R05

Code No: R05010203

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year Examinations, June - 2014
ELECTRICAL CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any five questions
All questions carry equal marks
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1.a) State and explain Kirchhoff's laws with a suitable example.
b) Find the equivalent resistance R_{ab} for the circuit shown in below figure 1.

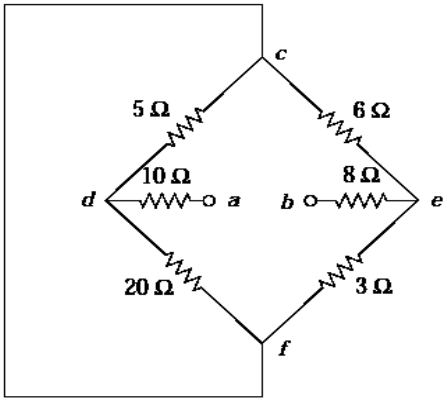

Figure: 1

2.a) State and explain faraday's laws of electromagnetic induction.
b) Two coils are connected in series and their effective inductance is found to be 15 mH. When the connection to one coil is reversed, the effective inductance is found to be 10 mH. If the coefficient of coupling is 0.7, determine:
i) The self inductance of each coil, and
ii) The mutual inductance.

3.a) Determine the rms value of the current waveform shown in below figure 2. If the current is passed through a 4 Ω resistor, find the average power absorbed by the resistor.

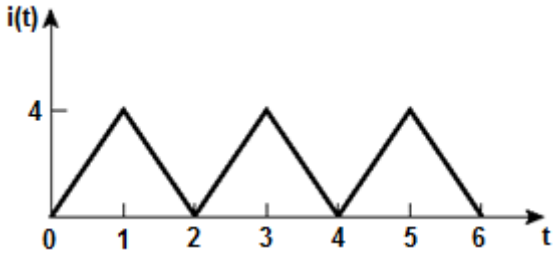

Figure: 2

b) A coil of resistance 5 Ω and inductance 120 mH in series with a 100 μF capacitor is connected to a 300 V, 50 Hz supply. Calculate (i) the current flowing, (ii) the phase difference between the supply voltage and current, (iii) the voltage across the coil and (iv) the voltage across the capacitor (v) draw the vector diagram.

4.a) A balanced delta-connected load has a phase current $I_{AC} = 10\angle -30^0$ A

i) Determine the three line currents assuming that the circuit operates in the positive phase sequence.

ii) Calculate the load impedance if the line voltage is $V_{AB} = 110\angle 0^0$ V.

b) A balanced star-connected load absorbs a total power of 5 KW at a leading power factor of 0.6 when connected to a line voltage of 240 V. Find the impedance of each phase and the total complex power of the load.

5.a) Define Graph, Tree, Basic tie set matrix and cut set matrix for a planar network with an example.

b) Explain the principle of duality and draw the dual network for the circuit shown in below figure 3.

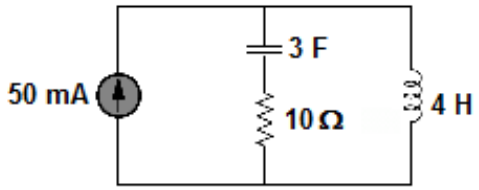

Figure: 3

6.a) State and explain thevenin's theorem with an example.

b) Apply superposition theorem to find v_0 for the circuit shown below figure 4.

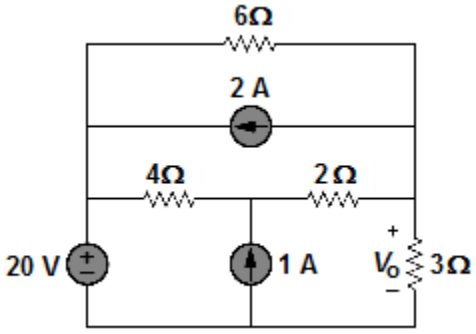

Figure: 4

7.a) Derive an equation for current *i* flowing through the 1 k Ω resistor in the figure 5 shown below, when the switch is moved from x to y. Assume that the switch has been in position x for some time.

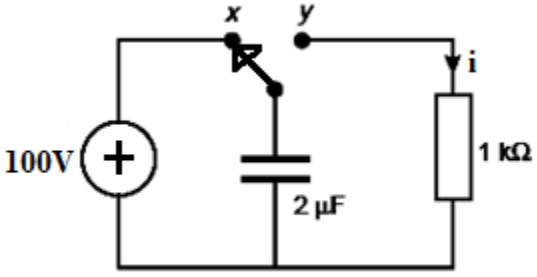

Figure: 5

b) The initial current in the inductor L of the circuit is I_o, with S open. Determine the current after S is closed for the network as shown in figure 6.

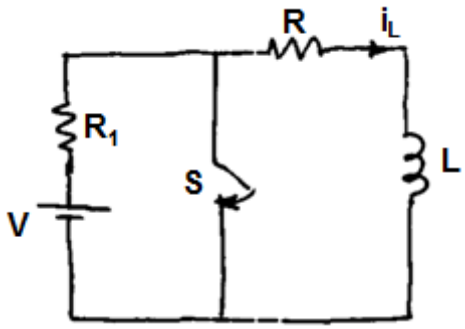

Figure: 6

8.a) Determine the Z-parameters for the network shown in below figure 7.

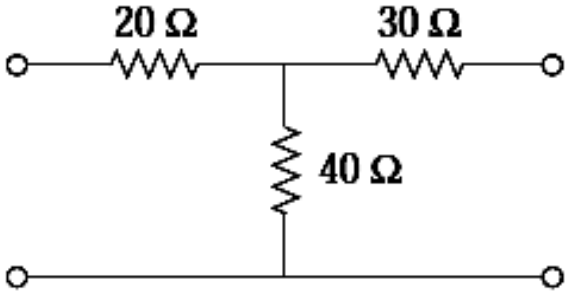

Figure: 7

b) For the circuit shown in below figure 8, find the ABCD parameters.

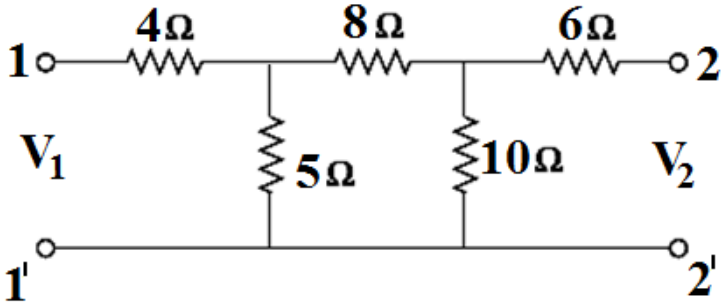

Figure: 8

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