Subject Code: R13211/R13 **Set No - 1**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(a) Define electric charge and electric current and write the relationship between these two.
(b) A series R-L circuit have R=20 ohms and L=0.3 H. What is the value of admittance, conductance and susceptance? Assume frequency as 50 Hz.
(c) Give the reasons why series resonance circuit is known as voltage resonance circuit and parallel resonance circuit is known as current resonance circuit.
(d) State Thevenin's theorem and what are its limitations.
(e) Give symmetry and reciprocity condition of z-parameters and inverse transmission parameters.
(f) What is time constant? Give the formula of time constant for R-L and R-C circuits.

[3+4+4+4+4+3]

PART-B

2.(a) Show that the equivalent capacitance of *N* parallel-connected capacitors is the sum of the individual capacitance.
(b) Find the average and effective values of saw-tooth wave form shown in Figure 2b?

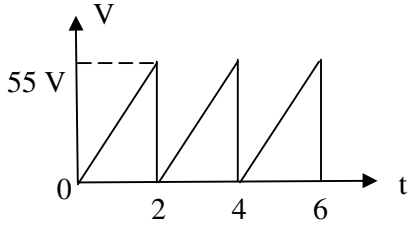

Figure 2b

[7+9]

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 of 11 V, 10 kHz? Also find the power factor and power dissipated in the circuit.
(b) Prove that the average power consumed by a pure inductor is zero.

[9+7]

4.(a) An inductive coil having a resistance of 20 ohm and inductance of 0.02H is connected in series with 0.02 μF capacitor. Calculate (i) quality factor of the coil (ii) Resonant frequency and (iii) the half-power frequencies.
(b) The self Inductance of one of the mutually coupled coils is 300mH and the mutual inductance between them is 100mH. Determine: (i) Self inductance of the other coil and (ii) turns ratio. Assume a co-efficient of coupling equal to 0.7.

[8+8]

5. Find the Thevenin's and Norton's equivalent circuits for the network shown in Figure 3.

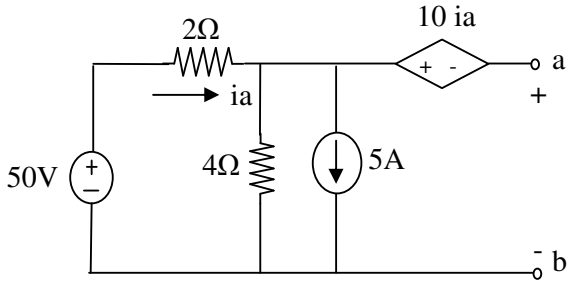

Figure 3

[16]

6.(a) Why h-parameters are called as hybrid parameters?

(b) Obtain the condition for a given network to be reciprocal as well as symmetrical network in terms of h-parameters?

(c) Obtain the z-parameters of the network shown in Figure 6.

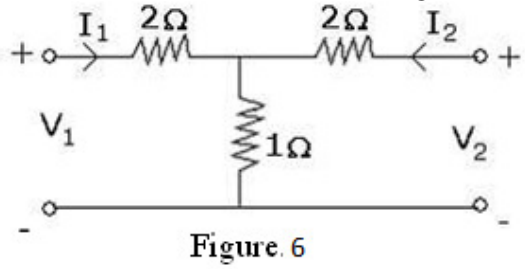

Figure. 6

[3+6+7]

7.(a) Derive an expression for the current in an RL circuit excited by a unit step voltage.

(b) A series RLC circuit with R=10 ohms, L=0.1 henries and C=20 microfarads has a constant voltage of 100 V applied at time t=0. Determine the transient current i(t) using Laplace transform techniques. Assume zero initial conditions.

[8+8]

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Subject Code: R13211/R13 **Set No - 2**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(a) What are the properties of incidence matrix.

(b) Define active power, reactive power, apparent power, power factor and give their expressions.

(c) Define self-inductance, mutual inductance and co-efficient of coupling.

(d) State superposition theorem and what are its limitations.

(e) Give symmetry and reciprocity condition of z, y and transmission parameters.

(f) In the circuit of Figure 1(f), switch S_1 has been closed for a long time while switch S_2 has been open for a long time. At t=0, switch opens S_1 and switch S_2 closes. What is the value of voltage $V_c(t)$ for all t>0.

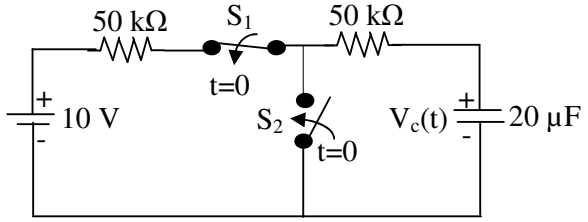

Figure 1(f)

[3+4+3+4+4+4]

PART-B

2.(a) Explain in detail about the tie set schedule with an example?

(b) For the circuit shown in Figure 2(b), (i) use nodal analysis to find the power supplied by the 3A source (ii) transform the voltage source into current source and use nodal analysis to find the power supplied by the new ideal current source.

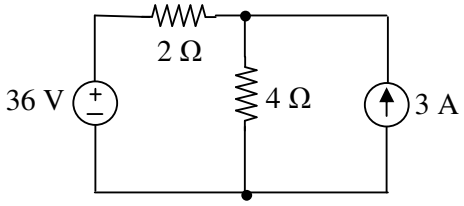

Figure 2(b)

[8+8]

3.(a) Three impedances $Z_1=(5+j5)\Omega$, $Z_2=(-j8)\Omega$ and $Z_3=4\Omega$ are connected in series to an unknown voltage source V. Find I and V if the voltage drops across Z_3 is $63.2\angle 18.45^0\ V$.

(b) A 200 V, 50 Hz, inductive circuit takes a current of 10A, lagging 30 degree. Find:
(i) the resistance (ii) reactance (iii) inductance of the coil

[8+8]

4.(a) Explain the dot rules in magnetically coupled circuits.

(b) A series RLC circuit has R = 17 ohms, 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?

[6+10]

5.(a) State and explain substitution theorem

(b) Find R in the Figure 5 so that maximum power is transferred to the resistance R.

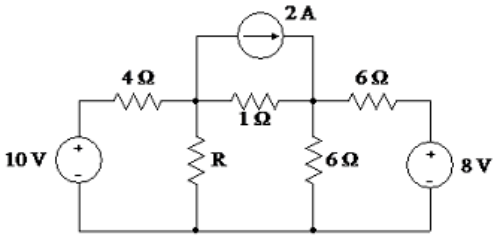

Figure 5

[8+8]

6.(a) Derive the relationship between admittance and hybrid parameters.

(b) Obtain the transmission parameters of the network shown in figure 6.

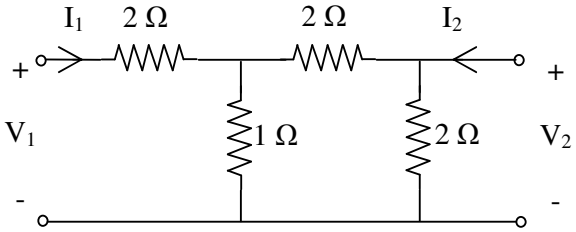

Figure 6

[8+8]

7.(a) For R - L - C series circuit with R = 10Ω, L = 0.2 H, C = 50 μF, determine the current i(t) when the switch is closed at t = 0. Applied voltage is $V(t) = 100 \cos(1000\, t + 60^0)$.

(b) Derive the expression for voltage across C of a parallel R-C circuit when excited by a sinusoidal current source at t=0.

[8+8]

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Subject Code: R13211/R13 **Set No - 3**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(a) Define planar graph and non-planar graph and write the difference between them.
(b) Express impedance of R-L, R-C, R-L-C series circuits in rectangular and polar forms at a constant frequency.
(c) Write the dot rules for mutually coupled circuit.
(d) State maximum power theorem and what are its limitations.
(e) Give symmetry and reciprocity condition of h-parameters and transmission parameters.
(f) In the circuit of Figure 1(f), switch S_1 has been closed for a long time while switch S_2 has been open for a long time. At t=0, switch opens S_1 and switch S_2 closes. What is the value of current $I_L(t)$ for all $t=+\infty$.

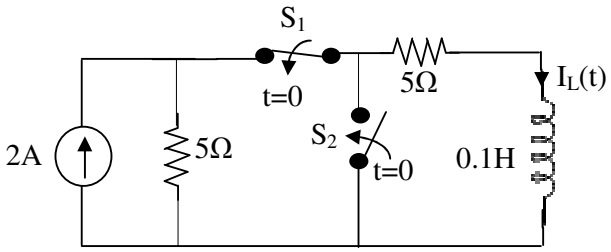

Figure 1(f)

[3+4+4+3+4+4]

PART-B

2.(a) Write a note on phasor representation of sinusoidal waves.
(b) Explain the duality with an example.
(c) For the circuit shown in Figure 2(c), use nodal analysis to find the power supplied by 7A source (i) if R=4 ohms (ii) if R is infinite

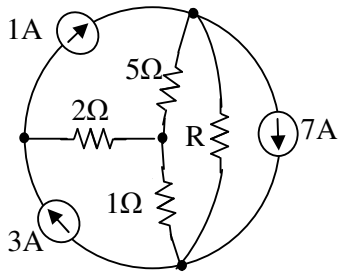

Figure 2(c)

[4+4+8]

3.(a) A RLC series circuit consists of resistance 75 Ω, inductance 125 mH and capacitance of 200 μF. The circuit is excited by a sinusoidal voltage of 115V, 50Hz, single phase source. Determine the current, voltage across each element, power consumed in each element. Draw the phasor diagram.
(b) Prove that the average power consumed by a pure capacitor is zero.

[9+7]

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?

[9+7]

5.(a) State Superposition Theorem. Using superposition theorem find v_0 in Figure 5.

(b) State and explain reciprocity theorem.

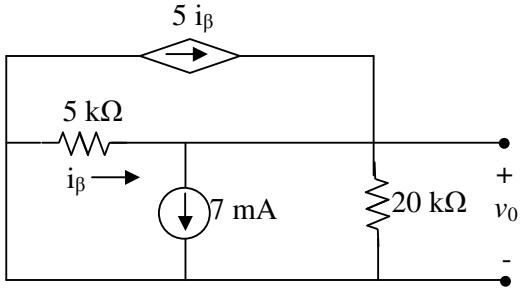

Figure 5

[9+7]

6.(a) The following test observations were recorded on a two-port network in a laboratory:

Port 1-1[1] on open circuit	Port 2-2[1] on short circuit
$V_1 = 25mV$	$V_1 = 15mV$
$V_2 = 40mV$	$I_1 = 15\mu A$
$I_2 = 10\mu A$	$I_2 = -5\mu A$

Determine the hybrid parameters of the network from the test data. Compute the open-circuit impedance parameters and verify the result.

(b) Derive Z – parameters as a function of ABCD parameters.

[8+8]

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? Assume switch S is closed at t=0.

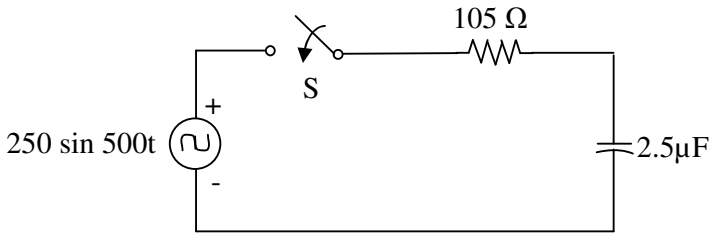

Figure 7b

[7+9]

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Subject Code: R13211/R13 **Set No - 4**

I B. Tech II Semester Regular/Supplementary Examinations July/Aug. - 2015

NETWORK ANALYSIS

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*****

PART-A

1.(a) Define electric energy and electric potential.
(b) Draw the impedance and admittance triangles of R-L and R-L-C series circuits.
(c) What are the differences between series and parallel resonance?
(d) State reciprocity, compensation and substitution theorem.
(e) Give the symmetry and reciprocity condition of y-parameters and inverse hybrid parameters.
(f) For the circuit of Figure 1(f), it is known that $V_c(0)=V_0=25$ V. To what value should the resistor R be adjusted so that the initial rate of change would be -200 V/s?

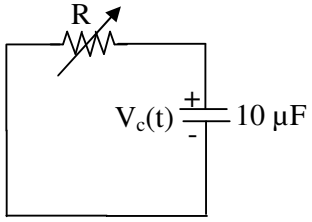

Figure 1(f)

[3+4+3+4+4+4]

PART-B

2.(a) Find the average value, RMS value and form factor of a sinusoidal wave.
(b) Find the current I in the figure 2(b).

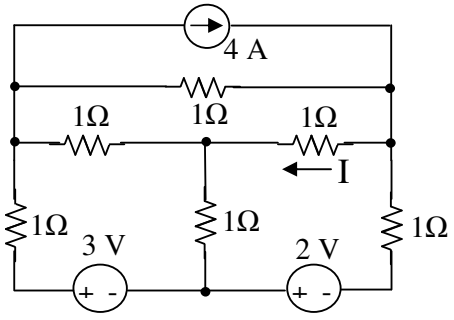

Figure 2(b)

[8+8]

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) A Capacitor of capacitance 79.5μF is connected in series with a non inductive resistance of 30 Ω across a 100V, 50Hz supply. Find: (i) impedance; (ii) current; (iii) phase angle.

[8+8]

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.
(c) Discuss the properties of anti resonance circuits.

[6+7+3]

5.(a) State and explain the Millman's theorem.
(b) Find current in the 6Ω resistor using Superposition theorem for the network shown in Figure 5.

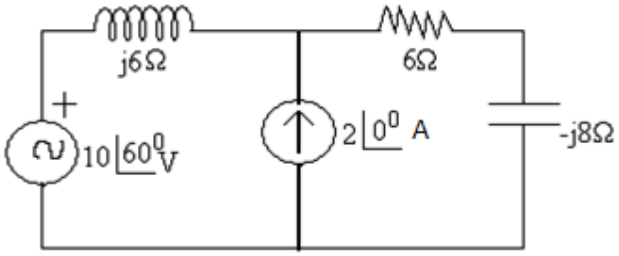

Figure. 5

[8+8]

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

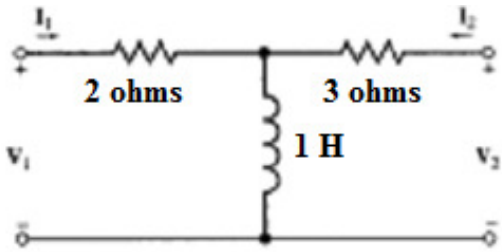

Figure 6a

[8+8]

7. A sinusoidal voltage V(t) = Vm sin(ωt+θ) is applied to a R-L circuit at time t = 0. Find the complete solution for the current in the circuit using Laplace transform method and differential equations.

[16]

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