Code: R7100406

R07

B.Tech I Year (R07) Supplementary Examinations December/January 2014/2015

NETWORK ANALYSIS

(Common to ECE, EIE, E.Con.E & ECC)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks
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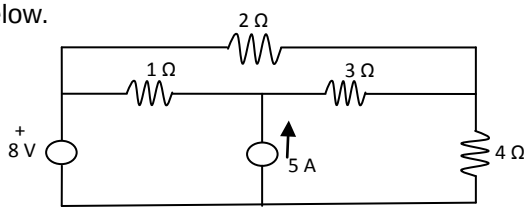
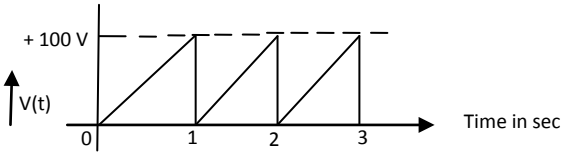
1 (a) Explain clearly what is source transformation.

(b) Using nodal analysis, find the currents and voltages in all the branches of the network. For the circuit shown figure below.



(c) A 5 μF capacitor has charge $q(t) = 100\left[1 + e^{-5\times10^4 t}\right]$ micro coulombs. Determine the corresponding V(t) and i(t).

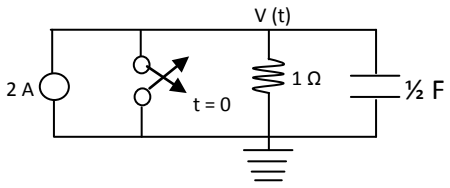
2 (a) Define average value, RMS value and form factor. Find these values for a saw tooth wave increasing linearly form 0 to 100 voltage in the interval 0 to 1 sec. At t = 1 sec, its value becomes zero and the wave repeats (as shown in figure below)



(b) Obtain the S-domain equivalent for the following elements.
(i) Resistance R.
(ii) Inductance with initial current- I_0.
(iii) Capacitors.
(iv) Capacitors with initial voltage V_0 give the relevant equations.

3 (a) Show that in series R-L-C circuit the resonant frequency is the geometric mean of half power frequencies.

(b) In the circuit shown below, find $V(0^+)$, $dv/dt\,(0^+)$, $dv/dt^2\,(0^+)$ and $V(\infty)$ when the switch 'S' is opened at t = 0.



(c) Two circuits having the same numerical ohmic impedance value are joined in parallel. The power factor of one circuit is 0.8 and the other is 0.6, both lagging. Calculate power factor of the combination.

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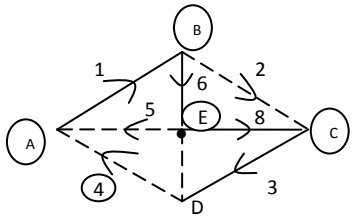
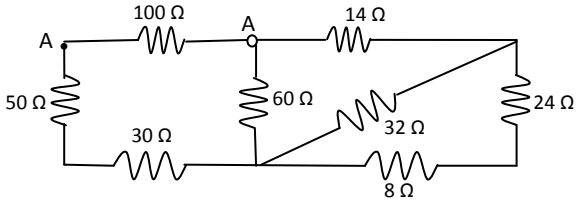
4 (a) For the given network (shown below) graph, construct the basic cutset incidence matrix, tracking elements 1. 6, 8, 3 as tree branches. Express the link branch voltage in terms of tree branch voltages.



(b) Distinguish between:
(i) Active and passive elements.
(ii) Independent and dependent sources.

(c) Find the equivalent resistance between terminals A & B of the network shown below.



5 (a) Write the standard Y-parameter equations. Obtain the Y-parameters interms of Z-parameters.

(b) Obtain Z-parameter for the circuit shown below and there by obtain ABCD parameters.

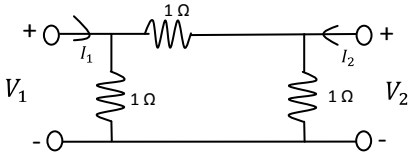
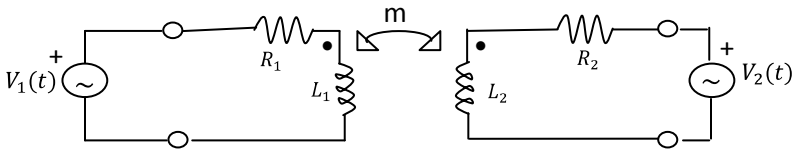


Figure.6

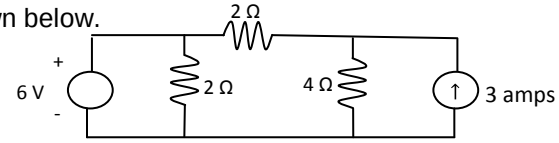
6 (a) Obtain the equivalent 'T' for magnetically coupled circuit in figure given below



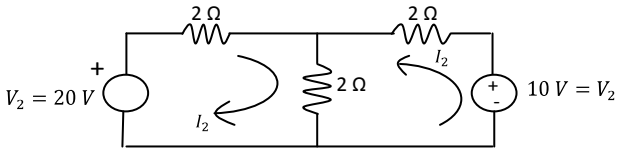
(b) Write down the Loop Equations for the network shown above.

(c) A series RLC circuit with $R = 5\ \Omega$, $L = 0.2\ H$ and $C = 1\ F$ has a voltage source $V = 10e^{-100t}$ volts applied at t = 0. Find the current through the circuit using Laplace transform method.

7 (a) Define and determine the current in resistor 4 Ω using super position theorem in the circuit shown below.



(b) State and verify Tellegen's theorem in the network shown below.



8 (a) What is composite filter? Discuss about general procedure for its design.

(b) Design a low pass m derived T section having a cut off frequency of 2.5 KHz, a frequency of infinite attenuation 2.65 KHz and a design impedance of 600 ohm.

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