Code No: R21042 **R10** SET - 1

**II B. Tech I Semester Supplementary Examinations, Jan - 2015**
**NETWORK ANALYSIS**
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) State and explain Kirchhoff's laws with an example.
   b) Write notes on the following:
      i) Ideal current source ii) Ideal voltage source
   c) Explain the source transformation with an example.

2. a) Define the following terms:
      i) RMS value ii) Form factor iii) Peak factor iv) Average value
   b) Explain the principle of duality.
   c) Discuss about planar and non planar graphs?

3. a) Explain the star-delta and delta-star transformation for an impedance network.
   b) Determine the total impedance of the circuit shown in Figure 3b?

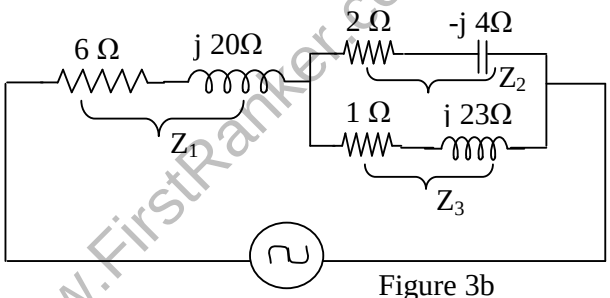

Figure 3b

4. a) For the circuit shown in Figure 4a, find the equivalent inductance.
   b) Define quality factor and derive the expression for the same for RLC series circuit.

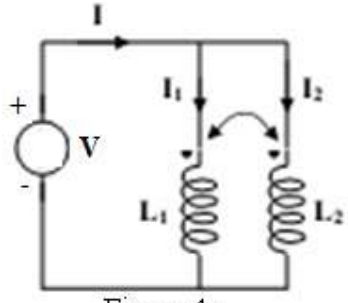

Figure 4a.
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5. a) State and explain substitution theorem
   b) Find R in the Figure 5 so that maximum power is transferred to the resistance R.

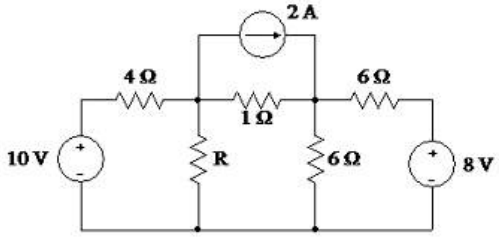


Figure 5

6. a) Derive the relationship between transmission and hybrid parameters.
   b) Find the Z-parameters of the two-port network shown in Figure 6a.

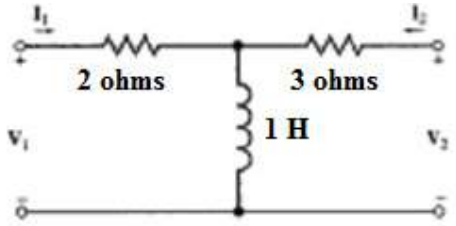


Figure 6a

7. a) Explain how the initial conditions are evaluated for the transient networks?
   b) A series R-C circuit shown in Figure 7b, with R = 105 Ω, C = 2.5μF has a sinusoidal voltage as source V = 250 sin (500t). Find the current assuming that there is no initial charge on the capacitor?

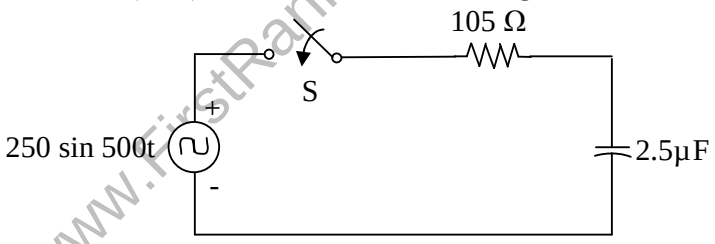


Figure 7b

8. Write notes on the following:
   a) Band pass filters
   b) Band elimination filters
   c) m-derived filters

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1. a) Calculate the charge stored on a 3 pF capacitor with 20V across it. Find the energy stored in the capacitor.
   b) Show that the equivalent capacitance of *N* parallel-connected capacitors is the sum of the individual capacitance.
   c) Determine all branches currents and voltage drops across all resistors of the circuit shown in the Figure 1c?

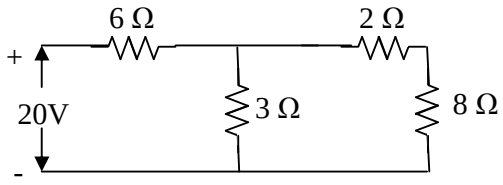


Figure 1c

2. a) Explain in detail about the tie set schedule with an example?
   b) Find the average and effective values of saw – tooth wave form shown in Figure 2b?

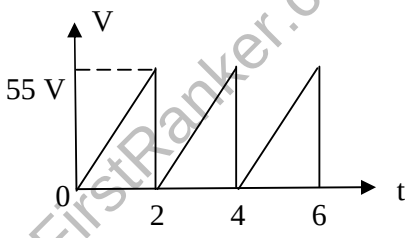


Figure 2b

3. a) Show that real power consumed in a pure capacitor is zero.
   b) For the circuit shown in Figure 3b, find the power factor, true power, reactive power and apparent power?

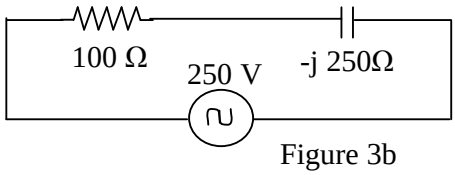


Figure 3b

4. a) Explain the dot rules in magnetically coupled circuits.
   b) A series RLC circuit has R = 17Ω, L = 38mH, C = 45μF. Calculate the resonant frequency and under resonance condition. Calculate current, power and voltage drops across various elements, if the applied voltage is 60V?
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5. a) State and explain Maximum power transfer theorem.
   b) Use superposition theorem to find $i_o$ in the circuit shown in Figure 5.

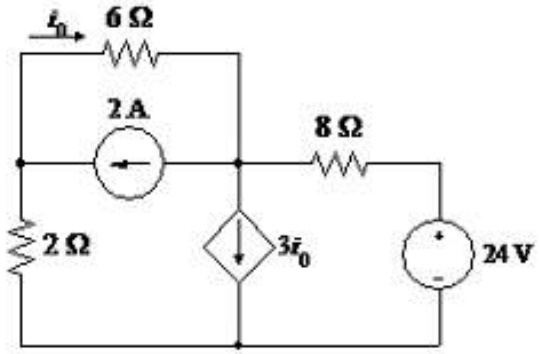


Figure 5

6. Find the ABCD, hybrid parameters of the two-port network shown in Figure 6.

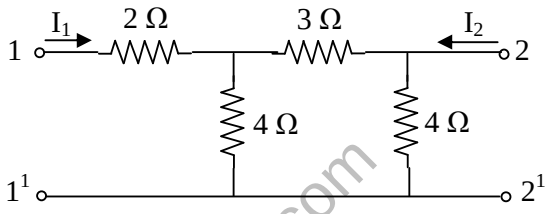


Figure 6

7. a) Find the voltage across the capacitance for t > 0 in the circuit shown in Figure 7.
   b) Derive an expression for current in an RL circuit when it is excited by a unit step voltage.

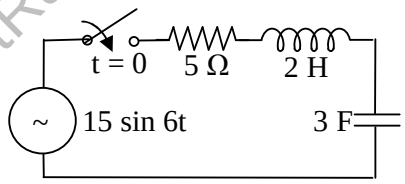


Figure 7

8. a) What are the applications of *m*-derived low-pass filter?
   b) Design an m-derived low pass filter having cutoff frequency of 2 kHz, resonant frequency 1000 Hz and design impedance of 450 Ω.

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1. a) Find the equivalent capacitance seen between terminals *a* and *b* of the circuit in Figure 1a**.**

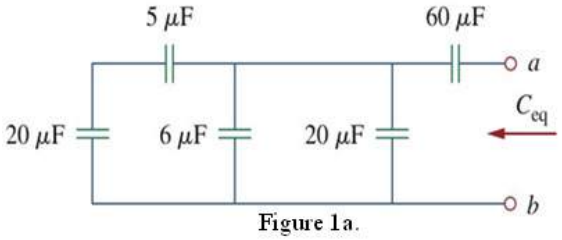

Figure 1a.

b) Find the power for each device (see Figure 1b)

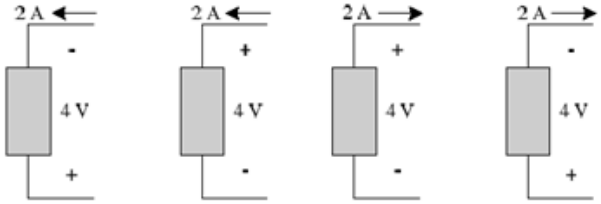

Figure 1b.

2. a) Find the average value, RMS value and form factor of a sinusoidal wave.
b) Write notes on phasor representation of sinusoidal waves.
c) Explain the duality with an example.

3. a) An RL series circuit of R = 4.7 kΩ and L = 1 H is connected across a voltage source of 150 V, 50 Hz. Determine impedance, power factor, current flowing in the circuit? What is the power dissipated in the circuit.
b) Show that active power consumed in pure inductor is zero.

4. a) Explain in detail about the concept of resonance in series RLC circuit. Derive the expression for resonant frequency?
b) Derive the expression for coefficient of coupling between the two coupled coils?
c) Discuss the properties of anti resonance circuits.
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Code No: R21042 **R10** SET - 3

5. a) State and explain reciprocity theorem.
   b) Obtain Thevenin equivalent of the circuit shown in Figure 5 with respect to the terminals a-b

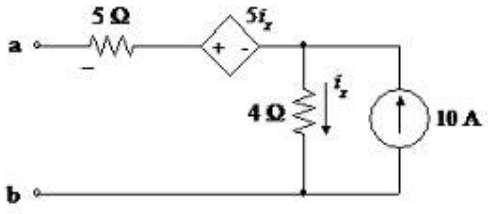


Figure 5

6. a) Explain about inverse hybrid parameters and how they are determined?
   b) Find Y parameters for the network shown in Figure 6b?

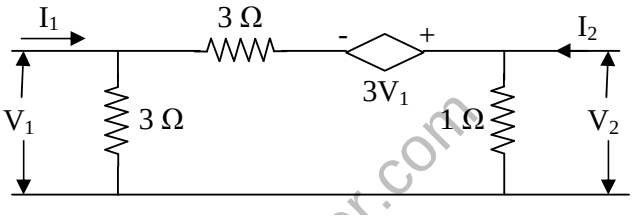


Figure 6b

7. a) Derive an expression for current in an RC series circuit energized by a DC voltage source.
   b) A series RLC circuit with R=20 ohms, L=0.2 henries and C=0.35 farads has a constant voltage of 60 Volts applied at time t=0. Determine the transient current i(t). Assume zero initial conditions.

8. a) Write notes on the following: i) Composite filters ii) Frequency selective filters
   b) Design a m-derived High Pass Filter with a cut-off frequency of 10 kHz. Design impedance of 550Ω and m = 0.5

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1. a) Find the current $i_o$, using nodal analysis, in the circuit shown in Figure 1a.
   b) Write short notes on independent sources and dependent sources.

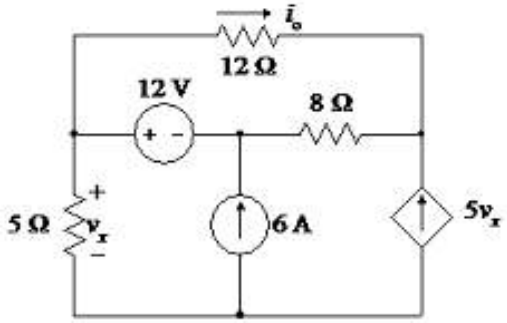


Figure 1a.

2. a) Discuss briefly about branch, node, tree with an example?
   b) Derive the expression for the RMS and average value for the output waveform of half wave rectifier?

3. a) Find the impedance and voltage across resistor and inductor, if a resistor of 1kΩ and an inductor of 110 mH are connected in series to a source o 11 V, 10 kHz? Also find the power factor and power dissipated in the circuit.
   b) Draw the phasor diagrams for R-L and R-C circuit excited by a sinusoidal voltage.

4. a) Define Q-factor and derive expressions for Q-factor and bandwidth of series resonant circuits.
   b) Show that the resonant frequency is the geometric mean of two half power frequencies.
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Code No: R21042 **R10** SET - 4

5. a) State and explain Tellegen's theorem.
   b) Use superposition theorem to find the current through $R_1$ of circuit shown in Figure 5a.

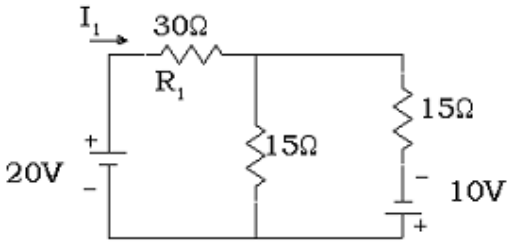


Figure 5a.

6. a) Explain the relationship between ABCD and Z-parameters.
   b) For the T-network shown in Figure 6, determine Z-parameters.

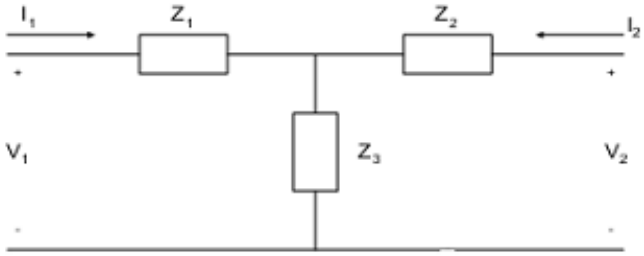


Figure 6

7. a) What is time constant? Write the expressions of time constant for R-L and R-C circuits. What are its uses in electrical engineering.
   b) The switch in the circuit shown in Figure 7 has been closed for a long time. It is opened at $t = 0$. Find the current $i(t)$ for $t > 0$.

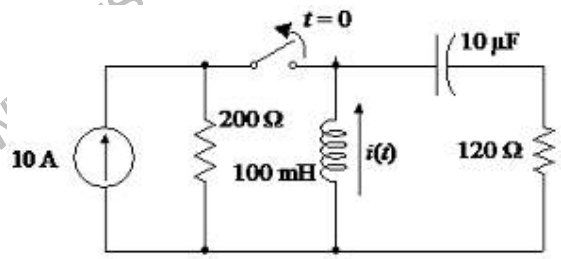


Figure 7

8. a) Draw the circuit diagram of *m*-derived shunt low-pass filter half section.
   b) Write notes on composite design of low-pass filters.
   c) Draw the magnitude response of ideal frequency-selective filters.