Code No: 123BW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	States the Kirchhoff's Laws.	[2]
b)	What is meant by Super Node?	[3]
c)	Define the Average value of a periodic waveform.	[2]
d)	Define the instantaneous value and peak value.	[3]
e)	Define the band width and Q factor? Write its expressions.	[2]
f)	What is the significance of dot convention?	[3]
g)	What is meant by duality? Give elements equivalent to dual elements.	[2]
h)	Write the procedure for constructing a tie set matrix for a given graph.	[3]
i)	State the Superposition theorem.	[2]
j)	Write the procedure to obtain the Thevenin's equivalent circuit.	[3]

PART-B

(50 Marks)

2.   Find the mesh currents in the circuit shown in below figure1.   [10]
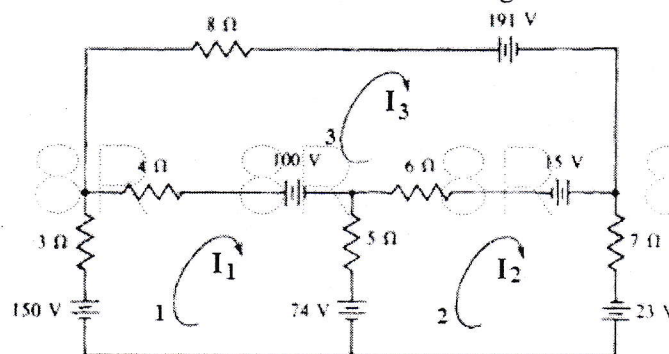

Figure: 1

OR

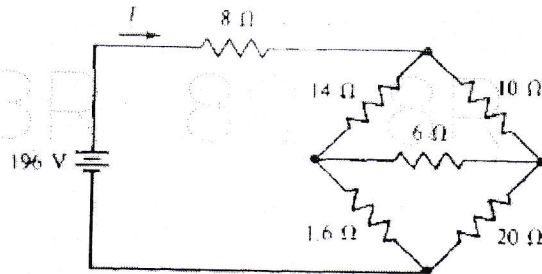3.a) Find current 'I' for the circuit shown in figure 2 by using delta/star transformation.

Figure: 2

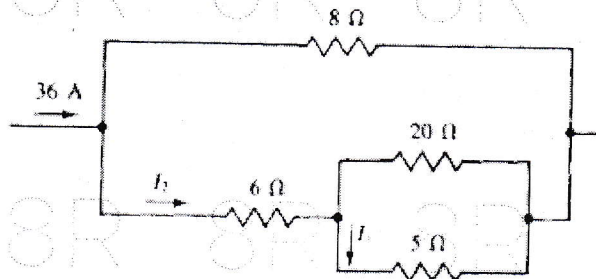b) Use current division twice find the current I_1, in the circuit shown in Figure 3. [5+5]

Figure: 3

4.a) A coil of R = 4 ohms, X_L= 3 ohms connected in series with a condenser of R = 8 ohms, Xc= 8 ohms, this combination is connected to 4 ohms resistor. Across this series circuit a voltage 100 volts is applied. Calculate:
i) current
ii) voltage drops across coil, condenser and resistor and
iii) power absorbed by the circuit.

b) A series R-L-C circuit consists of 100 ohms resistor and an inductor of 0.318H and a capacitor of unknown value. This circuit is supplied by 230V, 50 Hz supply and draws a current of 2.3A, and the current is in phase with the supply voltage. Find the value of the capacitance, and the power supplied by the source. [5+5]

OR

5.a) A circuit consists of a pure resistance and a coil connected in series as shown in figure 4. Powers dissipated in the resistance and in the coil are 1000W and 250W respectively. Voltage drops across the resistance and the coil are 200 V and 300 V respectively. Determine the reactance of the coil and the supply voltage.
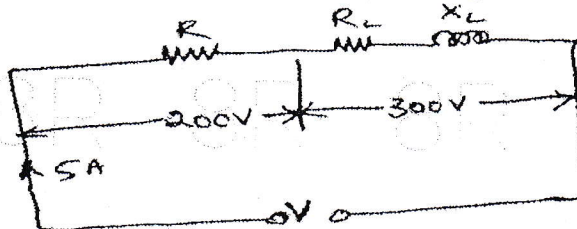

Figure: 4

b) An inductor of 0.5H inductance 90Ω resistance is connected in parallel with a 25μF capacitor. A voltage of 230V at 50Hz is maintained across the circuit. Determine the total power taken from the source (Figure 5). [5+5]
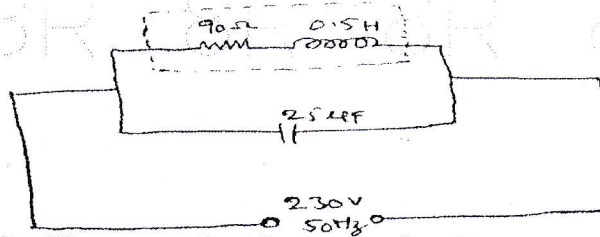

Figure: 5

6.a) Explain the procedure to draw the locus diagram of R-L series circuit when L is varying.
   b) Two coils having 500 and 1000 turns, respectively, are wound side by side on a closed iron circuit of area of cross-section 100 cm^2 and mean length 800 cm. Calculate the coefficients of self induction of the two coils and the mutual induction between the two. Neglect leakage. Take μ_r as 2000. If a current steadily grows from 0 to 1 A in 0.1 sec, in the first coil, find emf induced in the other coil. [4+6]

OR

7.a) State and explain Faraday's laws of electromagnetic induction.
   b) A series RLC circuit has to be designed so that it has a band width of 320 Hz and inductance of the coil is 0.2H. It is has to resonate at 350Hz, determine the resistance of coil and capacitance of condenser. If the applied voltage is 150V, determine the voltage across capacitor and coil. [5+5]

8.a) Describe the procedure to construct the duel network with an example.
   b) For the resistive network as shown in figure 6, write a cut set schedule and equilibrium equations on voltage basis. Hence obtain value of branch voltage and branch currents. [5+5]
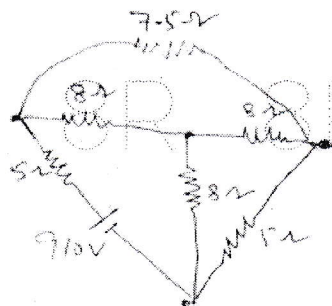

Figure: 6
OR

9.a) Draw the dual network for the circuit shown in figure 7 and explain the procedure employed.
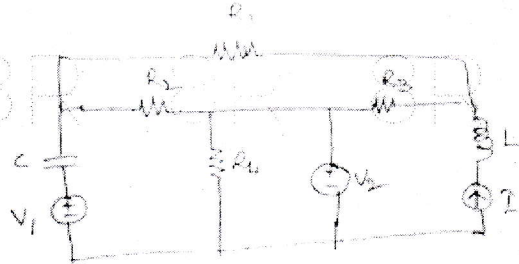

Figure: 7

b) Explain the super mesh analysis with an example. [5+5]

10. Calculate the change in current of the network given in figure 8 using compensation theorem when load resistor changes to 10 ohms. [10]
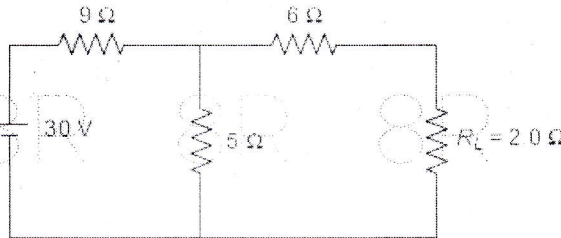

Figure: 8

OR

11. Find the current through 9 ohms resistor for the following network shown in figure 9 using Norton's theorem. [10]
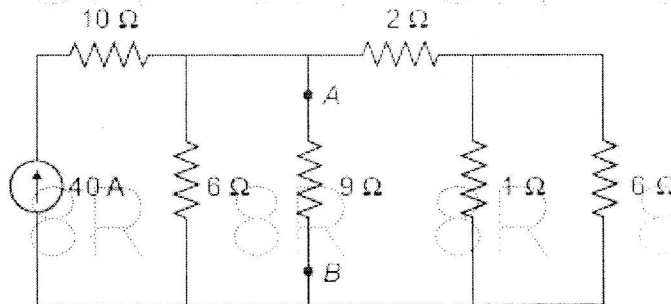

Figure: 9

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