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Code No: R21023 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, June - 2015
ELECTRICAL CIRCUIT ANALYSIS - I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1 a) Explain different types of elements that constitute an electric circuit. [7]

b) Explain the difference between linear and nonlinear resistance and explain different properties of voltage and current sources. [8]

2 a) Using nodal analysis find the power desipated in the 4 ohms resistor as shown in Figure 2. [10]

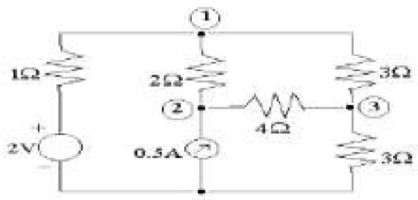


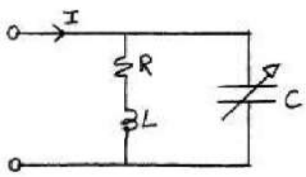
Figure 2

b) Obtain the relationship between star to delta and delta to star conversion. [5]

3 a) Explain the significance of real and reactive power and also complex power [7]

b) A voltage of 200 V is applied to a pure resistor (R), a pure capacitor, C and a lossy inductor coil, all of them connected in parallel. The total current is 2.4 A, while the component currents are 1.5, 2.0 and 1.2 A respectively. Find the total power factor and also the power factor of the coil. Draw the phasor diagram. [8]

4 a) Explain how the current locus can be obtained for the following circuit shown with neat diagram. [7]



b) Define Q factor and derive its value for (i) series resonance and (ii) parallel resonance. [8]

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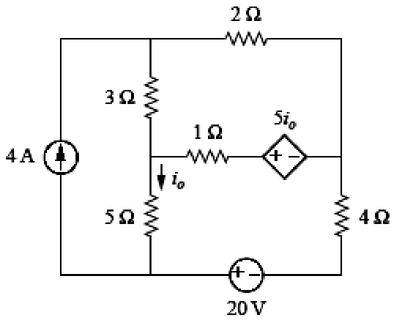
5 a) Explain the concept of self and mutual inductance. [7]

b) Explain "dot convention" for a set of magnetically coupled coils. [8]

6 Draw a suitable tree and dual network. Use general loop analysis to find i_0 in the circuit shown in below Figure. [15]



7 a) State and explain Millman's theorem for d.c excitations. [7]

b) Find the Thevenin's voltage and the Thevenin's equivalent resistance across terminals a-b in Fig.7. Assume V_1=15V, R_1=6 Ohms, R_2= 2 Ohms, r= 1 Ohm, I=2A and V=12V. Determine the power drawn from the 12V source when the load is connected. [8]

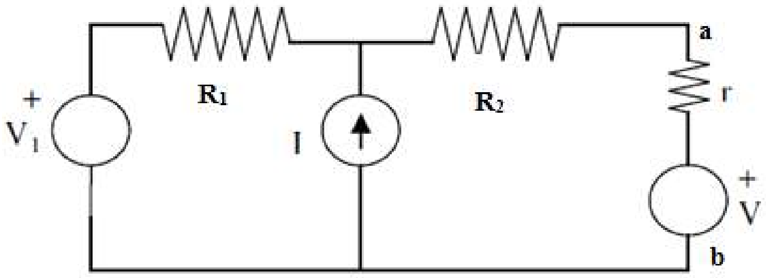
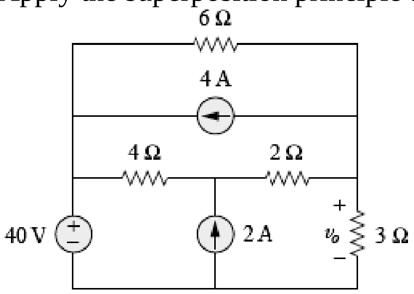


Fig. 7

8 a) Apply the superposition principle to find **'v_0'** in the circuit shown in below Figure. [8]



b) Explain reciprocity theorem. [7]

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ELECTRICAL CIRCUIT ANALYSIS - I
(Electrical and Electronics Engineering)

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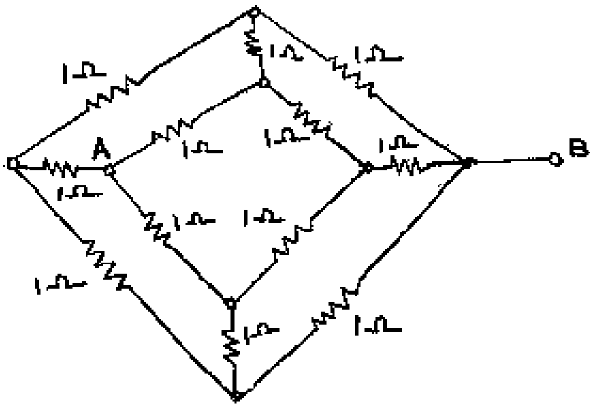
1 a) Differentiate between independent and dependent sources. What is their circuit representation. [8]

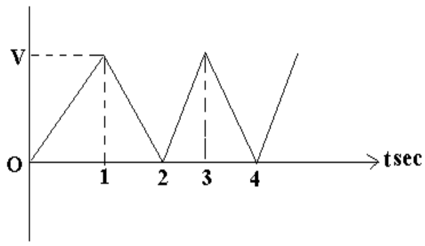
b) Explain the difference between linear and nonlinear resistance and explain different properties of voltage and current sources. [7]

2 a) Derive relationship between star to delta and delta to star conversion. [5]

b) Obtain a single equivalent Resistance between A and B terminals shown in bellow figure by Y-Δ transformation. [10]



3 a) Find the form factor for the following ware form. [10]



b) A series R C circuit is excited by sinusoidal voltage I = I_m sin wt. Find the expression for impedance using phasor diagram. [5]
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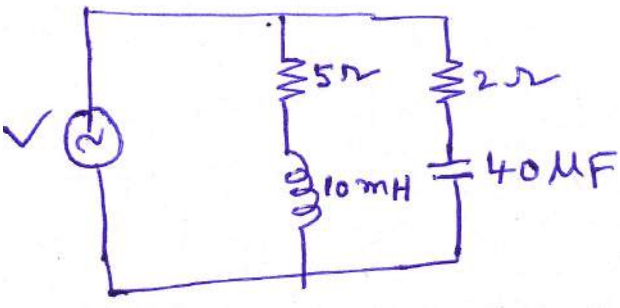
4 a) Define resonance frequency and half power frequency. Derive the expression for series resonance frequency [8]

b) Determine the resonance frequency for the circuit shown in below figure [7]



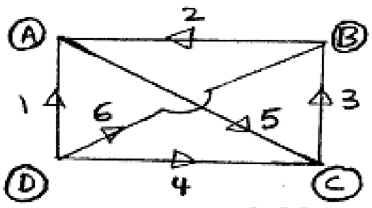
5 a) Two similar coils are wound on the same core. The resistance of each coil is 10 ohm. When excited by a 100 V, 50 Hz source, the first coil takes 2A, and the induced emf in the second coil is 50V. Determine the self and mutual inductances. [8]

b) Define coefficient of magnetic coupling. Derive the expression for coefficient of magnetic coupling for coupled coils. [7]

6 a) Define the following terms with respect to network topology. [8]

a) Graph b) Tree c) Cut set d)duality between networks

b) For the given network graph shown below, write down the basic Tieset matrix, taking the tree consisting of edges 2,4 and 5. [7]

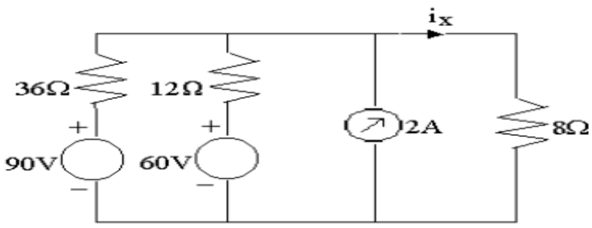


7 a) State and explain Thevinin's and Norton's theorems with examples. [8]

b) A load of (20-jx_2) is supplied from a source of 10V rms and internal impedance (10+j20)Ω. Find the value of x_2 for maximum power transfer and also find the maximum power [7]

8 a) Explain Compensation theorem. [7]

b) Find the current i_x using superposition theorem for the following network shown bellow. [8]



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II B. Tech I Semester Supplementary Examinations, June - 2015
ELECTRICAL CIRCUIT ANALYSIS - I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1 a) Explain the properties of different Voltage and current sources. [5]

b) Simplify the network, shown in Fig.1, using source transformations: [10]

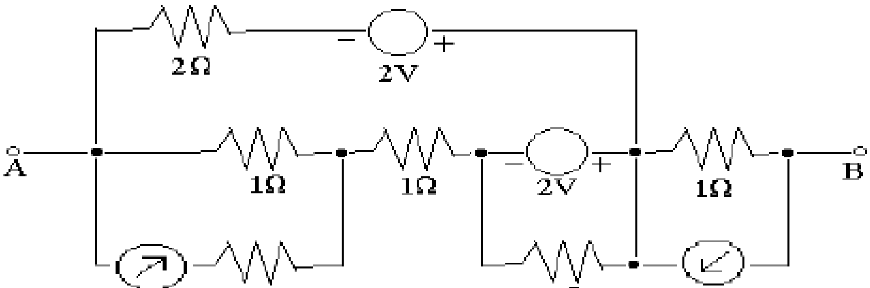

Fig.1

2 a) Find the current I supplied by the battery of the Figure 2 through delta / star transformation. [8]

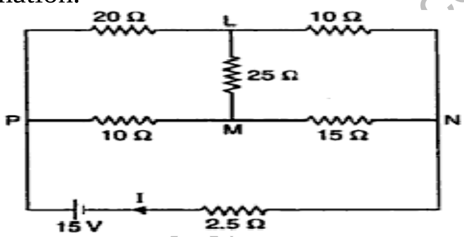

Figure 2

b) Explain about super node and super mesh for DC excitation. [7]

3 a) Derive RMS value and Average value and also form factor and peak factor from fundamentals of sin wave. [8]

b) A current of RMS value 10A and 40Hz frequency is in series with an equal magnitude current at 50Hz frequency. Write the expression for instantaneous currents and find its value (i) 0.025 sec (ii) 0.05 sec (iii) 0.1 sec after the two currents have passed through their positive maximum values simultaneously. [7]

4 a) Define Q factor and derive its value for (i) series resonance and (ii) parallel resonance. [8]

b) Consider a series resonance circuit consisting of a 10 Ohms resistance, a 2mH inductance and a 200nF capacitance. Determine the maximum energy stored, the energy dissipated per cycle and the bandwidth of the circuit. [7]
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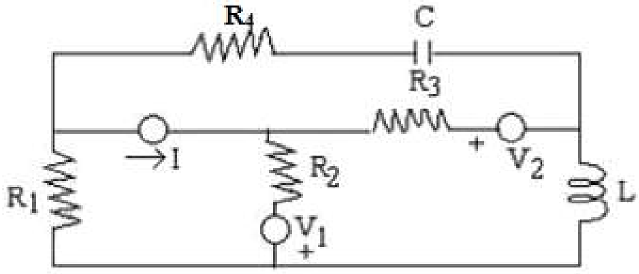
5 a) Explain the terms self induction, mutual induction and coefficient of coupling as applied to a magnetic circuit. With usual notation, establish the relationship between mutual inductance, self inductance and coefficient of coupling. [8]

b) A cast steel electromagnetic has an air gap of length 2mm and an iron path of length 30cms. Find the MMF needed to produce a flux density of 0.8T in the air gap. The relative permeability of the steel core at this flux density is 1000. Neglect leakage & fringing. [7]

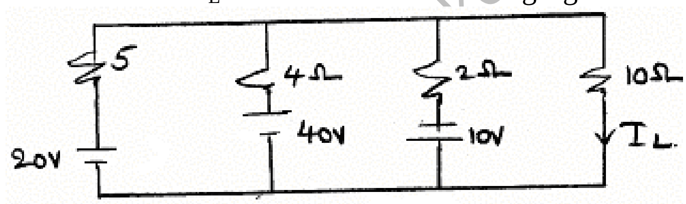
6 a) Define the following terms with respect to network topology. [7]
a) Graph b) Tree c) Cut set d) Tie Set

b) What is duality. Explain the procedure for obtaining the dual of the given planar network shown below figure. [8]



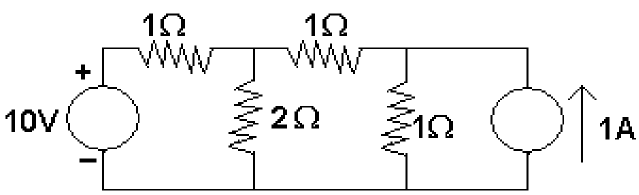
7 a) Explain Maximum power transfer theorem with example. [7]

b) Find the current I_L of the shown in following figure. Use Millmans theorem. [8]



8 a) State and explain the Tellegen's theorem. [7]

b) Calculate the current in the 2Ω resistor of figure bellow using superposition theorem. [8]



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Code No: R21023 **R10** SET - 4

II B. Tech I Semester Supplementary Examinations, June - 2015
ELECTRICAL CIRCUIT ANALYSIS - I
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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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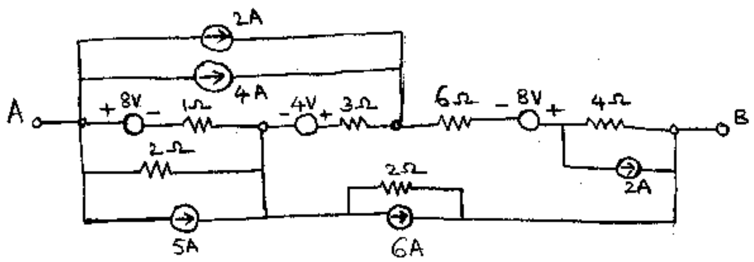
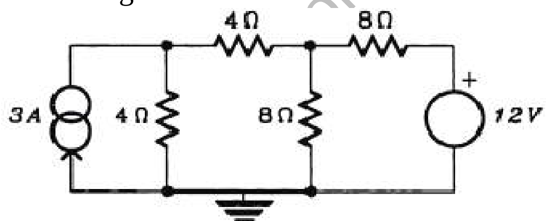
1 a) Differentiate between independent and dependent sources. What is their circuit representation. [7]

b) Make use of Source Transformation and obtain single source equivalent between the terminals A-B, shown in the figure bellow. [8]



2 a) Perform both node and mesh analysis for the circuit shown in below Figure to determine all the branch voltages and currents. [8]



b) Describe the Kirchoff's laws [7]

3 a) Using fundamental concepts of sin wave derive the R.M.S Value and Average value and also find form factor and peak factor. [8]

b) A resistor (R) of 50 Ω in parallel with a capacitor (C) of 40 μF, is connected in series with a pure inductor (L) of 30 mH to a 100 V, 50 Hz supply. Calculate the total current and also the current in the capacitor. Draw the phasor diagram. [7]

4 a) Obtain the expression for the frequency at which maximum voltage occurs across the capacitance in a series resonance circuit in terms of the Q-factor and resonance frequency. [8]

b) In a series RLC circuit if the applied voltage is 10V, and resonance frequency is 1KHz, and Q factor is 10, what is the maximum voltage across the inductance. [7]

5 a) Describe the composite magnetic circuits. [8]

b) Two coils having 800 and 1000 turns are wound on a common non-magnetic core. The leakage flux and mutual flux due to a current of 5A in coil is 0.3 mwb and 0.6 mwb respectively. Find i) Self and mutual inductance ii) coefficient of coupling [7]
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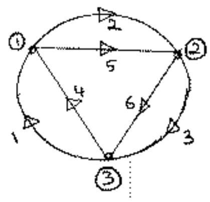
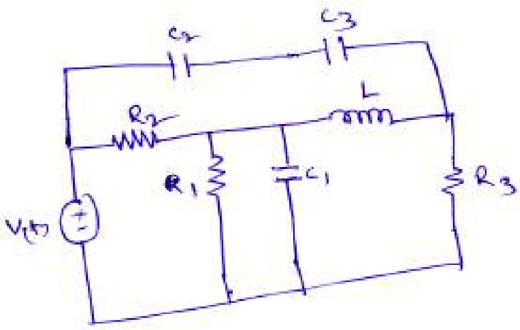
6 a) For the topological graph shown in the figure, obtain the fundamental Tieset matrix choosing the tree containing two elements 5 & 6. [8]



b) Illustrate the procedure for obtaining the dual network of the given circuit shown in below figure [7]



7 a) State and explain Norton's theorem. [7]

b) Use the Thevenin equivalent of the network shown in Fig.7 to find the value of R which will receive maximum power. Find also this power. [8]

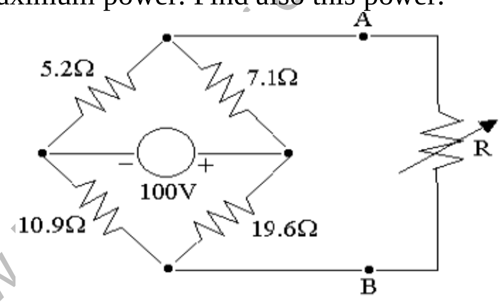
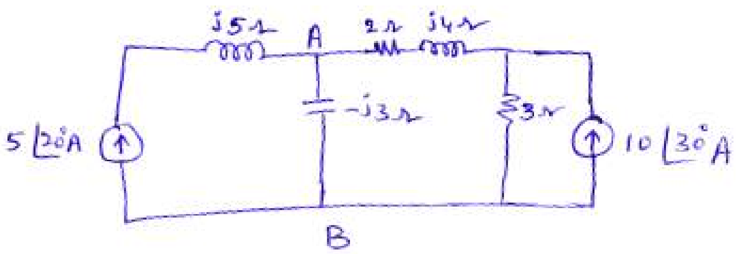


Fig. 7

8 a) State and explain reciprocity theorems with sinusoidal excitations. [7]

b) Determine the voltage across terminals AB using superposition theorem for the below figure [8]



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