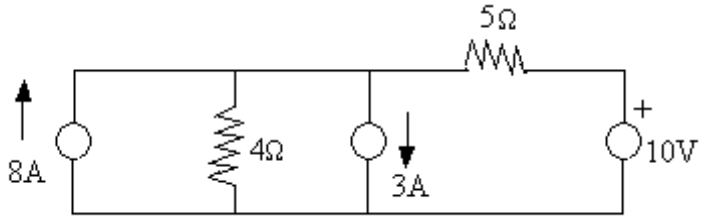

Figure 1b

   (c) Draw the dual of the network shown in Figure 1c, explaining the procedure for obtaining the dual of a given planar network. [6+5+5]

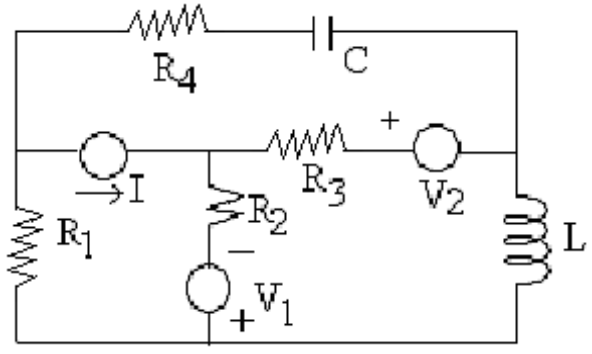

Figure 1c

2. (a) A Transformer has 100 turns on the primary and 200 turns on the secondary .A current in the primary causes a flux which links all turns of both the primary and secondary .The flux decreases according to the law $\phi = e^{-t}$ Webers for all t $\geq$0.Find
   i. the flux linkages of the primary and secondary
   ii. the voltage induced in the secondary

iii. If the coefficient of the coupling is 0.95 , What happens to the voltage induced in the secondary.

(b) Write down the Loop Equations for the coupled network shown in Figure 2b.

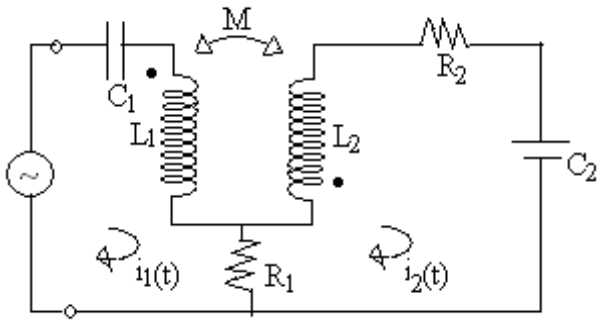

Figure 2b

(c) Calculate the MMF required to produce a flux of 0.01 wbs across an air gap of 2mm length having an effective area of 200cm^2 in a magnetic circuit.[6+6+4]

3. (a) Show that in a series R-L-C circuit, the resonant frequency is the geometric mean of half power frequencies.

(b) The voltage applied to a circuit and the current drawn are V= (200 – j100)V and I= (60 + j40) A respectively. Determine the circuit parameters and power dissipated.

(c) Derive the expression for i(t) when the switch S is suddenly Closed at t=0 in the circuit shown in Figure 3c. Sketch the variation of i(t) with Respect to time. [6+6+4]

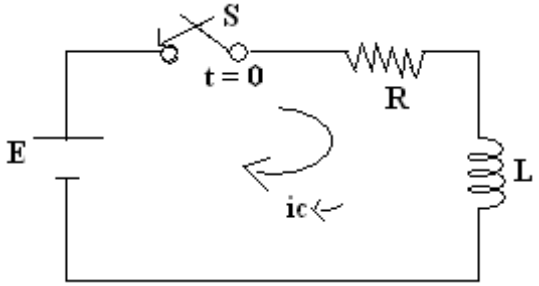

Figure 3c

4. (a) Determine the current i(t) in a series R-L-C circuit consisting of R=5Ω, L=1/2H and C=1/4F When the applied voltage $V_i(t)$ is a ramp voltage 12r(t-2). Assume that the circuit is initially relaxed. Use Laplace Transform method. (Figure 4a)

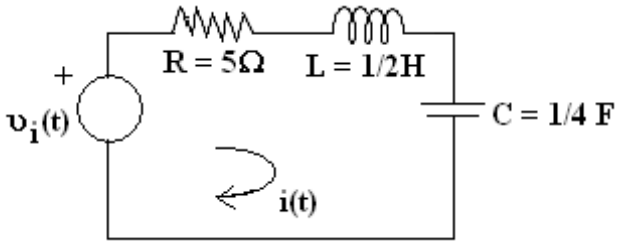

Figure 4a

(b) Determine the RMS value, Average value and form factor of a periodic function shown in Figure 4b. [8+8]

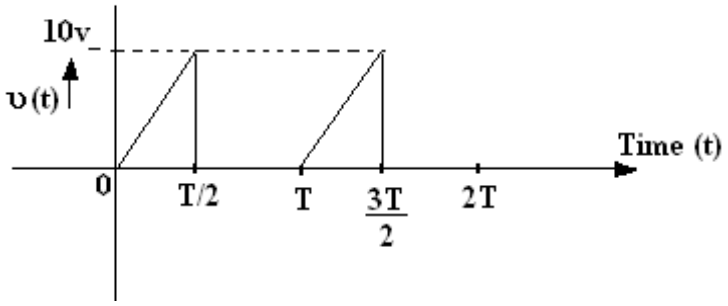

Figure 4b

5. (a) State and explain reciprocity theorem.

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

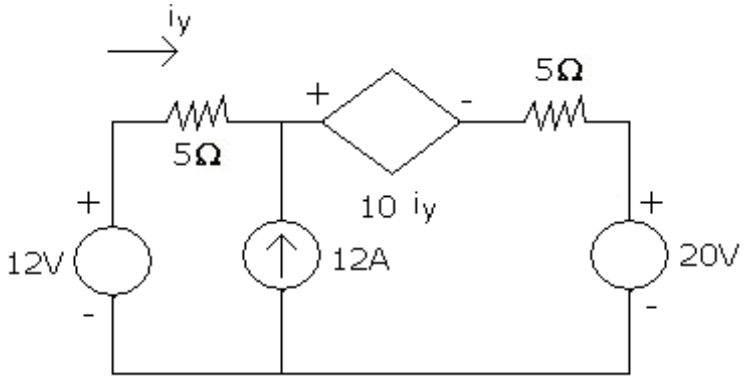

Figure 5b

6. (a) Define
   i. reciprocal network, and
   ii. symmetrical network.

(b) What is the condition for a given network to be reciprocal as well as symmetrical network in terms of ABCD parameters?

(c) Obtain h-parameters of the network shown in Figure 6. [4+4+8]

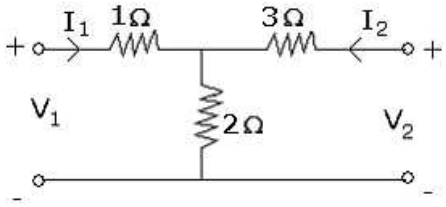

Figure 6

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]

8. What is a half section? What is its main characteristic? Why it is used? Derive expression for impedances as seen from the two ports of an m-derived half section. [16]

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Distinguish between
   i. ideal and practical sources and
   ii. Dependent and independent sources.
   (b) The current in a 15 mH inductor can be expressed as i(t)=[2-e^{-1000t}]mA. Find
   i. Voltage across the inductor and
   ii. Instantaneous Power.
   (c) In the network shown in Figure 1, determine the value of i. [4+4+8]

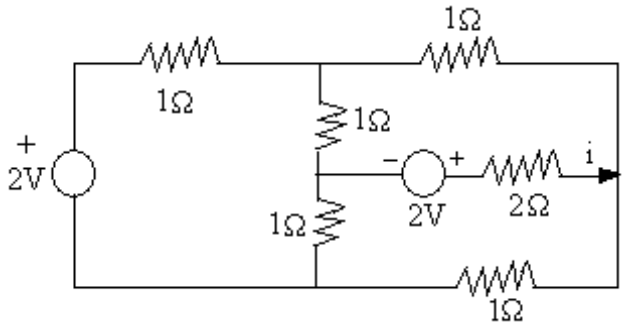

Figure 1

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

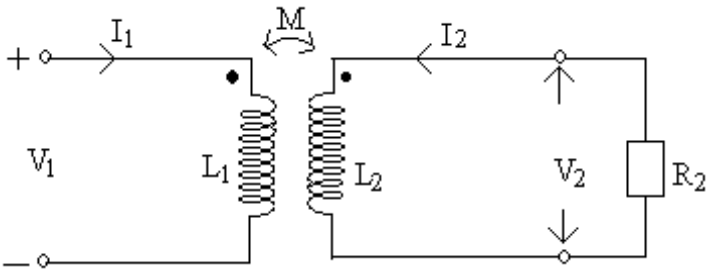

Figure 2a

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

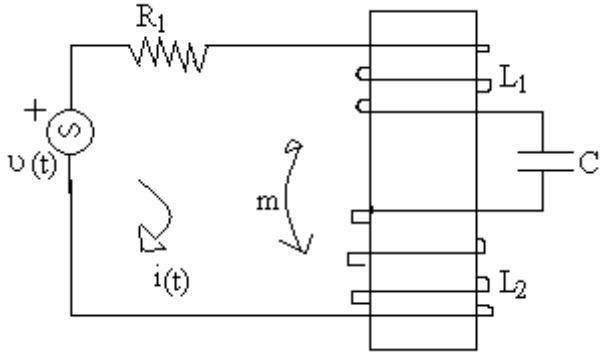

Figure 2b

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

3. (a) Obtain the expression for i(t) when the switch 's' is closed at t=0. Discuss the three cases of over damped, under damped and critically damped conditions. Sketch the current variation in each case.(Figure 3a)

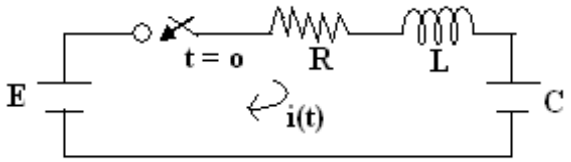

Figure 3a

(b) Represent the voltages V_1, V_2, V_3as phasors and determine the voltage V= V_1+ V_2+V_3.
Given $V_1=3\underline{|0^0}$, $V_2=5\underline{|30^0}$, $V_3=6\underline{|-120^0}$. [12+4]

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.

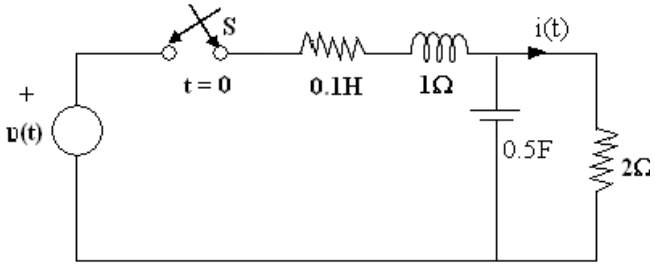

Figure 4a

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

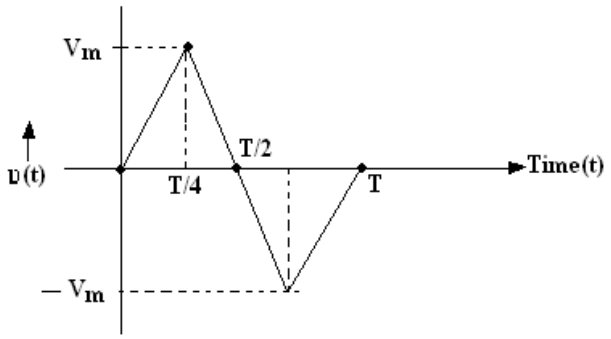

Figure 4

5. (a) Draw the dual network of the following ckt shown in Figure 5a.

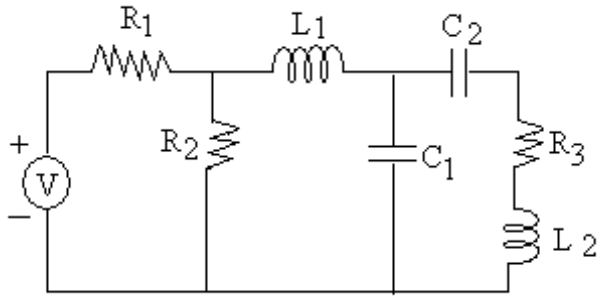

Figure 5a

(b) Explain, what are the dual quantities?

(c) Draw the phasor diagram of R, L, C elements connected parallel across a sinusoidal voltage source? [6+4+6]

6. (a) Write the standard Y-parameter equations. Obtain the Y-parameters in terms of z-parameters.

(b) Obtain z-parameters for the circuit shown in Figure 6b and there by obtain ABCD parameters. [6+10]

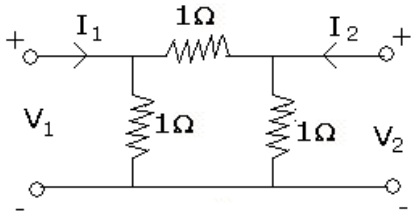

Figure 6b

7. (a) Draw the circuit of asymmetrical T-attenuator. Write the design equation for the circuit resistances in terms of

   i. the image resistances and

   ii. the image transfer constant θ.

(b) Design an asymmetrical T-attenuator to produce attenuation of 20 DB and to work between source impedance of 400Ω and load impedance of 900Ω. [10+6]

8. (a) State and explain the properties of LC networks.

(b) Classify the filters according to their

i. frequency characteristic and

ii. depending upon the relation between series impedance and shunt impedance. [6+10]

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

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]

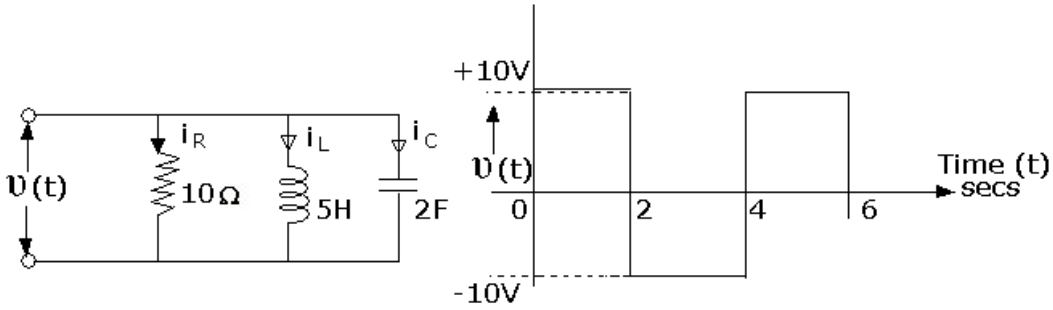

Figure 1b

2. (a) Define magneto motive force, Magnetic flux, and Reluctance of a magnetic circuit. Specify the unit for the above quantities, state the Relationship between the above quantities.
   (b) Write down the Voltage equation for the following Figure 2b, and determine the effective inductance.

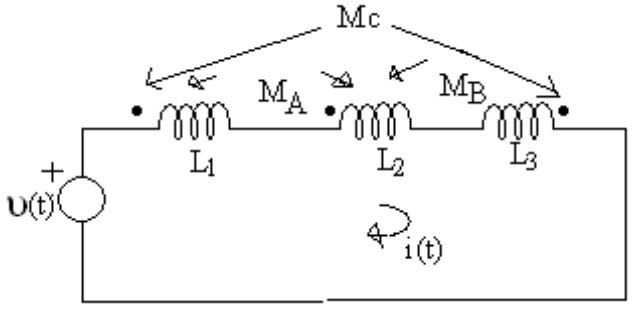

Figure 2b

   (c) Two identical coils connected in series gave an inductance of 800mH,and when one of the coils is reversed gave an inductance of 400mH.Determine self-inductance mutual inductance between the coils and the coefficient of coupling.

[5+6+5]

3. (a) Find i(t) for t>=0, When the switch is moved from position 1 to position 2 in the circuit (Figure 3a) shown at t=0. The switch was in position 1 for a long time. Sketch the variation of i(t).

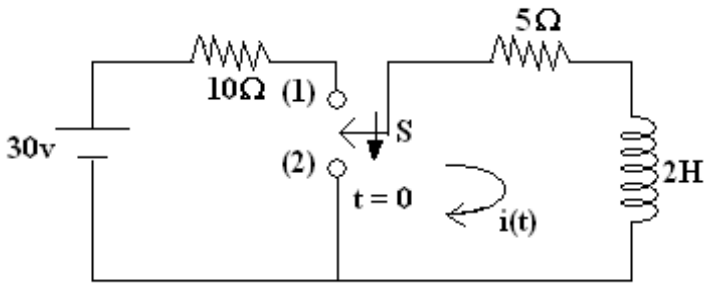

Figure 3a

(b) Obtain the Expression for frequency at which maximum voltage occurs across the capacitance in a series resonant circuit.

(c) Find the branch currents, total current and total power in the circuit (Figure 3) shown. Draw the phasor diagram. [6+4+6]

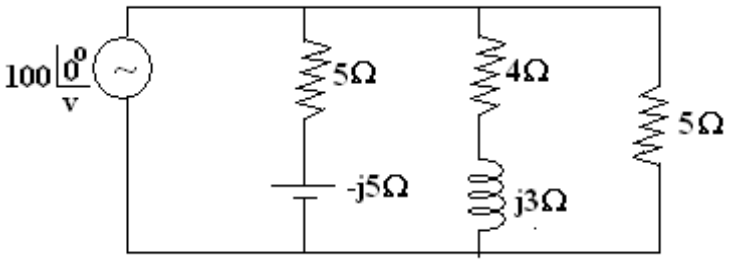

Figure 3

4. (a) A series R-L-C circuit with R=5Ω L=0.2H, and C=1F has a Voltage source V=10 e^{-100t}Volts applied at t=0.Find the current through the circuit using Laplace Transform method.

(b) Calculate the RMS value, Average value and form factor the Voltage wave form shown in Figure 4b. [8+8]

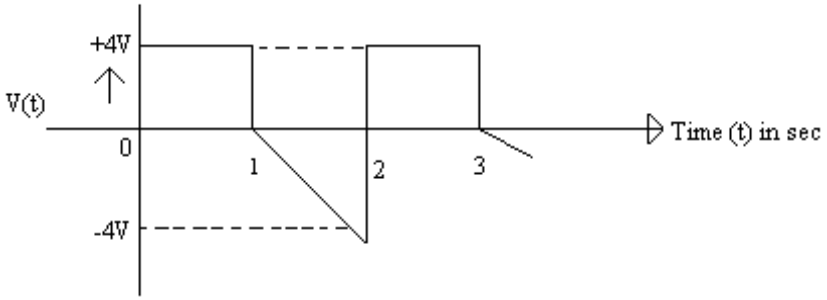

Figure 4b

5. (a) State and explain Max. Power transfer theorem which a circuit is excited by a.c. source.

(b) Find the load impedance for max. power transfer in the network of Figure 5?

If the load is purely resistive, what will be its value for max. power transfer? Also, find the max. power taken by the load in both cases. [6+10]

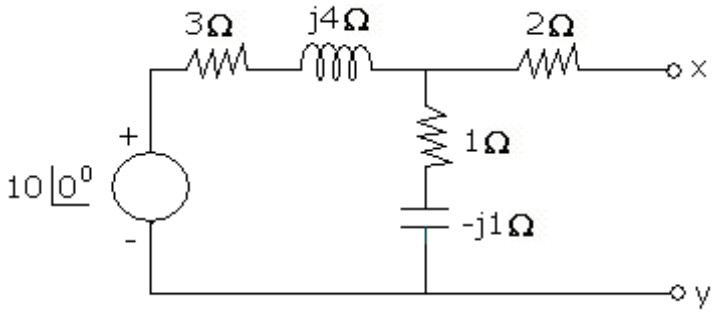

Figure 5

6. (a) Explain
   i. characteristic impedance and
   ii. image impedance.
   (b) Find the image impedance of a symmetrical lattice two port network shown in Figure 6b.

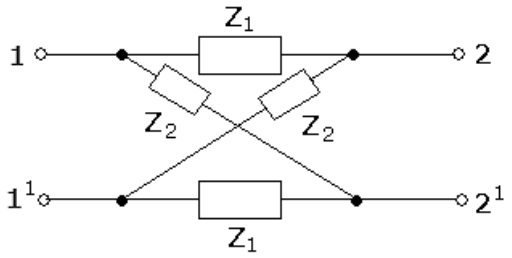

Figure 6b

   (c) What is the significance of poles and zeros in network functions? [6+6+4]

7. Derive the expressions for attenuation constant, phase constant, cut-off frequency and characteristic impedance of a symmetrical Π section. [16]

8. Draw the circuit diagram of a Band pass filter? Explain the design procedure of the above filter in detail? [16]

⋆ ⋆ ⋆ ⋆ ⋆

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

I B.Tech Supplimentary Examinations, Aug/Sep 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

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Distinguish between
   i. Active and Passive elements,
   ii. Unilateral and Bilateral elements
   iii. Linear and Non Linear elements.

   Give examples for each type of element.

   (b) Using Loop method of Analysis, determine the current in 2 ohms resistors. (Figure 1b)

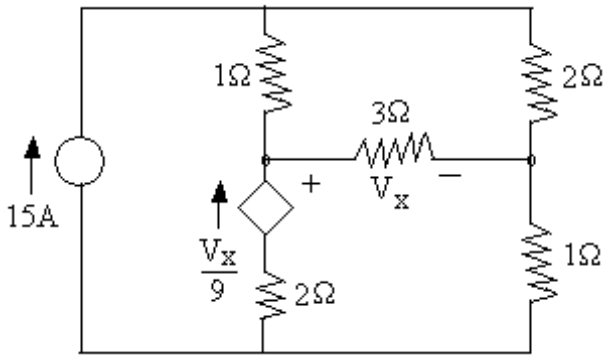

Figure 1b

(c) Explain the procedure for drawing the dual of a Planar work and draw the dual of network shown in Figure 1. [6+6+4]

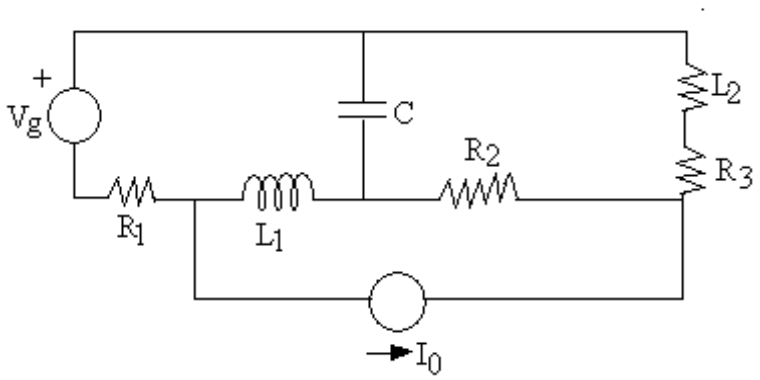

Figure 1

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

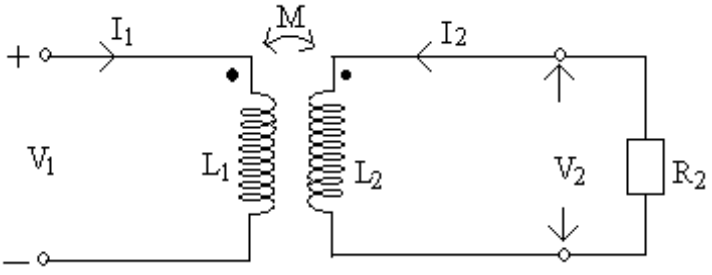

Figure 2a

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

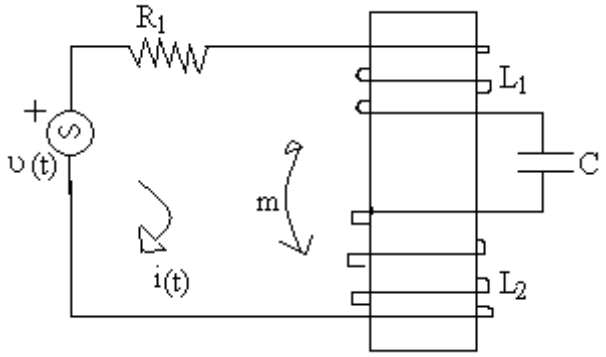

Figure 2b

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

3. (a) Define Q-factor. Derive an equation showing the relation between Q-factor and bandwidth. What is selectivity? How it is related to Q-factor.

(b) In the circuit (Figure 3b) shown, the switch is closed on the position 1 at t=0 there by applied a D.C voltage of 100V to series R-L circuit. At t=500μsec, the switch is moved to position 2 obtain the expression for current i(t) in the both intervals sketch i(t).

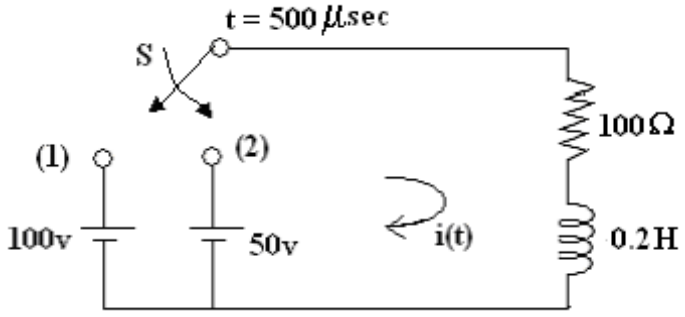

Figure 3b

(c) Obtain the branch currents and total current in the circuit (Figure 3) shown if applied voltage is $150\perp 45^0$V and draw the phasor diagram. [5+7+4]

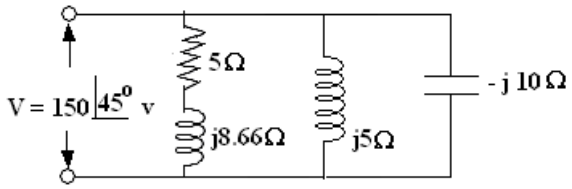

Figure 3

4. (a) Find the Laplace Transform of single pulse shown in Figure 4a.

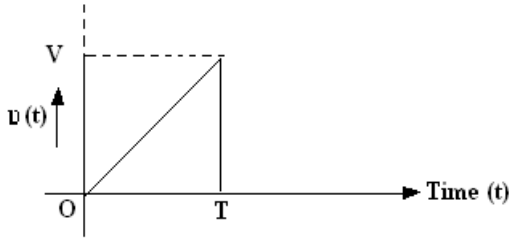

Figure 4a

(b) Define RMS value, Average value, Form factor of an alternating quantity. Also state the relationship between them.

(c) Find the RMS value of the voltage wave whose equation is v(t)=10+200 Sin(wt-30^o)+100Cos3wt-50 Sin(5wt+60^0). [8+4+4]

5. (a) Draw a phasor diagram for the circuit shown in Figure 5a indicating the terminal voltage V_1 and V_2 and the current I. Determine the value of current I, voltages V and V_2 and the circuit power factor.

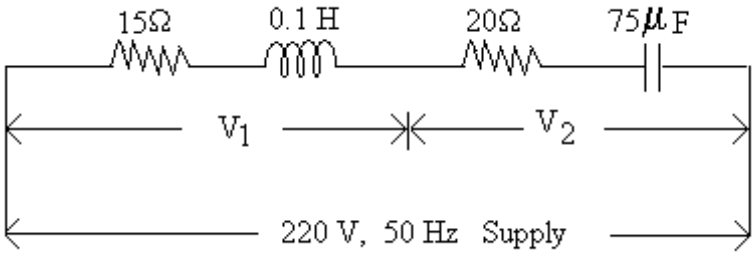

Figure 5a

(b) Explain the concept of duality between two electrical networks. Clearly distinguish between equivalent and dual networks. [10+6]

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]

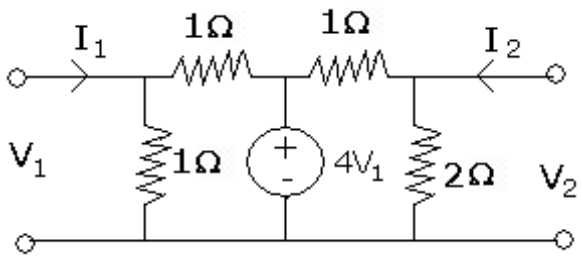

Figure 6

7. (a) Draw the circuit of asymmetrical T-attenuator. Write the design equation for the circuit resistances in terms of
   i. the image resistances and
   ii. the image transfer constant θ.
   (b) Design an asymmetrical T-attenuator to produce attenuation of 20 DB and to work between source impedance of 400Ω and load impedance of 900Ω. [10+6]

8. Draw the circuit diagram of a Band pass filter? Explain the design procedure of the above filter in detail? [16]

⋆ ⋆ ⋆ ⋆ ⋆