Subject Code: R13212/R13 **Set No - 1**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

ELECTRICAL CIRCUITS ANALYSIS-I

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(a) Give the volt-ampere relations of R, L, and C parameters.
(b) Define average value and r.m.s value.
(c) Define resonance and write its properties of R-L-C series resonant circuit.
(d) Write the analogy between electrical and magnetic circuits.
(e) Define tree, graph and co-tree.
(f) Write the statements of Thevenin's theorem and Nortan's theorem.

[3+4+4+4+3+4]

PART-B

2.(a) For the circuit shown in figure 2(a), use nodal analysis to determine voltage across 3Ω and 12 Ω resistance. Compute power absorbed by 6 Ω resistor.

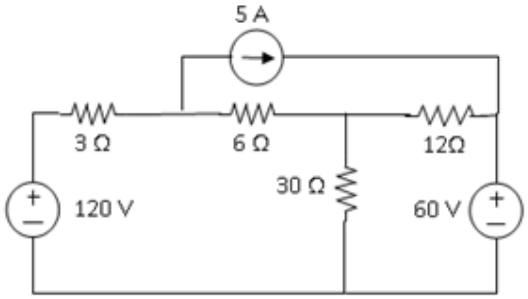

Figure 2(a)

(b) What is the magnitude of current drained from the 10V source in the circuit shown in figure 2(b) below?

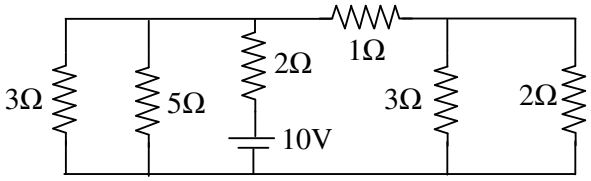

Figure 2(b)

[9+7]

3.(a) A current of 4 A flows through a non-inductive resistance in series, with a choking coil when supplied at 230 V, 50 Hz. If the voltage across the resistance is 100 V and across the coil is 180 V, draw the phasor diagram and calculate (i) impedance, reactance and resistance of the coil (ii) the power absorbed by the coil (iii) the total power.

3.(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.

[9+7]

4.(a) Derive the expression for bandwidth of series RLC circuit.

(b) Using the locus diagrams, determine the value of R_L for which the circuit shown in fig. 4 will be under resonance.

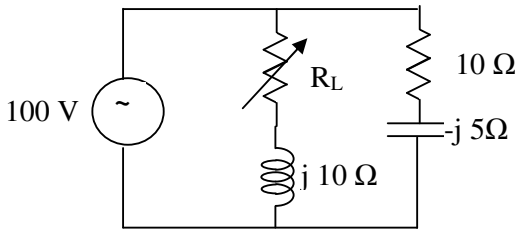

Fig. 4

[8+8]

5.(a) What are the Faraday's laws of electromagnetic Induction? Explain.

(b) For the network shown in below figure 5, find the voltage across load resistance R_L.

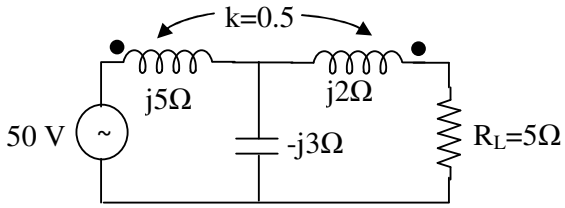

Figure 5

[7+9]

6.(a) For the given network shown in Figure 6(a), draw the oriented graph and choose one possible tree and construct basic cutest schedule. Write down the network equations from above matrix.

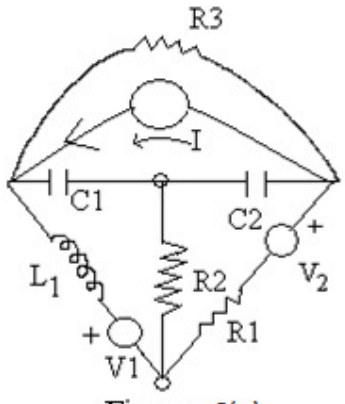

Figure. 6(a)

6.(b) Draw the dual of the network shown in below figure 6(b) and explain its procedure.

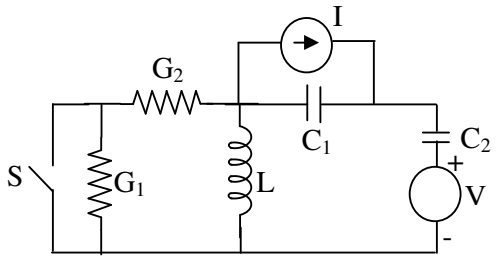

Figure 6(b)

[9+7]

7. Find the current through the capacitor of –j5Ω reactance as shown in figure 7 using superposition theorem.

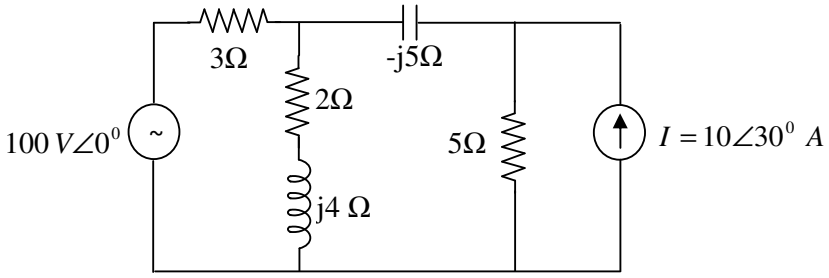

Figure 7

[16]

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Subject Code: R13212/R13 **Set No - 2**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

ELECTRICAL CIRCUITS ANALYSIS-I

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(a) Give the difference between dependent and independent sources.
(b) Give the expressions for average value, r.m.s value and form factor of a sinusoidal waveform.
(c) Draw the current locus diagrams of R-C series circuit with R variable as well as C variable.
(d) State Faraday's law of electromagnetic induction.
(e) Define cut-set matrix and write its properties.
(f) Write the statements of maximum power transfer theorem and reciprocity theorem.

[3+4+4+3+4+4]

PART-B

2.(a) Explain the source transformation techniques with suitable circuits.
(b) Calculate the mesh currents in the network shown in Figure 2(b).

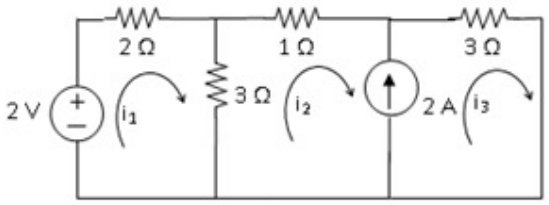

Figure 2(b)

[7+9]

3.(a) A series combination of R and C is in parallel with a 25 Ω resistor. A 50 Hz source results in a total current of 6.5 A, a current of 5 A through 25 Ω resistance and a current of 2.3 A in the RC branch. (i) Draw the phasor diagram of the circuit and find values of R and C (ii) Find apparent, active, reactive power and power factor of the circuit.
(b) Determine R.M.S and Average value of the waveform shown in Figure 3.

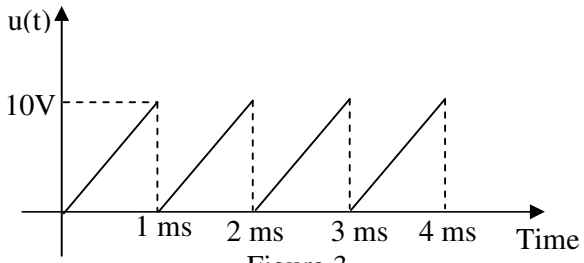

Figure 3

[8+8]

4.(a) In a series RLC network, R = 50 Ω and C = 20 μF, and L = 50 mH. Find the voltage across each element, when the voltage across the resistor is a maximum, given that the applied voltage is 100 V with a variable frequency.

(b) Obtain the current locus for the circuit of Figure 4, and find the value of R_C which results in a phase angle of 45° between V and I.

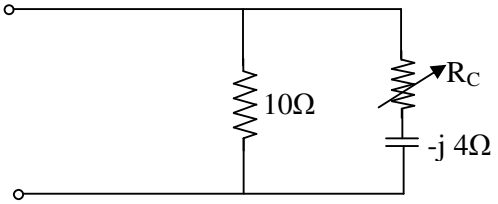

Figure 4

[8+8]

5.(a) Compare electric and magnetic circuits with respect to similarities and dissimilarities.

(b) For the circuit shown in figure 5, determine the currents i_1 and i_2 using loop method of analysis.

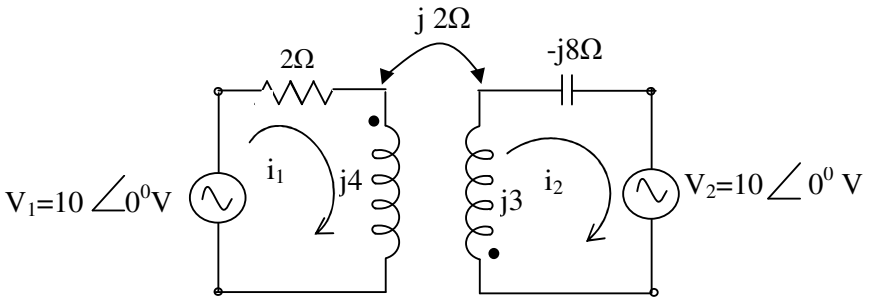

Figure 5

[7+9]

6.(a) For the given network shown in Figure 6, draw the graph and chose a possible tree. Construct the basic tie set schedule. Write the equation for the branch currents and interns of the link current and write separately the independent equations.

(b) Define: (i) Graph (ii) Path (iii) Connected graph.

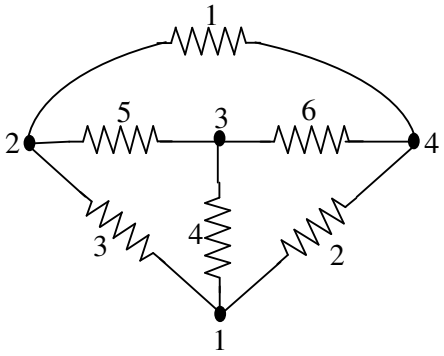

Figure 6

[12+4]

7.(a) Find voltage across 10Ω resistance in the network shown in Figure 7a, using the Thevenin's theorem.

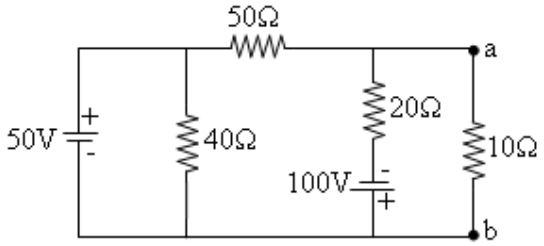

Figure 7a

(b) Find the current through 2Ω resistor in Figure 7b, using Millman's theorem.

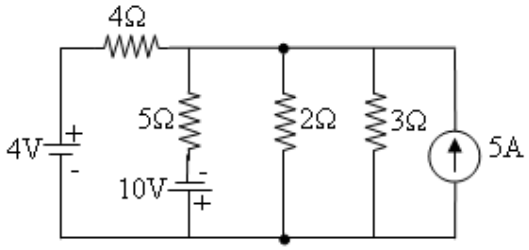

Figure 7b

[9+7]

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Subject Code: R13212/R13 **Set No - 3**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

ELECTRICAL CIRCUITS ANALYSIS-I

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(a) What is the use source transformation. Convert the voltage source to current source and vice-versa with an example.
(b) Define form factor and power factor.
(c) Define bandwidth and quality factor and write the relationship between them.
(d) Define flux, MMF and reluctance.
(e) What is duality? Write the rules to draw the dual of a network.
(f) Write the statements of Millman's theorem and superposition theorem.

[3+4+4+4+3+4]

PART-B

2.(a) State and explain Kirchhoff's laws with an example.
(b) Determine current 'i' in the network shown in figure 2(b) using nodal analysis.

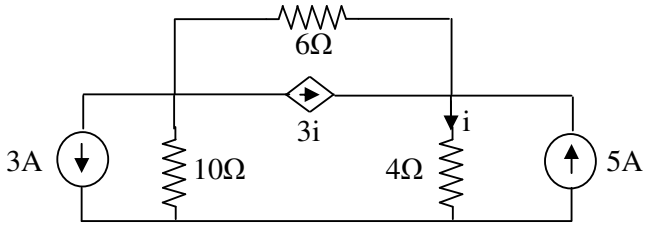

Figure 2(b)

[7+9]

3.(a) A Resistor of 100Ω in series with a capacitance of 50μF is connected to a supply of 200V, 50Hz. Find: (i) impedance (ii) current (iii) phase angle (iv) voltage across the resistor & capacitor.
(b) In a series RL circuit R= 5 ohms and L= 0.06H and the voltage across Resistor is V_R=15 sin200t. Find the current and total voltage across the circuit.

[8+8]

4.(a) A series R-L-C circuit consists of resistance R = 20Ω, inductance, L=0.01H and capacitance, C = 0.04 μF. Calculate the frequency at resonance. If a 10 Volts of frequency equal to the frequency of resonance is applied to this circuit, calculate the values of V_C and V_L across C and L respectively. Find the frequencies at which these voltages V_C and V_L are maximum?

4.(b) Find the resonant frequency for the circuit shown in Figure 4.

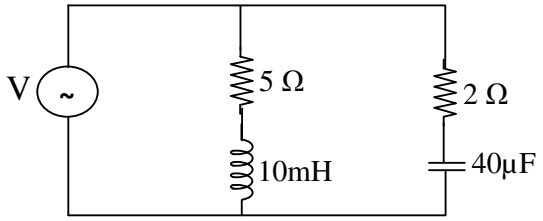

Figure 4

[8+8]

5.(a) Two coupled coils with L_1 = 0.01 H and L_2 = 0.04 H and k = 0.6 can be connected in four different ways such as series aiding, series opposing, parallel aiding and parallel opposing. Find equivalent inductance in each case.

(b) Explain the dot convention for mutually coupled coils.

(c) Derive the expression for coefficient of coupling between pair of magnetically coupled coils.

[6+4+6]

6.(a) Determine the basic cutest matrix for the oriented graph given in Figure 6(a) where the elements 1, 2, 3 are free branches.

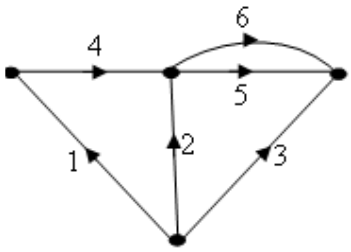

Figure 6(a)

(b) For the Network shown in Fig. 6(b), formulate its dual network.

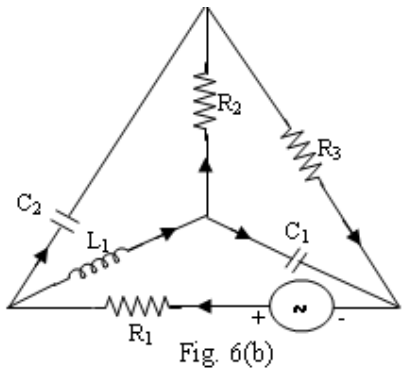

Fig. 6(b)

[8+8]

7.(a) Find V_L in the circuit shown in figure 7, using superposition theorem.

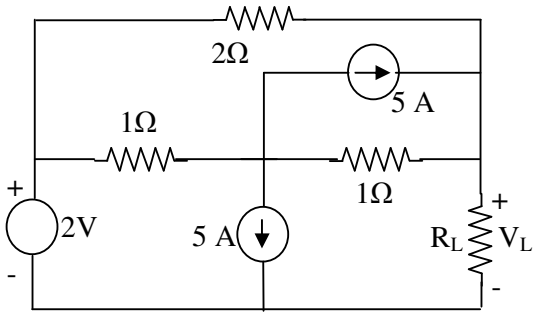

Figure 7

(b) State and explain compensation theorem.

[9+7]

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Subject Code: R13212/R13 **Set No - 4**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

ELECTRICAL CIRCUITS ANALYSIS-I

(Electrical and Electronics Engineering)

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Answering the question in **Part-A** is Compulsory,
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*****

PART-A

1.(a) State Kirchhoff's laws.
(b) Define phase and phase difference. What is the difference between these two?
(c) Draw the current locus diagrams of R-L series circuit with R variable as well as L variable.
(d) Define self-inductance, mutual inductance and co-efficient of coupling and write the relation between them.
(e) Define connected graph, oriented graph, and planar graph.
(f) Write the statements of superposition theorem and compensation theorem.

[3+4+4+4+3+4]

PART-B

2.(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 2(b) 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?

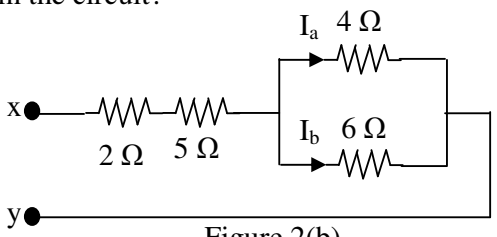

Figure 2(b) [7+9]

3.(a) A resistance and inductance are connected in series across a voltage given by $v(t) = 283 \sin \omega t$. The power drawn by the series combination is 400 W and the current has a maximum value of 4 A. Determine the circuit parameters and the power factor of the circuit.
(b) A periodic voltage waveform has been shown in the below figure 3. 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

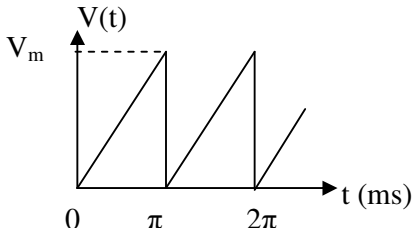

Figure 3

[8+8]

4.(a) A series RC circuit having variable R and C = 20μF is supplied from AC source having voltage V= $200\angle 0^{\circ}$ volt at ω = 2000 rad/sec. Draw current locus for sample values of R = 0, 5, 15, 25, 35, 50Ω.

(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.

[8+8]

5.(a) 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.

(b) Write the Loop Equations for the Coupled circuit shown in Figure.5.

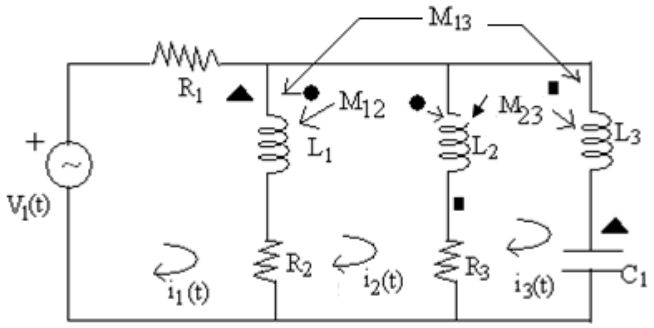

Figure. 5

[8+8]

6.(a) Explain the principles of duality? Write a graphical procedure to draw a dual network?

(b) Find the branch currents shown in below figure 6 by using the concept of the tie-set matrix.

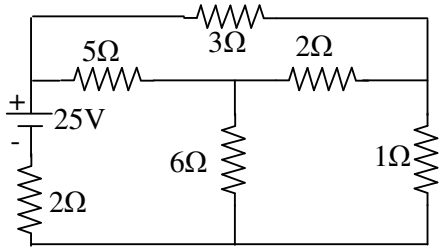

Figure 6

[8+8]

7.(a) Obtain Thevenin's equivalent circuit for the network shown in Figure 7a.

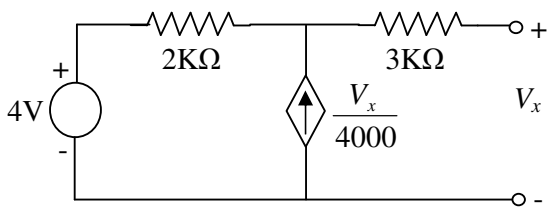

Figure 7a

(b) Find current through 1 Ω resistor using Millman's theorem for the circuit shown in fig. 7b.

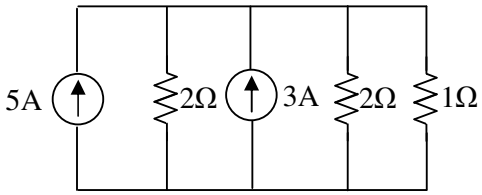

Figure 7b

[8+8]

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