Code: 15A04201

R15

B.Tech I Year II Semester (R15) Regular Examinations May/June 2016

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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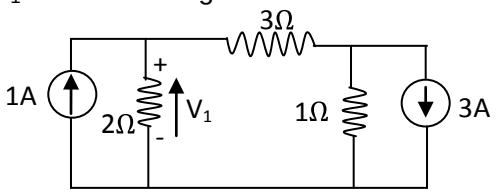
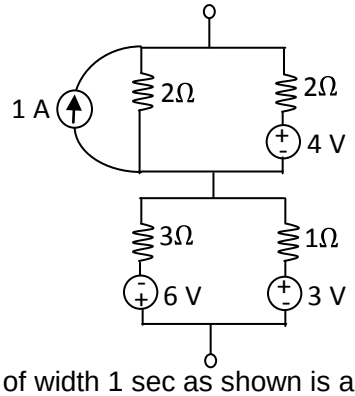
1 Answer the following: (10 X 02 = 20 Marks)

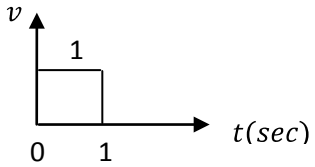
(a) Determine V_1 in the following network.



(b) Reduce the following network into a single source network.



(c) A unit pulse of width 1 sec as shown is applied to an R – L series circuit with $R = 1\ \Omega$ and L = 1H. Sketch the current response $i(t)$ in the circuit.



(d) A DC source of 1V is suddenly applied to a series R-L-C circuit with $R = 2\Omega$, L = 1H and C = ½ F. Sketch the current response $i(t)$ in the circuit.

(e) A voltage source V = 50 sin 100t is applied to a series R-L-C circuit with $R = 10\Omega$, L = 0.1H and $C = 100\mu F$. Determine the phase angel between the current and voltage phasors in steady state.

(f) A voltage source $V = 100 \sin(\omega t + 45°)$ volts is applied to a network resulting in a current $I = 50 \sin(\omega t + 75°)$ amps. Find the average power consumed by the network.

(g) A coil of impedance R + j X_L is in parallel with a capacitor of $C = 10\mu F$. If $R = 10\Omega$ and L=0.1H find the frequency at which it resonates, if connected to a variable frequency source.

(h) Two coupled coils with self inductances of 1H and 2H are connected in series aiding. The resulting inductance L eq is 4H. Find the coefficient of coupling between them.

(i) When 10 V is applied to a two port resistive network, on no load, the voltage at the open circuit end is 8 V. When 1 amp load is connected, the voltage at the load end is 6 V. Find the voltage at the load end for a load current of 2 amp. The supply voltage is same in all the cases.

(j) Draw the frequency response characteristics of a band pass filter and indicate the important frequencies in it.

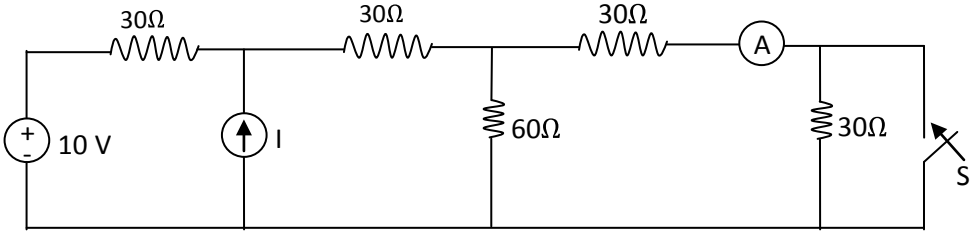
Contd. in page 2

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

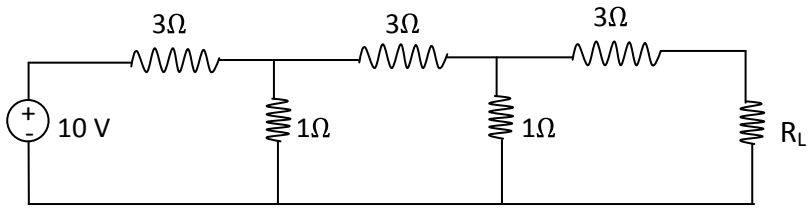
2 In the network shown below, ammeter reads 4/3 amps when the switch S is closed. Find the reading of the ammeter when the switch is opened.



OR

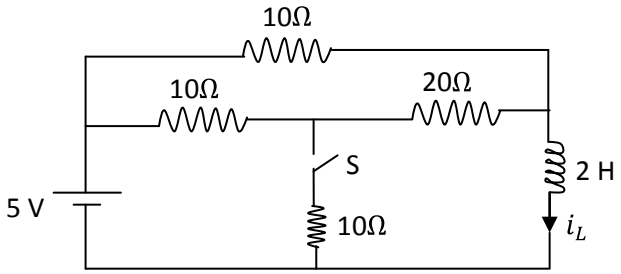
3 (a) State and explain Thevenin's theorem.

(b) In the following network determine R_L such that maximum power is delivered to it.



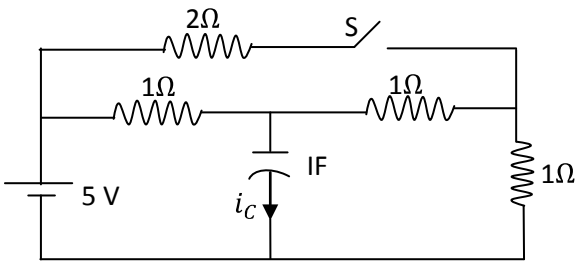
UNIT - II

4 In the following network, the switch S is open and steady state is reached. At t = 0, S is closed. Find $i_L(t)$ for $t > 0$.



OR

5 The following network is in steady state with S open. At t = 0, S is closed. Find $i_C(t)$ for $t > 0$.



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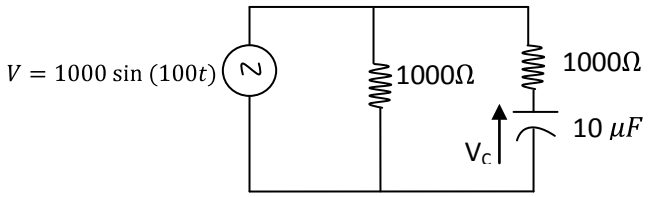
UNIT - III

6 (a) A voltage source $V = 100\sin(300t + 30°)$ is applied to a network containing two elements in series. The resulting current $I = 20\sin(300t - 30°)\,amps$. Determine the values of the two elements.

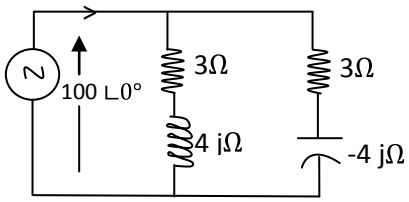
(b) In the following network, determine the voltage across capacitor V_c.



OR

7 (a) A voltage source $V = V_m \sin\omega t$ is applied to a series R-L circuit. Determine the expression for average power consumed.

(b) In the following network determine the total power supplied by the source.

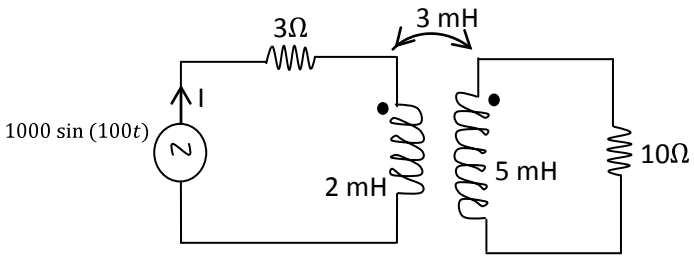


UNIT - IV

8 A coil of impedance R + j X_L is connected in series with a 50Ω resistor and a capacitor – j X_C ohms. The combination is connected across a 100 V variable frequency source. At a frequency of 200 Hz, maximum current of 0.7 amps flows in the circuit and the voltage across the capacitor is 200 volts at this frequency. Find R, X_L, X_C and band width of the circuit.

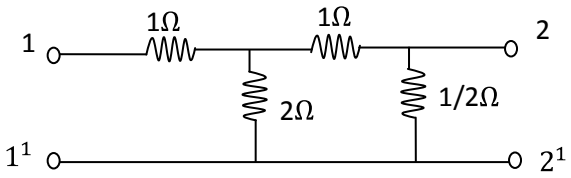
OR

9 In the following coupled circuit determine the current supplied by the source I.



UNIT – V

10 Find the Y and Z parameters of the following two port resistive network. Verify the relation between them.



OR

11 (a) Describe the principle of constant K low pass filter and high pass filter.

(b) Design a constant K low pass filter of T-type with a cut off frequency of 2 KHz with a load resistance termination of 500 ohms.

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