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

**I B. Tech II Semester Supplementary Examinations, April/May - 2019**
**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) State Ohms law and write the $v - i$ equations of L and C elements. (4M)

   b) What is the phase angle of a coil having a resistance equal to half its inductive reactance? (3M)

   c) Show that the power factor of a series RLC circuit is unity when it is in a state of resonance. (3M)

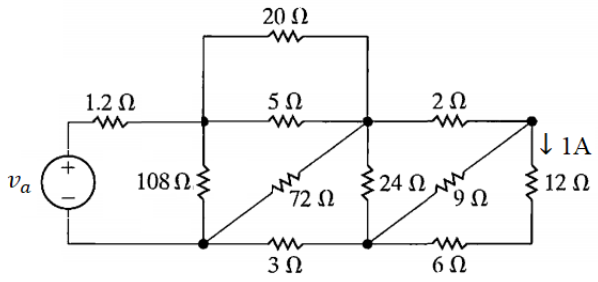
   d) Describe Reciprocity theorem with example. (4M)

   e) Draw a diagram to represent two two-port networks connected in cascade and parallel. (4M)

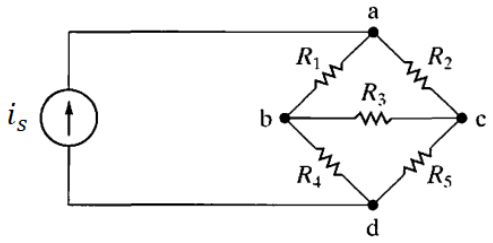
   f) Why there could be periods of transient operation in inductive and capacitive circuits when the switches in this circuit are operated? (4M)

## PART -B

2. a) If the current in the 12 Ω resistor in the following given circuit is 1 A, as shown find (i) source voltage $v_a$ and, (ii) power absorbed by 20 Ω resistor. (6M)




   b) Assume that current $i_s$ in the following given circuit is known and the resistors $R_1$ to $R_5$ are also known (5M)




   (i) How many unknown currents are there?
   (ii) How many independent equations can be written using Kirchhoff s current law (KCL)?
   (iii) Write an independent set of KCL equations.
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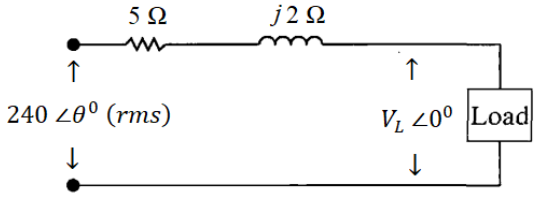
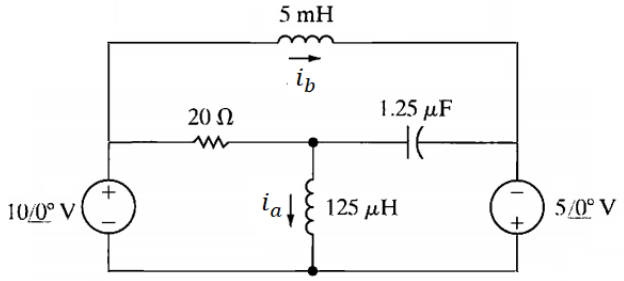
c) How do you construct cut set matrix? Describe with suitable example. (5M)

3. a) For the circuit shown in the following figure, find the $V_L$(rms) and $\theta$ if the load absorbs 2000 VA at a lagging power factor of 0.85. Also construct the phasor diagram for the solution obtained. (8M)




b) Use the mesh-current method to find the $i_a$ and $i_b$ in the following circuit. (8M)




4. a) Show that the equivalent inductance of parallel connected two magnetically coupled coils having self-inductances $L_1$ and $L_2$ with mutual inductance M is (assume the suitable dot convention for the circuit) (5M)

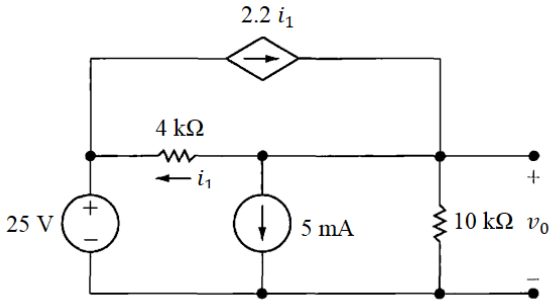
$$L_{eq} = \frac{L_1L_2 - M^2}{L_1+L_2 - 2M}$$

b) A series circuit consists of a 40 Ω resistor, a 0.5 H inductor and a variable capacitor connected across a 100 V, 50 Hz supply. Calculate (a) the value of the capacitance required to give resonance, (b) the voltages across the resistor and inductor at resonance, and (c) the Q-factor of the circuit. (6M)

c) Derive the expression for the bandwidth (B) of parallel resonant circuit in terms of the angular resonant frequency ($\omega_0$) and the Q-factor. (5M)

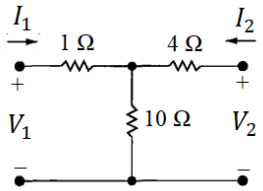
5. a) Explain in detail how do you use tellegens theorem with suitable example. (6M)

b) By using the principle of superposition, find the $v_0$ in the following circuit. (10M)




6. a) Describe, which two of the ABCD parameters are always equal in symmetrical two-port networks. (4M)

b) Find the z and *y* parameters for the following given circuit. (12M)




7. The switch in the circuit in following figure has been in position 'a' for a long time. At, $t = 0$ the switch moves instantaneously from 'a' to position 'b', as shown (16M)

(i) Construct the s-domain circuit for $t > 0$
(ii) Find $V_0$ and $I_L$
(iii) Find $v_0$ for $t > 0$
(iv) Find $i_L$ for $t \geq 0$