Code No: R13211 **R13** **SET-1**

I B. Tech II Semester Supplementary Examinations, December - 2020
NETWORK ANALYSIS
(Com. to ECE, EIE, E Com E)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are the different types of dependent sources? (3M)

   b) What is meant by phase difference? What is the difference between voltage and current in pure inductive and capacitive circuits? (4M)

   c) For mutually coupled series coils what is the equivalent inductance with two different possible mutual connections? (4M)

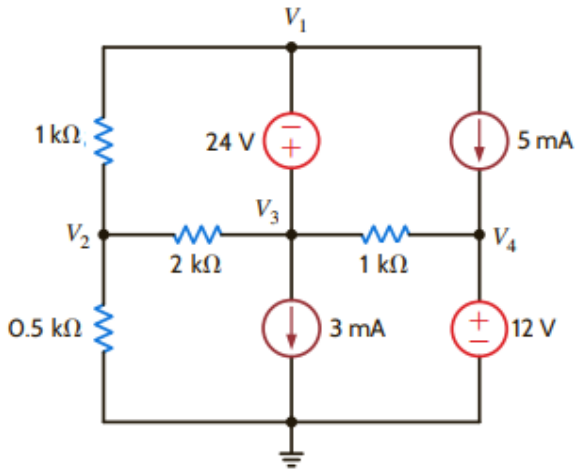
   d) Briefly illustrate compensation theorem with suitable example. (4M)

   e) Give and explain in brief about relations of the inverse transmission line parameters. (4M)

   f) Write the second order differential equation of RLC series and parallel circuit. (3M)

PART –B

2. a) Use nodal analysis to determine the node voltages of circuit shown in the following figure. (8M)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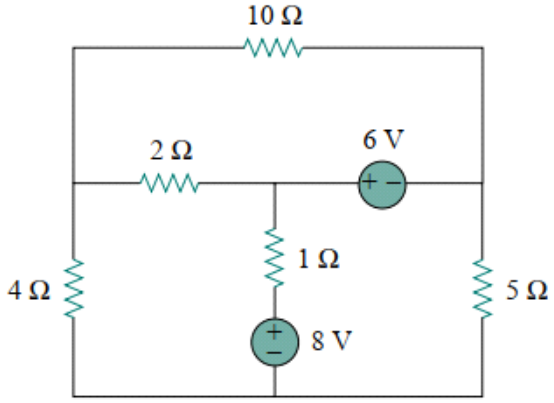
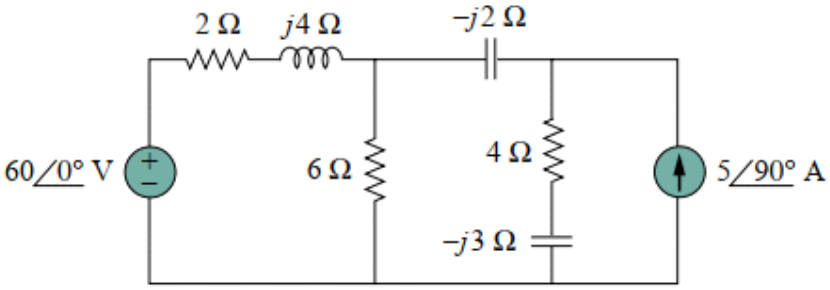
b) Draw the graph of the circuit as shown in the following figure, find tie test schedule and determine loop currents. (8M)

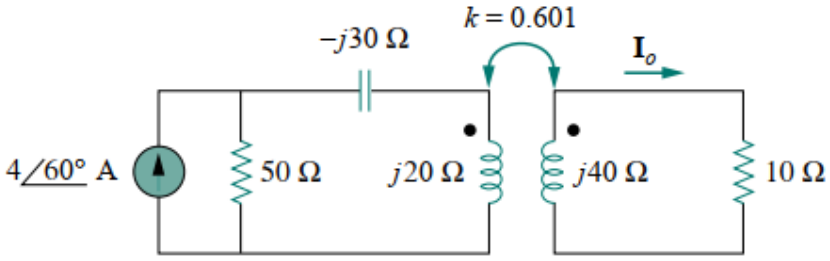


3. a) Determine the real power, reactive power, complex power, and the power factor for a load having the following characteristics. (8M)
(i) I = 2 ∠40° A rms, V= 450 ∠70° V rms.
(ii) I = 1.5 ∠–20° A rms, Z = 5000 ∠15° Ω.
(iii) V = 200 ∠+35° V rms, Z = 1500 ∠–15° Ω

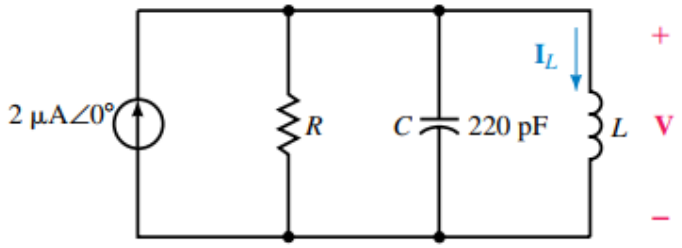
b) Use mesh analysis to determine various loop currents for the circuit shown in the following figure. (8M)



4. a) Find $\mathbf{I}_0$ in the following circuit. Switch the dot of the right side winding to the bottom and calculate $\mathbf{I}_0$ again. (8M)



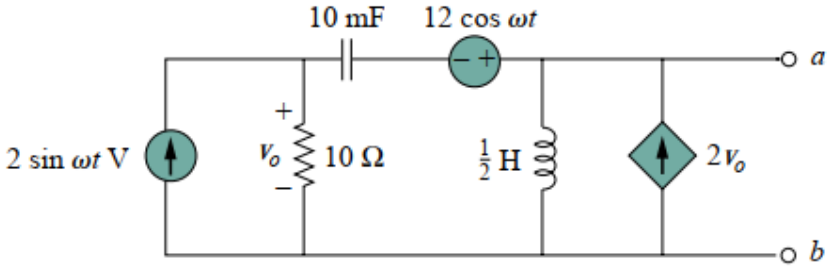
b) Consider parallel resonant circuit shown in the following figure: (8M)



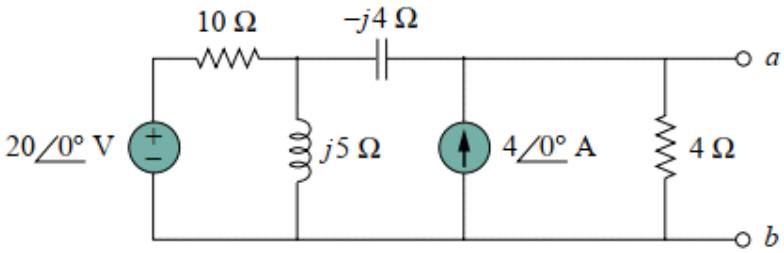
Suppose the circuit has a resonant frequency of 800 kHz and a bandwidth of 25 kHz.

i) Determine the value of the inductor, *L,* in henries.
ii) Calculate the value of the resistance, *R,* in ohms.
iii) Find V, I_L, and power, P, at resonance.
iv) Find the approximate values of the half-power frequencies, f_1 and f_2.
v) Determine the voltage across the circuit at the lower half-power frequency f_1, and show that the power dissipated by the resistor at this frequency is half the power dissipated at the resonant frequency.

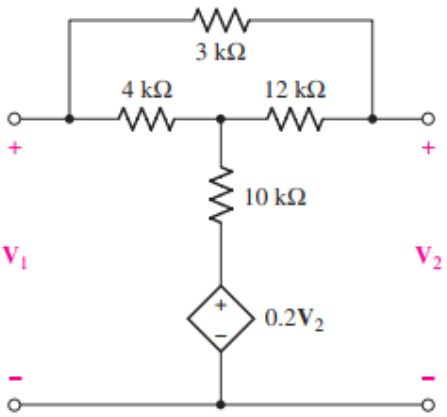
5. a) At terminals *a-b*, obtain Thevenin's equivalent circuits for the network shown in the following in figure. Take ω = 10 rad/s (8M)



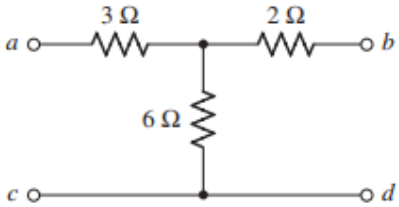
b) Find the Maximum power transfer to the load resistance, 4 Ω across *a-b* in the following circuit. (8M)



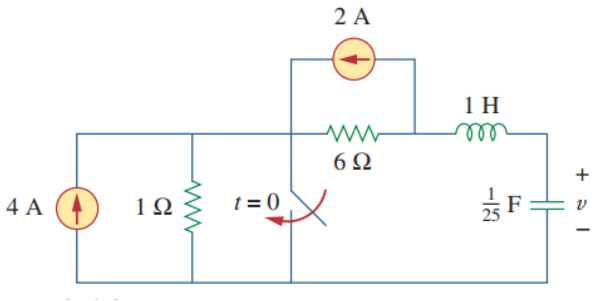
6. a) Use an appropriate method to obtain the h-parameters of the network illustrated in the following figure. (8M)



b) The two-port networks of the following figure are connected in series. (i) Determine the impedance parameters for the series connection by first finding the z-parameters of the individual networks. (ii) If the two networks are instead connected in parallel, determine the admittance parameters of the combination by first finding the y-parameters of the individual networks. (8M)



7. a) For the given the network shown in the following figure, find for $v(t)$ for $t > 0$. (8M)



b) In the circuit shown in the following figure, the switch moves from position 1 to position 2 at $t = 0$. Use Laplace transforms to find $v(t)$ for $t > 0$. (8M)