Code No:A109210204 | R09 | SET-1

B.Tech II Year - I Semester Examinations, May-June, 2012
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) Prove that in a fixed inductive system current can't be changed instantaneously.
b) A current shown in the following Fig.1 passes through a 200μF condenser. Calculate volatge, charge, power and energy stored at time t = 1 sec. [7+8]

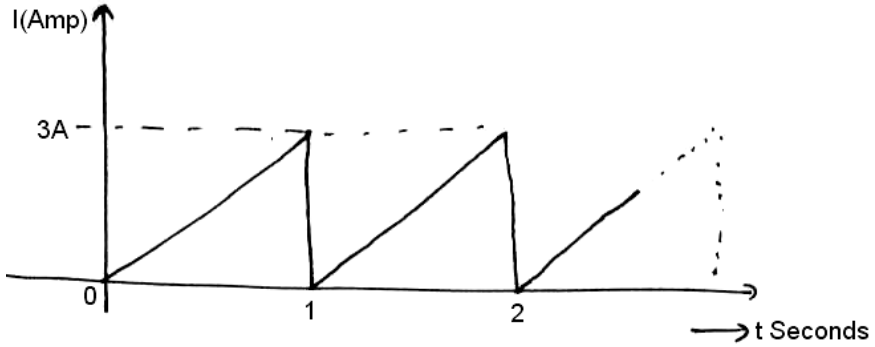

Fig.1

2.a) Find the current flowing through resistance R_L in the following Fig.2 using nodal analysis. [9+6]

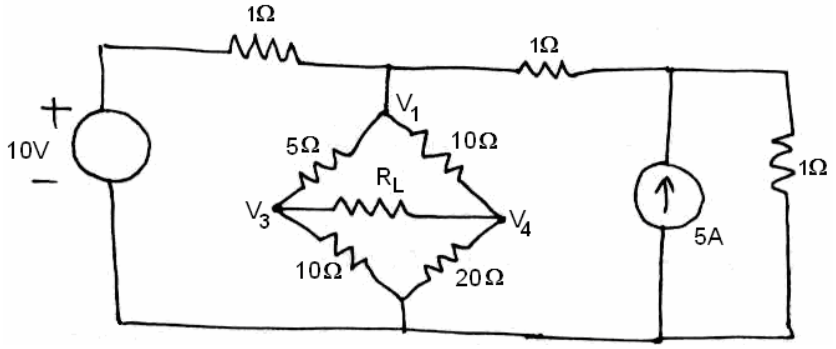

Fig.2

b) Explain mesh analysis with an example.

3.a) For the electrical circuit shown in the Fig.3 determine
i) impedance ii) current taken from supply
iii) power factor of the circuit.
Draw the phsor diagram for currents of various branches and overall current.

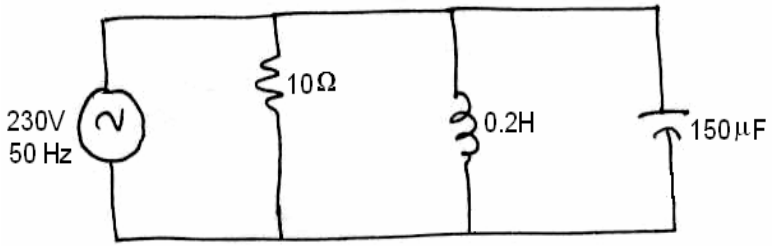

Fig.3

b) Find the RMS and average values of the wave form shown in Fig.4. [9+6]

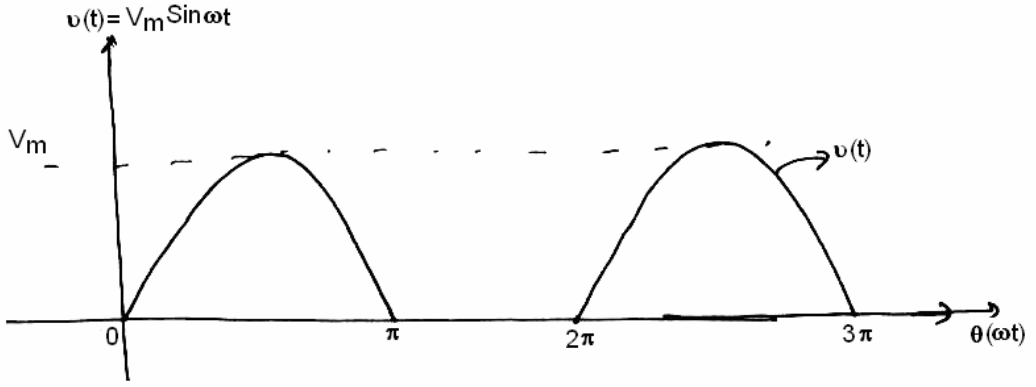

Fig.4

4.a) Derive expression for half power frequencies of a R L C series network.

b) Construct the admittance locus diagram and determine the variable inductance values so that the phase angle between the supply voltage and supply current is zero for the Fig.5. ω = 200 rad/s. [7+8]

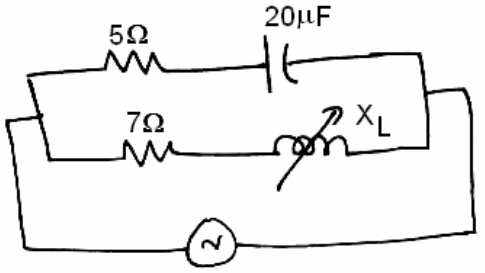

Fig.5

5.a) Define coefficient of coupling. Obtain an expression for it.

b) Find the equivalent inductance of the circuit shown in Fig.6. [7+8]

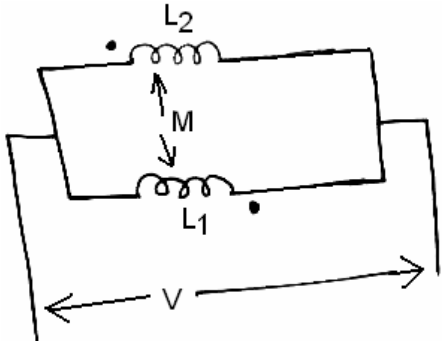

Fig.6

6.a) Using network topology, solve for node voltages and branch currents for the network shown below in Fig.7.

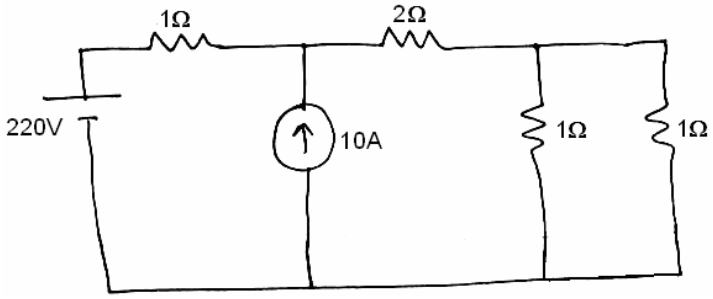

Fig.7

b) Define and explain the following terms:

i) branch ii) tree iii) twig

iv) path v) cutset. [10+5]

7.a) State and explain Thevenin's theorem.

b) For the circuit shown in the Fig.8 find the current flowing through the resister 'R' using Norton's theorem. [5+10]

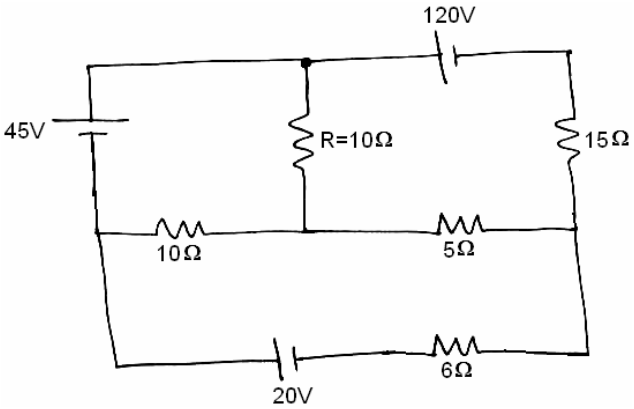

Fig.8

8.a) Using principle of superposistion theorem, find the current in 5Ω resistor in Fig.9.

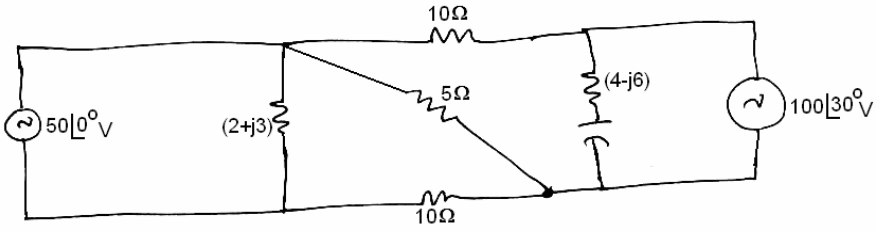

Fig.9

b) Determine the load to be connected across A and B in Fig.10 such that maximum power transfer takes place to the load. What is the value of this maximum power? [7+8]

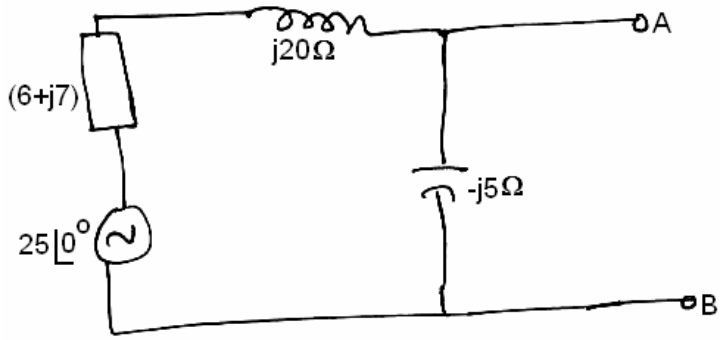

Fig.10

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B.Tech II Year - I Semester Examinations, May-June, 2012
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Prove that in a fixed capacitive system voltage cannot be changed instantaneously.

b) The current in a 5H inductor varies as shown in the Fig.1. Find the
i) Flux linkage in system after t = 1 second
ii) The rate of change of flux linkages in the system after 10 s. [5+10]

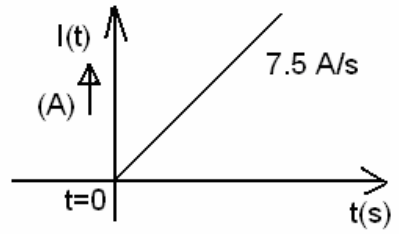

Fig.1

2.a) Explain Nodal analysis with an example.

b) Find the power supplied by 15 V source in the circuit shown in Fig.2 using mesh analysis. [5+10]

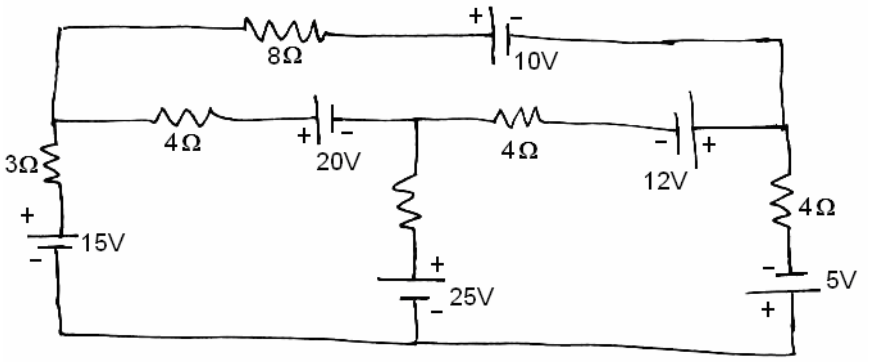

Fig.2

3.a) Explain the concept of complex power. Define power factor. What is its significance in electrical circuits?

b) A wire carries a current which is a combination of a direct current of 10 A and a sinusoidal current with a peak of 10 A. Determine the RMS value of the resultant.

c) A resistance and inductance are connected in series across a voltage given by υ(t) = 283 Sin 314 t. The power drawn by this circuit is 400 W and the current has a maximum value of 8 A. Determine the parameters of the network and its power factor. [7+8]

4.a) Derive the expression for frequencies at which voltage across inductance and capacitance are maximum in a R L C series circuit.

b) The circuit shown in Fig.3 is in resonance for two values of 'C' when the frequency of driving force is 5000 rad/s. Find the two values of C and construct admittance locus diagram. [7+8]

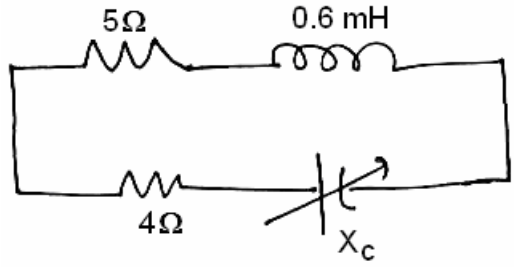

Fig.3

5.a) Explain Farnaday's laws of electromagnetic induction.

b) Write the loop equations for the network shown in the Fig.4.

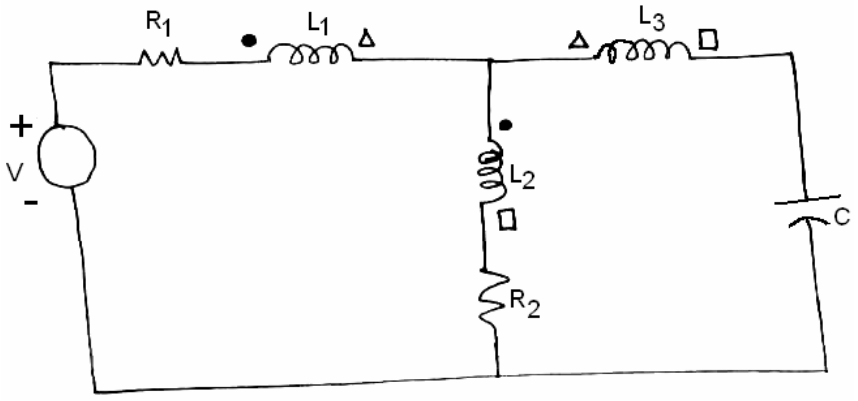

Fig.4

c) A cast steel ring is wound with 500 turns. The cross section of the core is 2×10^{-3} m^2 and the mean length is 0.16 m.

i) Find the value of I required to develop a magnetic flux of $\phi = 4 \times 10^{-4}$ Wb.

ii) Determine the values of μ and μ_r for the material under these conditions.

Assume H for cast steel is 170 AT/m. [4+4+7]

6.a) Determine the voltage V_2 and V_3 in the circuit shown in Fig.5 using cut set analysis. Choose Tree (1,4,3) for this purpose.

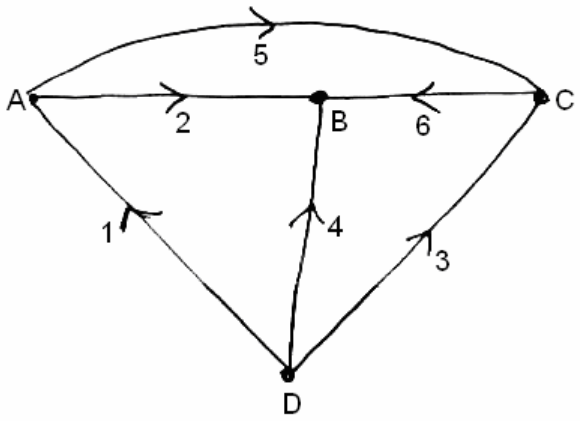

Fig.5

b) Explain the principle of duality and draw a dual network for the Fig.6. [8+7]

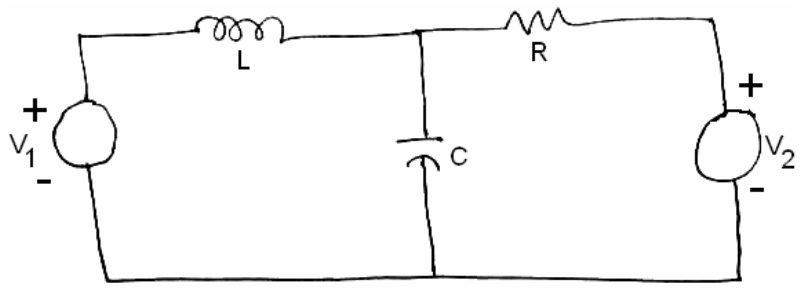

Fig.6

7.a) State and explain compensation theorem.

b) Find the current though the 4Ω resistor in Fig.7, using Norton's Theorem. [5+10]

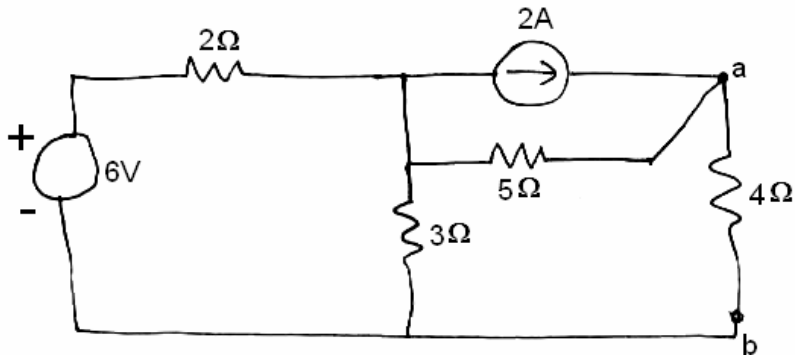

Fig.7

8.a) For the network show in the Fig.8, the 6 Ω resistance is altered to 8Ω. Find the change in current in 10Ω resistance due to this change using compensation theorem.

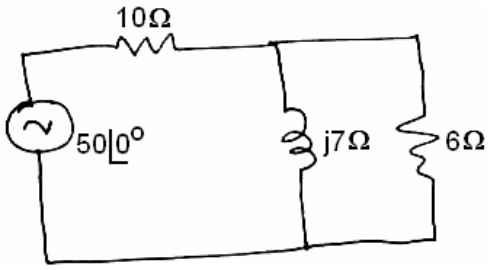

Fig.8

b) For the network shown in Fig.9, verify Tellegen's Theorem. [8+7]

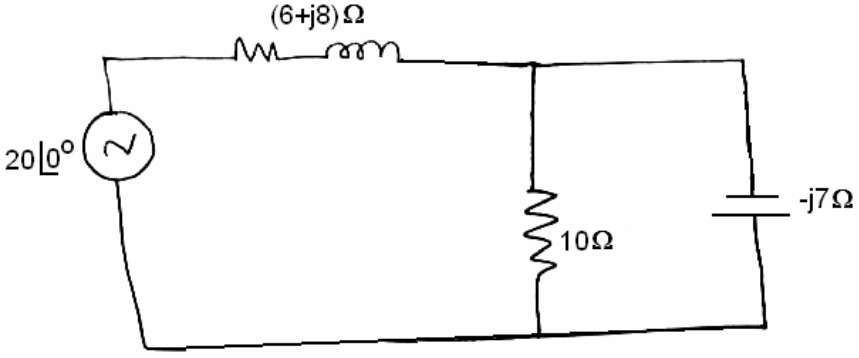

Fig.9

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Code No:A109210204 | R09 | SET-3

B.Tech II Year - I Semester Examinations, May-June, 2012
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Explain the characteristics of Ideal voltage and current sources.
b) Explain different source transformation techniques.
c) Write the loop equation for the circuit shown in Fig.1 [6+6+3]

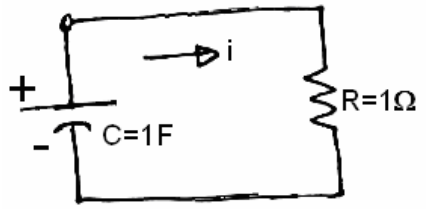

Fig.1

2.a) Find the voltage across the terminals ab using nodal analysis in Fig.2.

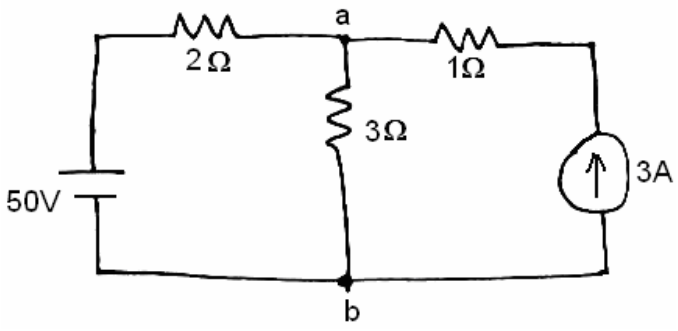

Fig.2

b) Use mesh analysis to find currents through the loops in Fig.3. Evaluate power dissipated in 6Ω resistance. [7+8]

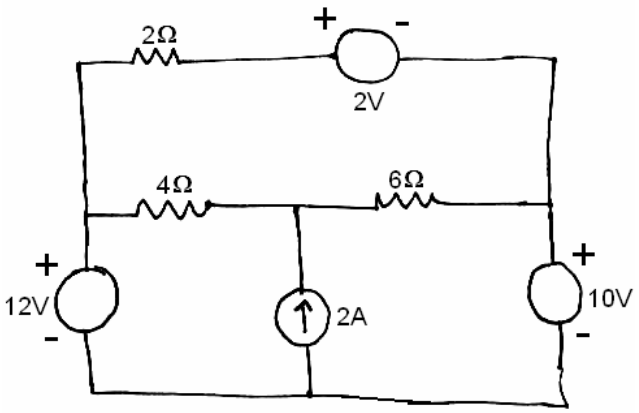

Fig.3

3.a) When 220V, 50Hz ac supply is supplied across terminals 'AB' in the circuit shown in Fig.4, the total power input is 3.25 kW and the current is 20A. Find the current through Z_3.

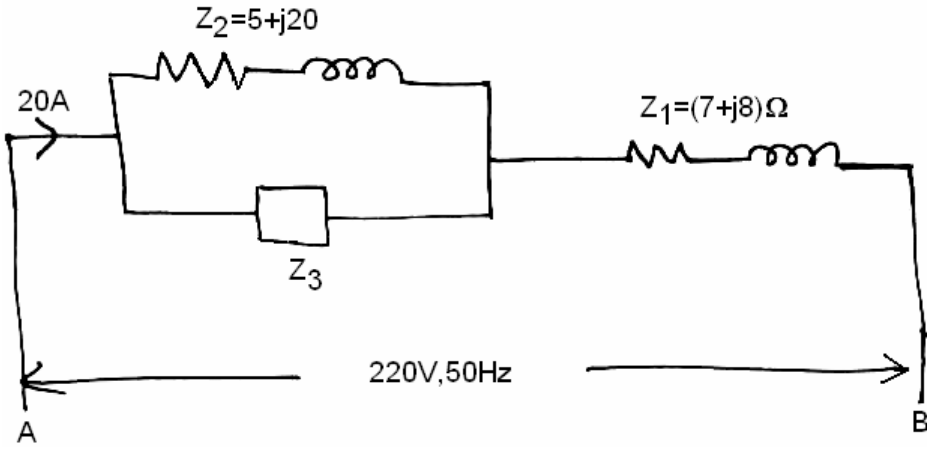

Fig.4

b) Find the RMS voltage of the wave form shown in Fig.5. [8+7]

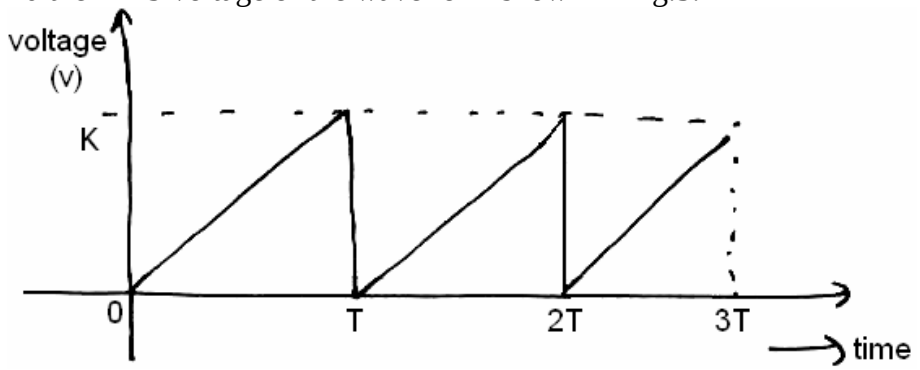

Fig.5

4.a) A series RLC circuit with R = 25Ω, L = 0.01H, C = 0.05 μF is energized by a 10V variable frequency source. Find the resonant frequency, Quality factor, band width. Find the frequencies at which voltages across inductor and capacitor are maximum.

b) For the circuit shown in Fig.6, draw the admittance locus diagram and state whether resonance is possible or not. [8+7]

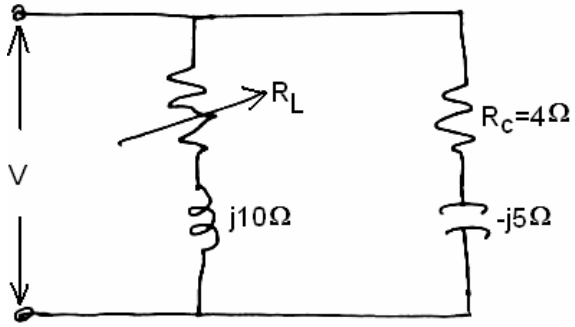

Fig.6

5.a) A circular iron ring, having a cross sectional area of 10cm^2 and a length of 4πcm in iron has an air gap of 0.4π mm made of a saw cut. The relative permeability of iron is 10^3 and permeability of free space is $4\pi \times 10^{-7}$ H/m. The ring is wound with a coil of 2000 turns and carries 2mA current. Determine the air gap flux, neglecting leakage and fringing.

b) Find the equivalent inductance for the circuit shown in Fig.7. [8+7]

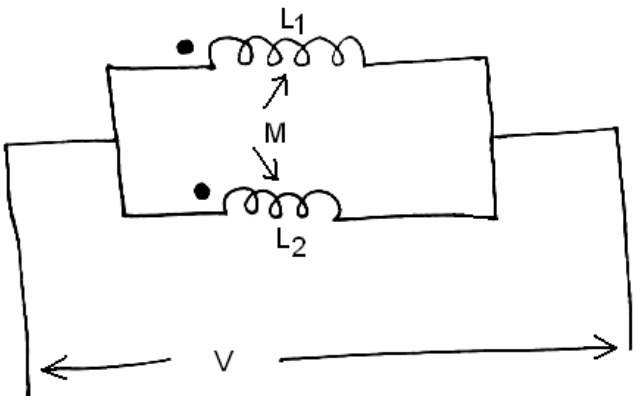

Fig.7

6. Find the cut set and tie set matrices for the graph shown in Fig.8 and obtain equilibrium equations in matrix form using KVL. Calculate the loop currents and branch voltages using tie set. [15]

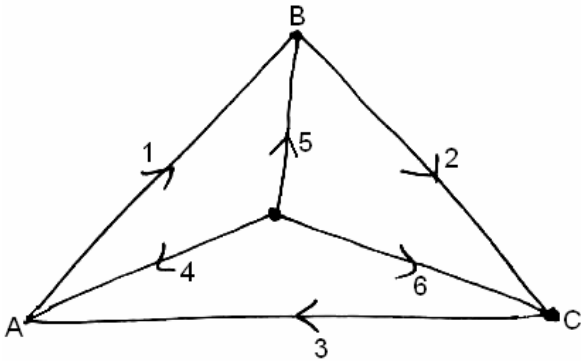

Fig.8

7.a) State and explain super position theorem.

b) Apply super position theorem to network shown in Fig.9 and find voltage V_{AB}.

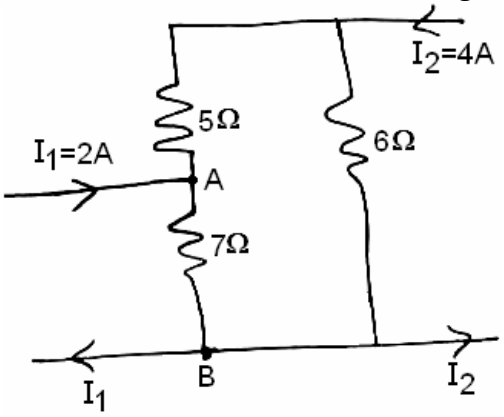

Fig.9

c) Verify reciprocity Theorem for the network in Fig.10. [3+6+6]

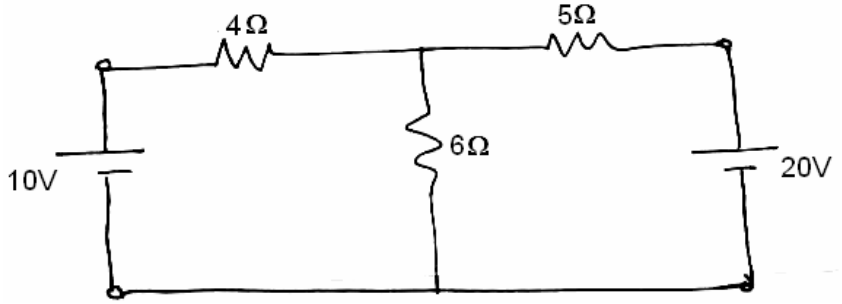

Fig.10

8.a) For the network shown in Fig.11, find value of maximum power if both the parameters of load are varying.

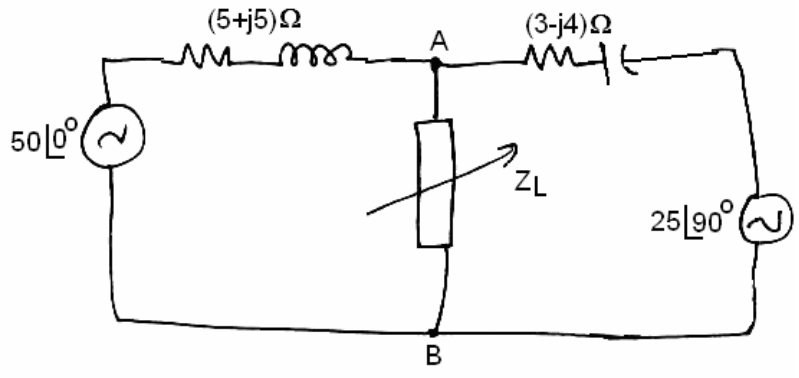

Fig.11

b) Predict the current I shown in Fig.12 below in response to $20\angle O^0$ V. The impedance values are given in ohms. Use Thevenin's theorem. [8+7]

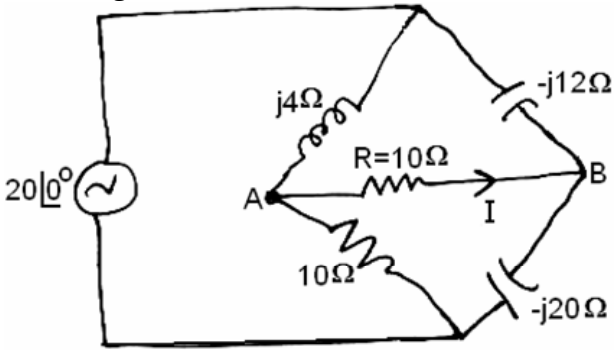

Fig.12

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Code No:A109210204 | R09 | SET-4

B.Tech II Year - I Semester Examinations, May-June, 2012
ELECTRICAL CIRCUITS
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Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

- - -

1.a) Derive the expressions for energy stored in
i) Inductor ii) Capacitor

b) Sketch the waveforms for i) current ii) power iii) energy, if a voltage of the wave form in Fig.1 is applied to a capacitor of $C = 2\mu F$. [6+9]

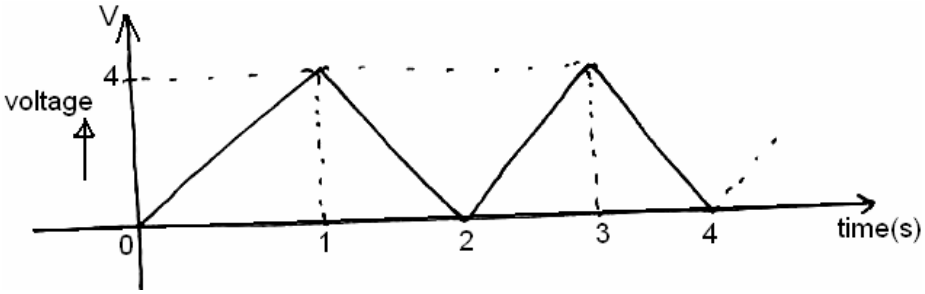

Fig.1

2.a) Derive expressions for star to delta, delta to star conversions.

b) Find the power dissipated in the 15Ω resistance of the network in Fig.2. Use mesh analysis. [7+8]

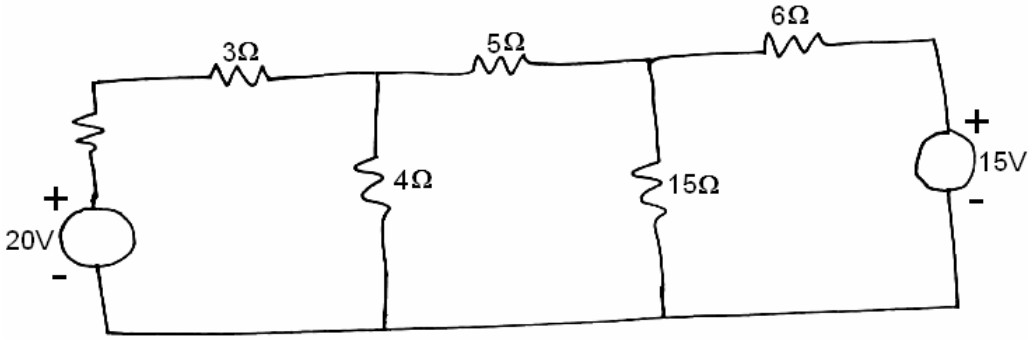

Fig.2

3.a) Find crest factor, form factor for the wave form shown in Fig.3.

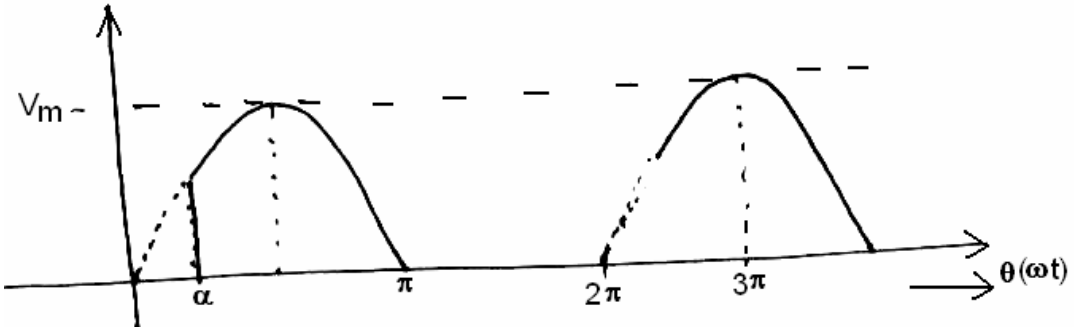

Fig.3

b) Find the complex power for the entire circuit of Fig.4. Draw the power triangle. [7+8]

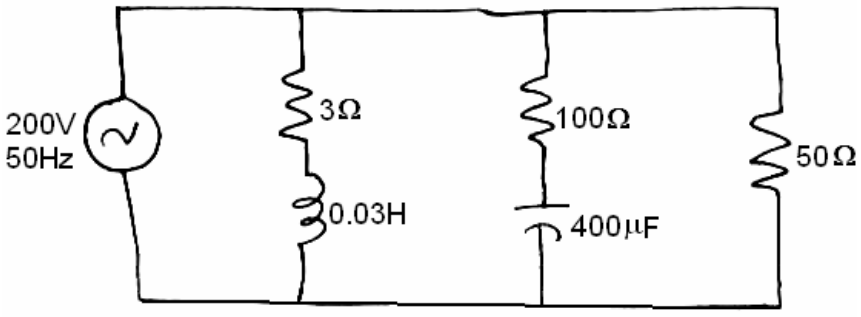

Fig.4

4.a) Obtain the root locus for the circuit in Fig.5. Find the value of R_L which results in a phase angle of 45^0 between V and I.

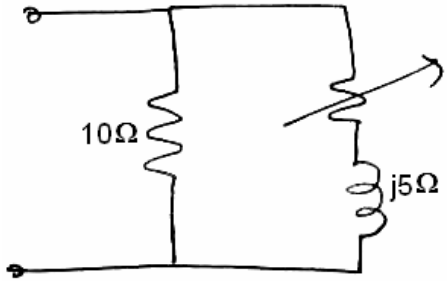

Fig.5

b) The Q – factor of a resonant circuit at 50 Hz is 1.5. If the circuit is supplied with a constant voltage and variable frequency, find the frequency at which the inductor voltage is maximum. [8+7]

5.a) Explain the dot convention in coupled circuits.

b) A cast steel of d.c electromagnet shown in the Fig.6 has a coil of 1000 turns as its central limb. Determine the current that the coil should carry to produce a flux of of 2.5 mWb in air gap. Neglect leakage. Dimensions are given in cm. [5+10]

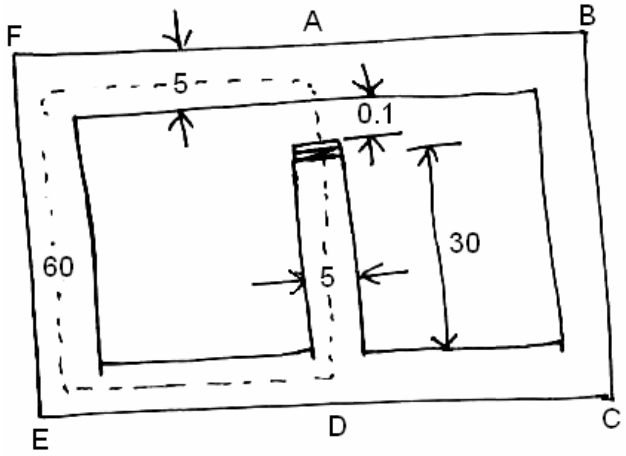

Fig.6

$B(wb/m^2) \rightarrow$	0.2	0.5	0.7	1.0	1.2
$H(AT/m) \rightarrow$	300	540	650	900	1150

6.a) Select a suitable tree and find cut set and tie set matrices for the graph shown in Fig.7.

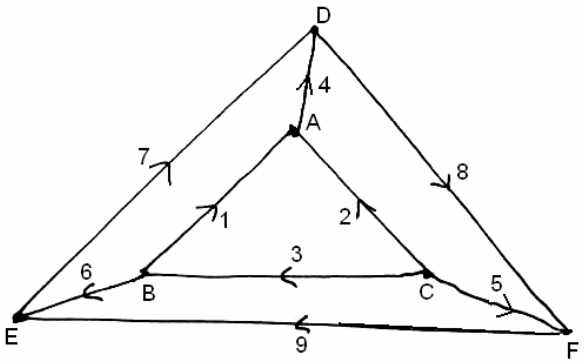

Fig.7

b) Explain the principle of duality with an example. [10+5]

7.a) State and explain Tellegen's theorem.

b) Find the Thevenins's equivalent for circuit shown in Fig.8.

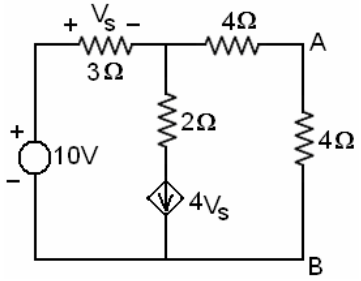

Fig.8

c) Find the value of 'R' connected across terminals A and B in Fig.9 that absorbs maximum power. [3+6+6]

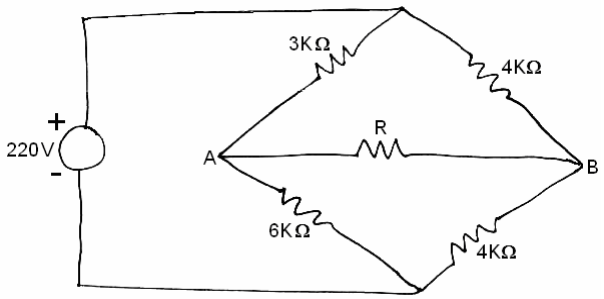

Fig.9

8.a) Find the current through the network under steady state conditions in Fig.10.

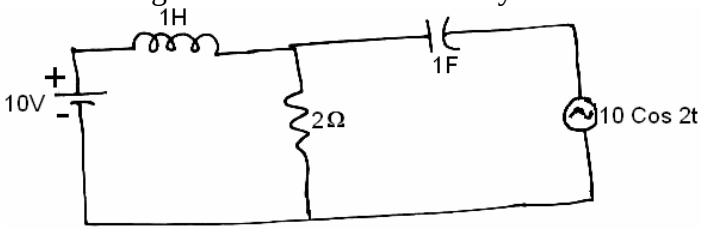

Fig.10

b) Show that the network in Fig.11 is reciprocal. [7+8]

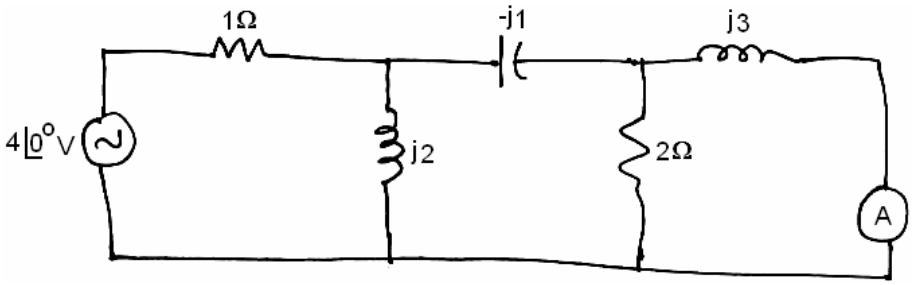

Fig.11

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