Code: 13A04101

R13

B.Tech I Year (R13) Supplementary Examinations December/January 2014/2015

NETWORK ANALYSIS

(Common to ECE and 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) For a network of seven branches and four nodes, the number of independent loops will be ----

(b) The number of independent loops for a network with n nodes and b branches are----------

(c) In a series RLC circuit with output taken across C, the poles of the transfer function are located at $-\alpha \pm j\beta$. The frequency of maximum response is given by ---------

(d) The free response of RL and RC series networks having a time constant τ is of the form-----

(e) The natural response of a network is of the form $(A_1 + A_2 t + A_3 t^2) e^{-t}$. The network must have repeated poles at s = 1 with multiplicity ----------

(f) The mutual inductance M associated with the two coupled inductances L_1 and L_2 and is related to the coefficient of coupling K is ----------

(g) A 2 port network using Z parameter representation is said to be reciprocal if ----------

(h) Two inductors of values L_1 and L_2 are coupled by a mutual inductance M. By inter connection of the two elements, one can obtain a maximum inductance of ----------

(i) A π – section filter comprises a series arm inductance of 20 mH & two shunt capacitors each of 0.16 microfarad. Calculate the attenuation at 15 KHz.

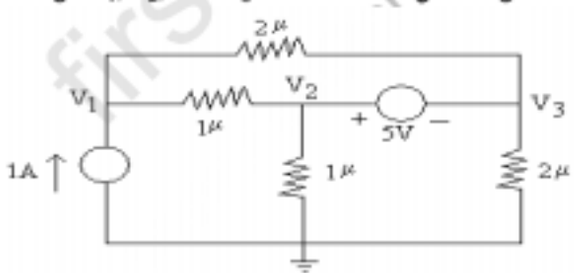
(j) A second order band pass filter has a value of 10 for the ratio of center frequency to bandwidth. The filter can be realized with ----------

PART – B

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

UNIT – I

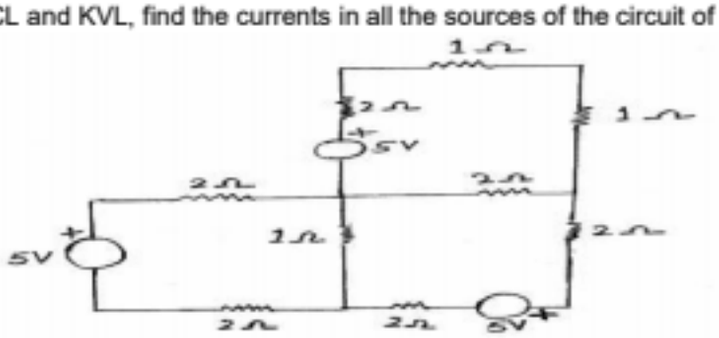
2 (a) Find the node voltage V_1, V_2, and V_3 for the circuit given figure below.



(b) State and explain Tellegen's theorem

OR

3 (a) Using KCL and KVL, find the currents in all the sources of the circuit of the following figure.



(b) Explain Miller's theorem with an example.

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UNIT – II

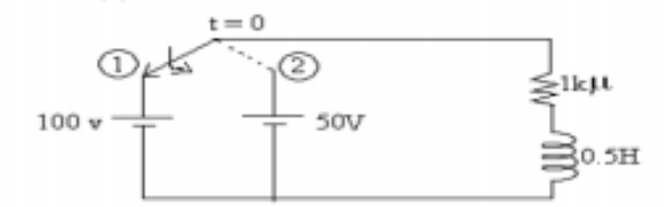
4 (a) Define circuit transient, time constant, natural response and forced response.

(b) An exponential voltage $V(t) = e^{-t}$ is suddenly applied at t = 0 to a series RC circuit with R = 9 Ω, C = 0.25F. Obtain particular solution for current i(t) through the circuit if the initial charge across the capacitor C is zero.

OR

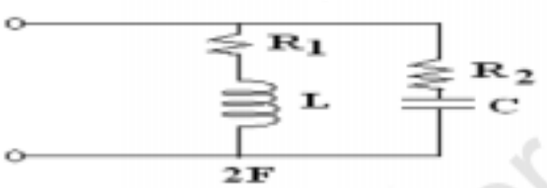
5 (a) Deduce the transient response of RL series circuit excited by DC source.

(b) In the series RL circuit the switch is closed on position (1) at t=0, and then at t = t'= 50 μ sec, it is moved to position (2) Find the expression for current in the intervals 0 < t < t' and t < t'. Shown in figure below.



UNIT – III

6 (a) Obtain the expression for resonance frequency of a parallel resonant circuit shown in the figure below. Find the condition for resonance at all frequencies.



(b) Define self-inductance of a coil, mutual inductance between two coils and coefficient of coupling. Derive the relation between the self, mutual inductances and coefficient of coupling.

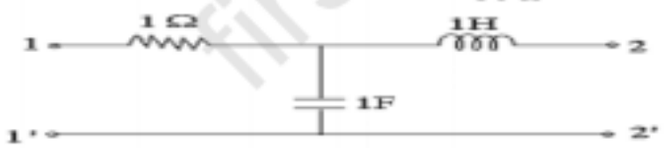
OR

7 (a) A RLC series circuit of 8 Ω resistance should be designed to have a bandwidth of 50 Hz. Determine the values of L and C so that the system resonates at 250 Hz.

(b) Distinguish between reactance, impedance, admittance and suceptance

UNIT – IV

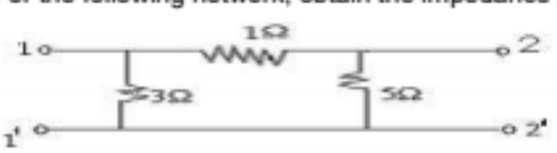
8 (a) Obtain the transmission parameters of the 2-port network shown in figure below.



(b) Design a high pass filter with a cut-off frequency of 1 KHz with a terminated design impedance of 800 Ω.

OR

9 (a) For the following network, obtain the impedance parameters and hence determine transmission parameters.



(b) Derive the relation between Y and h parameters.

UNIT – V

10 (a) What is the difference between constant – k and m-derived filters?

(b) Design a high pass π network, having a cut-off frequency of 3250 Hz. The frequency of infinite attenuation may be taken as 2750 Hz. The characteristic impedance is 450 μ.

OR

11 (a) Explain what is meant by constant k-filters. Classify them.

(b) Design an m-derived T section low pass filter having a design impedance of 600 Ω, cut-off frequency of 2400 Hz and infinite attenuation at 2500 Hz.

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