Code.No: A109210204 | R09 | SET-1

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

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

Answer any FIVE questions
All questions carry equal marks

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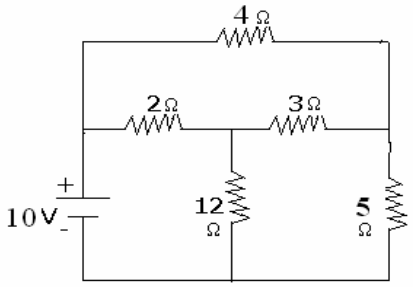
1.a) Explain Active elements in detail.
b) A 25 ohms resistor is connected across a voltage source V (t) = 150 Sin ωt. Find the current I (t) and the instantaneous power P(t) and also the average power. Draw the relevant waveforms. [7+8]

2.a) State and explain Kirchoff's laws.
b) Find the current supplied by 10 V battery by using Star – Delta transformation for the following network. [7+8]

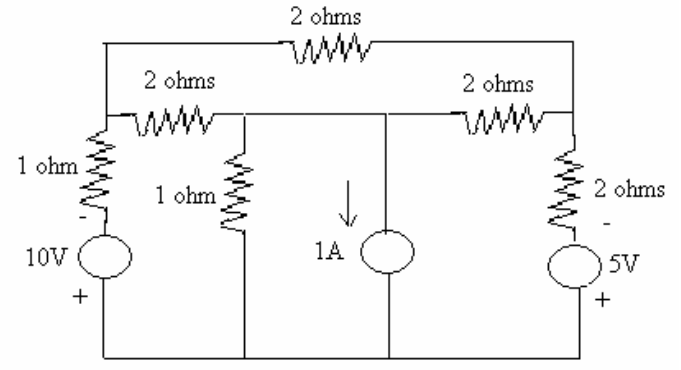


3.a) Derive the expression for RMS value of alternating current wave $I = I_m$ Sin ωt.
b) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit find
i) The complex power in the coil and
ii) The values of R and L. [7+8]

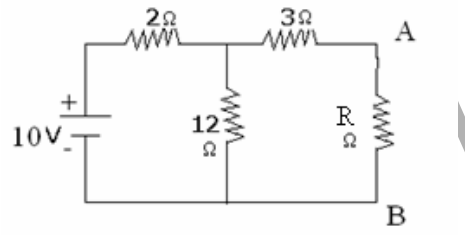
4.a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half power frequencies respectively.
b) A voltage $V = 50\angle 0^0$ V is applied to a series circuit consisting of fixed inductive reactance X_L = 5 ohms and a variable resistance R. Sketch the admittance and current locus diagrams. [7+8]

5.a) Obtain the expression for co - efficient of coupling.
b) A cast steel electromagnet has an air gap length of 3 mm and an iron path of length 40 cm. Find the number of amphere turns necessary to produce a flux density of 0.7 Wb/m^2 in the gap. Neglect the leakage and fringing. [7+8]

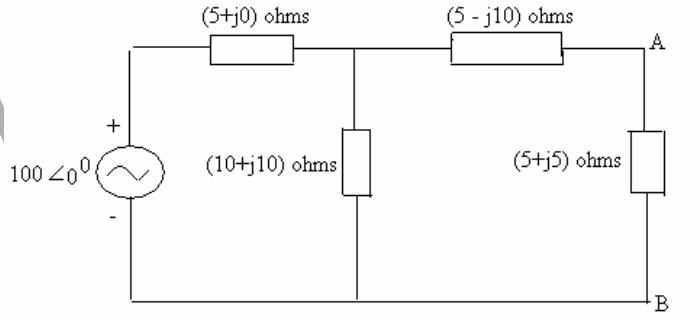
6. For the below network, draw
   i) Graph ii) Tree iii) Dual network [4+4+7]



7.a) State and explain Tellegens theorem.
   b) When the load impedance R draws the maximum power? Find the maximum power delivered to the load by using maximum power transfer theorem for the given network. [7+8]



8.a) State and explain Milleman's theorem for AC network by taking any one example.
   b) By using Norton's theorem find the current flowing through (5+j5) ohms impedance [7+8]



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Code.No: A109210204 | R09 | SET-2

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

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

Answer any FIVE questions
All questions carry equal marks

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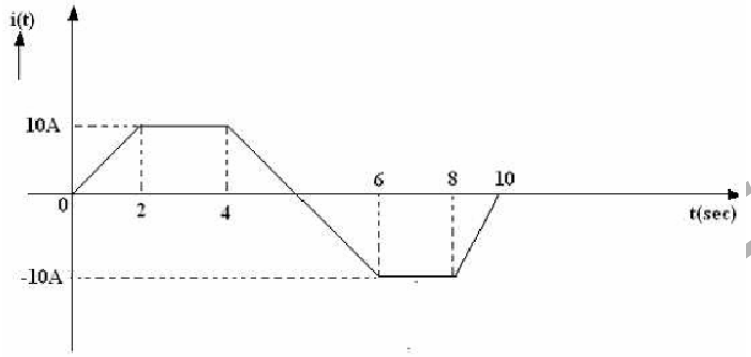
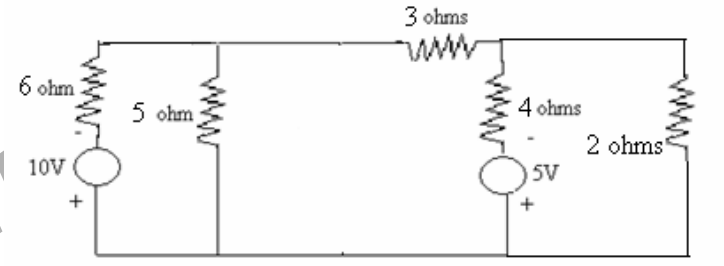
1.a) Explain Passive elements in detail.

b) A pure inductance of 3 mH carries a current of the wave form shown in figure. Sketch the waveform of V(t) and P(t). Determine the average value of power. [7+8]



2.a) Three resistances R_{ab} , R_{bc} and R_{ca} are connected in delta connection, Derive the expressions for equivalent star connection.

b) By using nodal analysis find the current flowing through 3 ohms resistor. [7+8]



3.a) Show that power dissipated by a pure capacitor exited by a sinusoidal voltage source V = Vm Sin ωt is zero.

b) A circuit consisting of three branches, Z_2 is in parallel with Z_3 the combination is in series with Z_1 having the values Z_1=10+j30, Z_2 = 5+j10and Z_3 = 4-j16 connected across single phase, 100 V, 50 Hz supply. Find

i) I_1, I_2 and I_3 ii) V_1 and V_2 [7+8]

4.a) Obtain the current locus of a series circuit having a fixed resistance and a variable inductance.

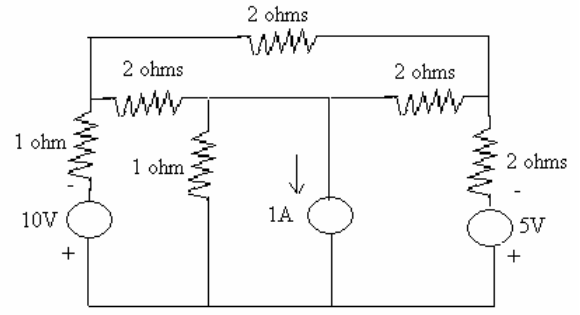
b) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 μF, Calculate the resonant, lower and upper half – power frequencies. [7+8]

5.a) Define and explain self – inductance and mutual – inductance.

b) Two coupled coils of $L_1 = 0.8$ H and $L_2 = 0.2$ H have a coupling coefficient k = 0.9. Find the mutual inductance M.

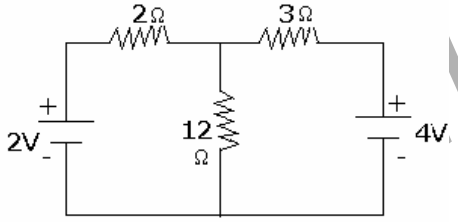
c) State and explain Faraday's laws of electro magnetic induction. [5+5+5]

6. Obtain the node voltages for the following network shown in figure. [15]



7.a) State and explain reciprocity theorem.

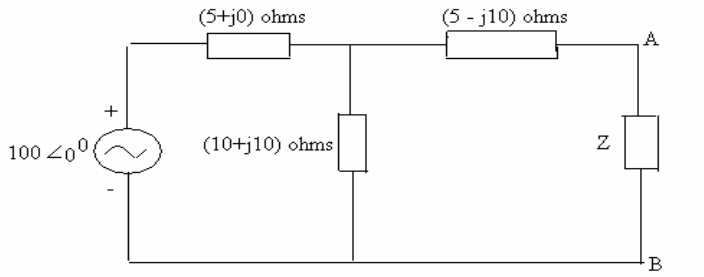
b) Using superposition theorem determine the current through 12Ω resistor (All resistances are in Ω) as shown in figure [7+8]



Figure

8.a) Write down the procedure to obtain the Norton's equivalent circuit for AC network by taking any one example.

b) When the maximum power will be flowing through the impedance Z? And also find the maximum power delivered the load impedance Z for the following network. [7+8]



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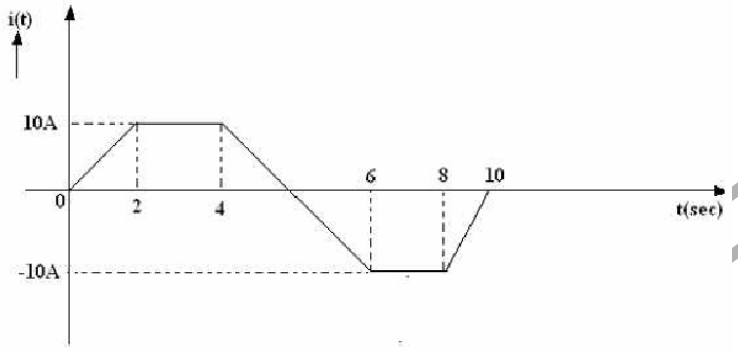
II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

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

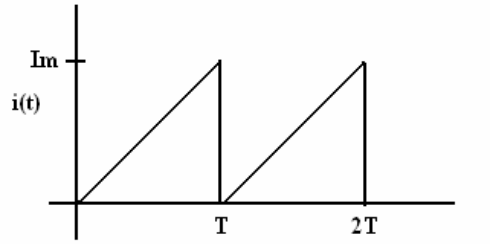
Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Write short notes on source transformation.
b) A pure inductance of 5 mH carries a current of the wave form shown in figure. Sketch the waveform of V(t) and P(t). Determine the average value of power. [7+8]



2.a) Write short notes on Star – Delta transformation.
b) By taking any one example write down the procedure to obtain node voltages by using nodal analysis. [7+8]

3.a) Find form factor of triangular waveform shown in the figure.



Figure

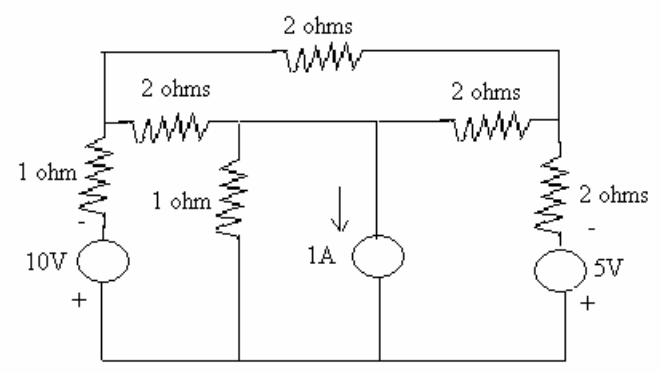
b) A series circuit consisting of a 10 ohms resistor, a 100 μF capacitance and 10 mH inductance is driven by a 50 Hz AC voltage source of maximum value 100 V. Calculate the equivalent impedance, current in the circuit, the power factor and power dissipated in the circuit. [7+8]

4.a) Show that $Q_0 = \omega_0 L/R = f_0 / BW$ for a series RLC circuit.
b) A voltage of $V = 50\angle 0^0$ V is applied to a series circuit of fixed resistance R = 5 ohms and a variable capacitance C. Sketch the admittance and current locus diagrams. [7+8]

5.a) What is an electric circuit? What is a magnetic circuit? Make a comparison between electric circuit and magnetic circuit.

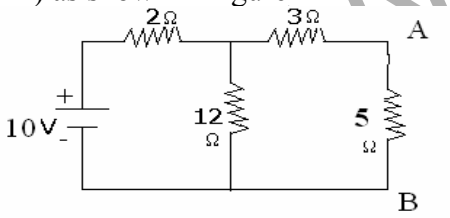
b) Coil 1 of a pair of coupled coils has a continuous current of 5 A, and the corresponding fluxes φ_{11} and φ_{12} are 0.2 and 0.4 mWb respectively. If the turns are $N_1 = 500$ and $N_2 = 1500$, find L_1, L_2, M and k. [7+8]

6. For the below network draw the graph and write down the procedure to obtain cut set matrix. [15]



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

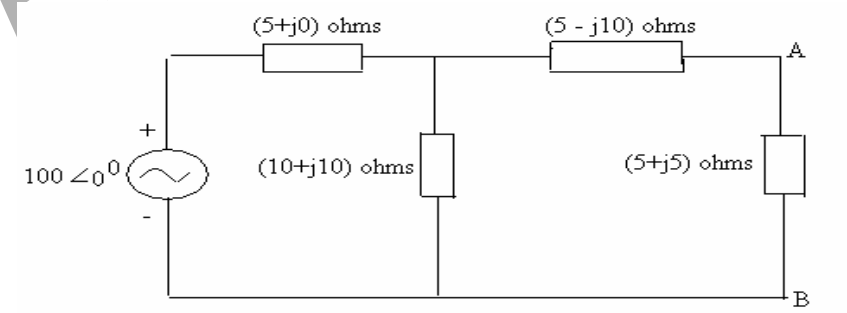
b) By using Thevenin's theorem determine the current through 5Ω resistor (All resistances are in Ω) as shown in figure [7+8]



Figure

8.a) State and explain Compensation theorem for AC network by taking any one example.

b) By using Norton's theorem find the current flowing through (5+j5) ohms impedance. [7+8]



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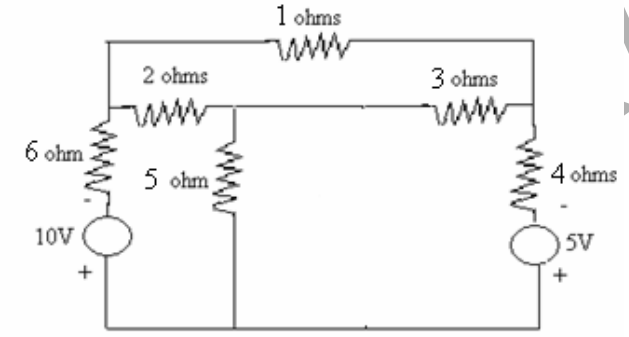
II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL CIRCUITS
(COMMON TO EEE, ECE, ETM)

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

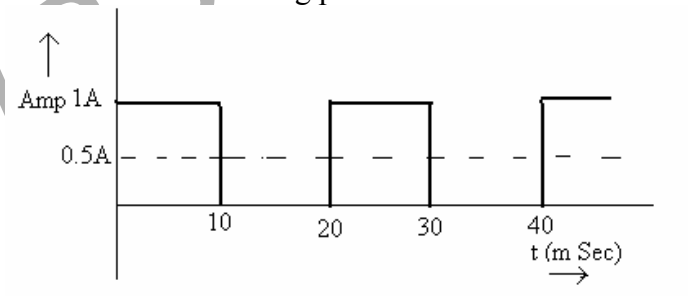
Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Explain voltage - current relationship for passive elements.
b) A 20 ohms resistor is connected across a voltage source V (t) = 200 Sin ωt. Find the current I (t) and the instantaneous power P(t) and also the average power. Draw the relevant waveforms. [7+8]

2.a) State and explain Kirchoff's laws.
b) By using loop analysis find the current flowing through 5 ohms resistor. [7+8]



3.a) Find form factor of a non alternating periodic waveform shown in figure.



Figure

b) A parallel circuit having two branches, first branch consisting of 3 ohms resistor is in series with 12.7 mH inductor, second branch consisting of 1 ohm resistor in series with 3.18 mH is connected across 200 V, single phase, 50 Hz supply.
Calculate:
a) Conductance and susceptance of each branch
b) The resultant admittance
c) The current in each branch
d) Total current input [7+8]

4.a) Obtain the current locus of a fixed resistance and a variable capacitance.

b) Given a series RLC circuit with R = 10 ohms, L = 1 mH and C = 1 μF is connected across a sinusoidal source of 20 V with variable frequency. Find

i) The resonant frequency

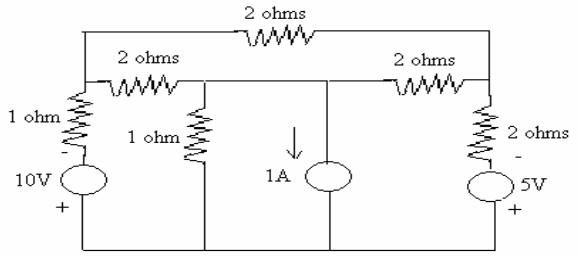
ii) Q factor of the circuit at resonant frequency

iii) Half power frequencies. [7+8]

5.a) State and explain Faraday's laws of electro magnetic induction.

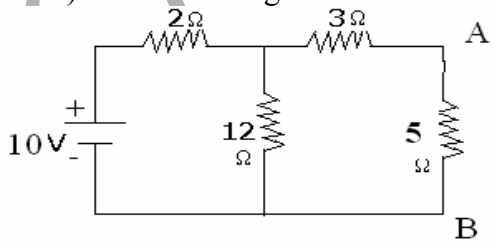
b) An iron ring of mean circumference of 1 m is uniformly wound with 400 turns of wire. When a current of 1.2 A is passed through the coil, a flux density of 1.15 Wb/m^2 is produced in the iron. Find the relative permeability of the iron under these circumstances. [7+8]

6. For the above network draw the graph, Select a tree and write tie set schedule for selected tree, solve circuit. [15]



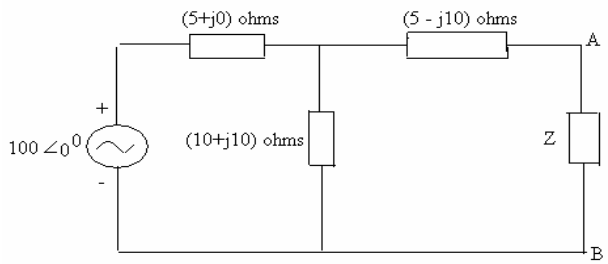
7.a) State and explain Compensation theorem.

b) By using Norton's theorem determine the current through 5Ω resistor (All resistances are in Ω) as shown in figure [7+8]



8.a) State and explain Superposition theorem for AC network by taking any one example.

b) When the maximum power will be flowing through the impedance Z? And also find the maximum power for the following network. [7+8]



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