CBCS SCHEME

USN | | | | | | | | | | |

17EC35

Third Semester B.E. Degree Examination, June/July 2019
Network Analysis

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define the following terms with examples:
- i) Active elements
- ii) Passive elements
- iii) Linear and non linear elements
- iv) Lumped node
- v) Unilateral and bilateral elements. **(10 Marks)**

b. Use the node analysis and find the value of V_x in the circuit shown in below Fig.Q.1(b). Such that the current through the impedance $(2 + J3)\Omega$ is zero.

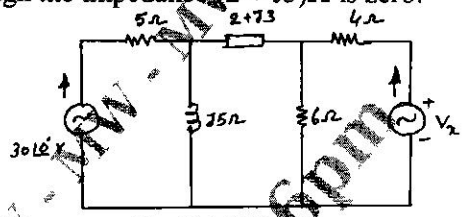

Fig.Q.1(b) **(10 Marks)**

OR

2 a. Derive an expression for i) Δ to Y transformation ii) Y to Δ transformation. **(10 Marks)**

b. Find the voltage across 20Ω resistor in the network shown in Fig.Q.2(b) below by using Mesh analysis method. **(10 Marks)**

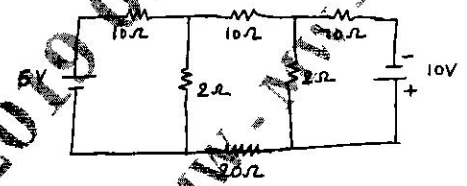

Fig.Q.2(b)

Module-2

3 a. State and prove Millman's theorem with an example. **(10 Marks)**

b. Find the Thevenin's equivalent circuit of Fig.Q.3(b) shown below: **(10 Marks)**

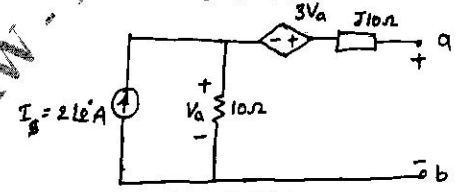

Fig.Q.3(b)

OR

4 a. Prove that the maximum power transferred from source to load when,

i) $R_L = R_o$ ii) $R_L = |Z_o|$ iii) $Z_L = \dot{Z}_o$ **(10 Marks)**

b. Find the value of i_b using Norton's equivalent circuit when R = 667Ω, refer Fig.Q.4(b). **(10 Marks)**

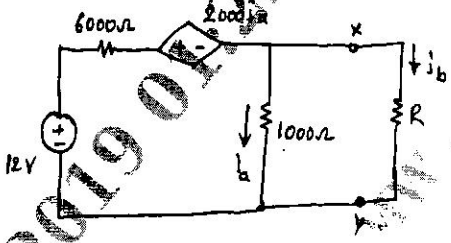

Fig.Q.4(b)

Module-3

5 a. Determine i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$, when the switch is closed at t = 0, from the Fig.Q.5(a) shown below. **(10 Marks)**

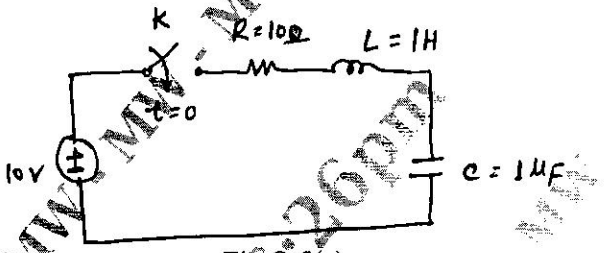

Fig.Q.5(a)

b. Find :

i) $i(0^+)$ and $v(0^+)$

ii) $\frac{di(0^+)}{dt}$ and $\frac{dv(0^+)}{dt}$

iii) $I(\infty)$ and $v(\infty)$

from the circuit shown in Fig.Q.5(b) below. **(10 Marks)**

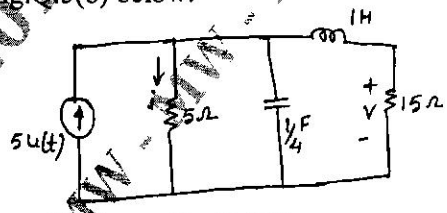

Fig.Q.5(b)

OR

6 a. Deduce the Laplace transform of the following:

i) Sin^2t ii) Cos^2t iii) Sinwt iv) $\int_0^t i(t).dt$ **(10 Marks)**

b. State and prove Initial and Final value theorems. **(10 Marks)**

Module-4

7 a. Demonstrate the terms: i) Resonance ii) Q-factor iii) Band width iv) Selectivity v) Half power frequency pertaining to a R-L-C series circuit. **(10 Marks)**

b. Prove that the Resonating frequency in a R-L-C series circuit is geometrical mean of half power frequencies i.e. $f_0 = \sqrt{f_1 f_2}$. **(10 Marks)**

OR

8 a. Evaluate w_0, Q, BW and half power frequencies and the output voltage V at W_0, refer Fig.Q.8(a). **(10 Marks)**

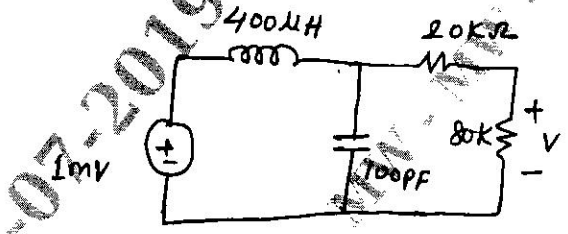

Fig.Q.8(a)

b. Derive an expression for resonance by varying R_L in parallel RLC circuit. **(10 Marks)**

Module-5

9 a. Express Z parameters in terms h parameters and what are hybrid parameters. **(10 Marks)**

b. Determine the transmission parameters for the network shown Fig.Q.9(b) below. **(10 Marks)**

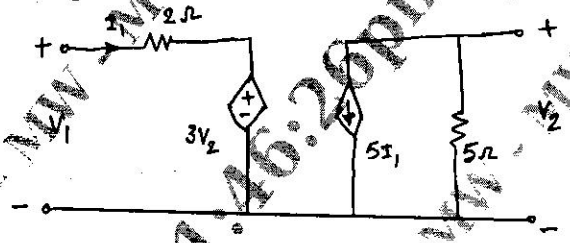

Fig.Q.9(b)

OR

10 a. Obtain the condition of transmission parameters for two networks connected in cascade. **(10 Marks)**

b. Determine the Z-parameters for the circuit shown in Fig.Q.10(b) below. **(10 Marks)**

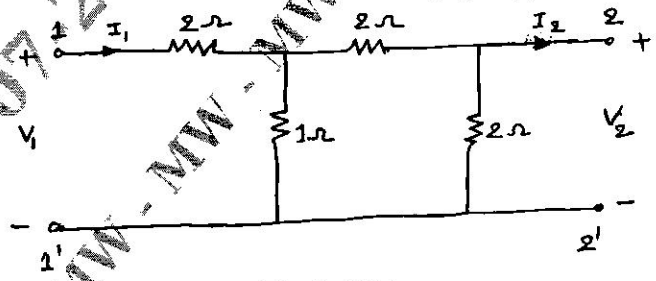

Fig.Q.10(b)

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CBCS SCHEME

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15EC34

Third Semester B.E. Degree Examination, June/July 2019
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain E-shift and I-shift with an example. **(08 Marks)**

b. Find the voltage across the capacitor of 10 Ω reactance of the network shown in Fig.Q1(b) by loop current method.

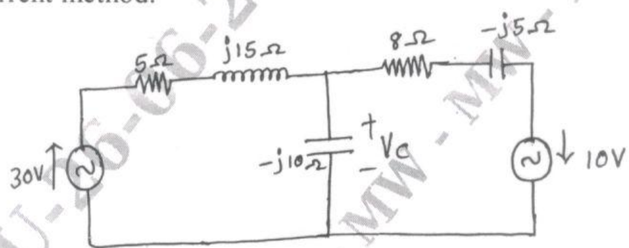

Fig.Q1(b) **(08 Marks)**

OR

2 a. Determine the equivalent resistance between the terminals A and B in the network of Fig.Q2(a) using star-delta transformation.

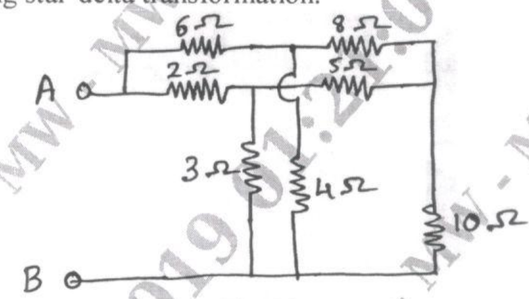

Fig.Q2(a) **(08 Marks)**

b. Find the voltages at nodes 1, 2, 3 and 4 for the network shown in Fig.Q2(b) using nodal analysis.

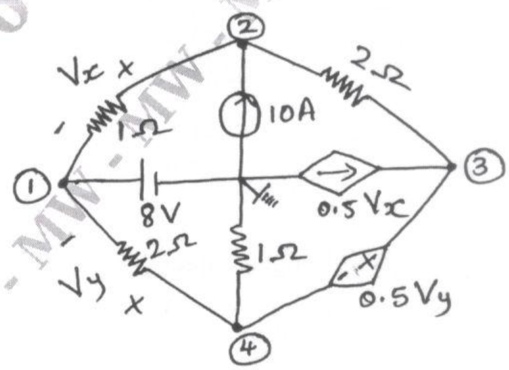

Fig.Q2(b) **(08 Marks)**

Module-2

3 a. State and explain superposition theorem. **(08 Marks)**

b. Obtain Thevenin's equivalent circuit across A and B for the network shown in Fig.Q3(b).

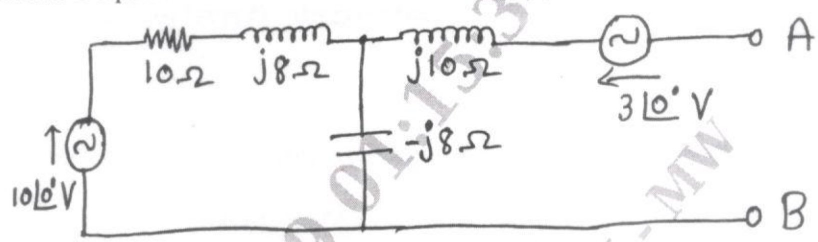

Fig.Q3(b) **(08 Marks)**

OR

4 a. State and explain Millman's theorem. **(08 Marks)**

b. Find the value of Z_L in the circuit shown in Fig.Q4(b) using maximum power transfer theorem and hence the maximum power.

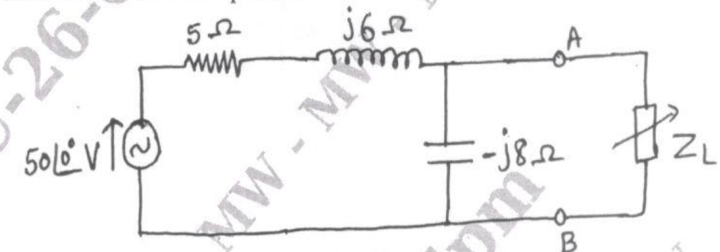

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. State and prove initial value theorem and final value theorem. **(08 Marks)**

b. In the network shown in Fig.Q5(b), K is changed from position a to b at t = 0. Solve for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, if R = 100 Ω, L = 0.1 H and C = 0.25 μF and V = 100 V. Assume that the capacitor is initially uncharged.

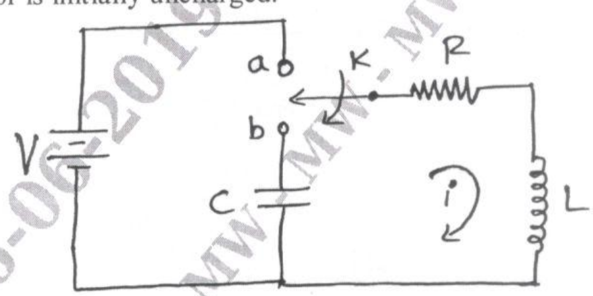

Fig.Q5(b) **(08 Marks)**

OR

6 a. What is the significance of initial conditions? Write a note on initials and final conditions in basic circuit elements. **(08 Marks)**

b. Find the Laplace transform of (i) f(t) = u(t) (ii) f(t) = t. **(08 Marks)**

Module-4

7 a. Derive an expression for half power frequencies for a series resonant circuit, **(08 Marks)**

b. For the network shown in Fig.Q7(b), find the value of L at which circuit resonates at a frequency of 600 rad/sec.

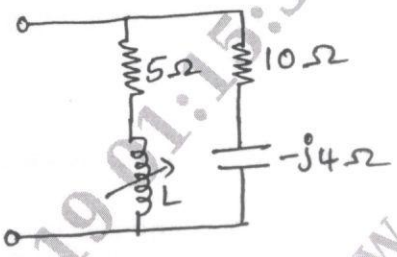

Fig.Q7(b) **(08 Marks)**

OR

8 a. Obtain the expression for the resonant frequency and the dynamic impedance of a parallel resonant circuit. **(08 Marks)**

b. An RLC series resonant circuit draws a maximum current of 10 Amps, when connected to 230 V, 50 Hz supply. If the Q-factor is 5, find the parameters of the circuit. **(08 Marks)**

Module-5

9 a. Derive the Y-parameters in terms of ABCD parameters. **(08 Marks)**

b. Obtain the h-parameters for the circuit shown in Fig.Q9(b).

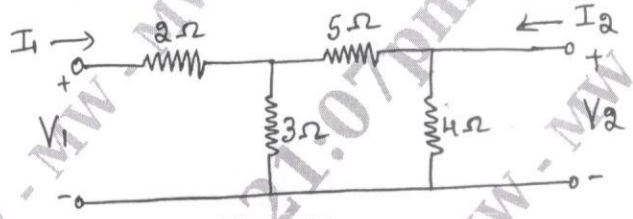

Fig.Q9(b) **(08 Marks)**

OR

10 a. Express h-parameters interms of z-parameters. **(08 Marks)**

b. Find the y-parameters for the circuit shown in Fig.Q10(b). The use parameter relationships to find h-parameter.

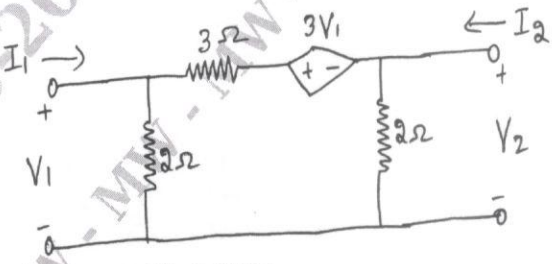

Fig.Q10(b) **(08 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

17EC35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Network Analysis

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Reduce the Network shown in Fig Q1(a) to a single voltage source in series with a resistance using source shift and source transformation. **(07 Marks)**

b. Use mesh analysis to determine the three mesh currents I_1, I_2 and I_3 in the circuit show in Fig Q1(b). **(05 Marks)**

c. Find current in 30Ω resistor using nodal analysis for the circuit shown in Fig Q1(c). **(08 Marks)**

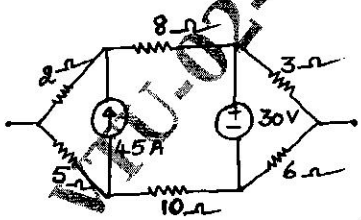

Fig Q1(a)

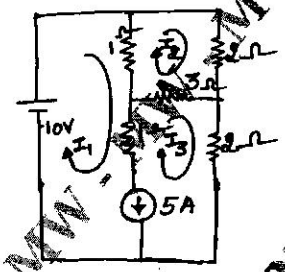

Fig Q1(b)

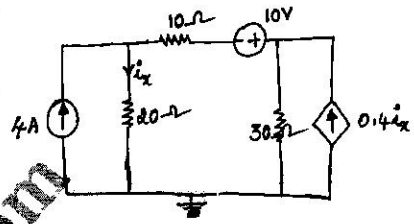

Fig Q1(c)

OR

2 a. Find the equivalent resistance between a and b using star delta transformation for the network shown in Fig Q2(a). **(05 Marks)**

b. For the circuit shown in Fig Q2(b), determine I_x and other loop currents. **(07 Marks)**

c. For the circuit shown in Fig Q2(c), determine all node voltages. **(08 Marks)**

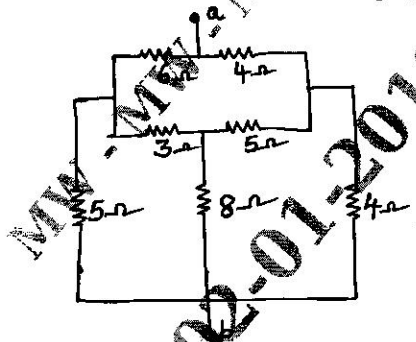

Fig 2(a)

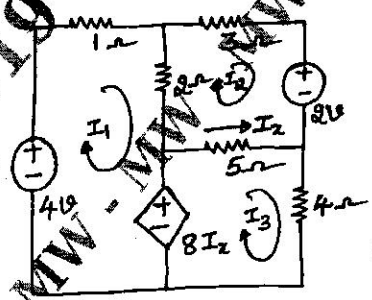

Fig 2(b)

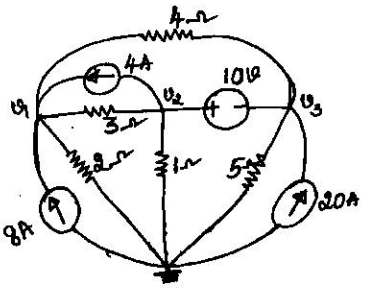

Fig 2(c)

Module-2

3 a. For the circuit shown in Fig Q3(a), find the current I_x using super position theorem. **(07 Marks)**

b. Verify Reciprocity theorem by calculating 'I' for the network shown in Fig Q3(b). **(05 Marks)**

c. Obtain the Thevenin's equivalent of the circuit shown in Fig Q 3(c) **(08 Marks)**

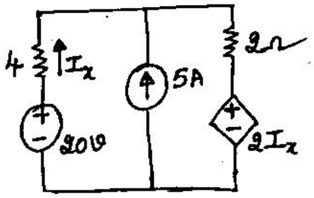

Fig Q3 (a)

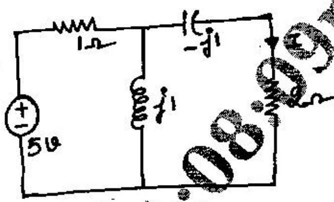

Fig Q3 (b)

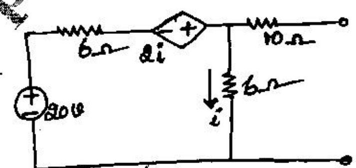

Fig Q3 Q(c)

OR

4 a. For the circuit shown in Fig Q4(a), find the current in (6 + j8) Ω impedance using Millman's theorem. **(05 Marks)**

b. For the Network shown in Fig Q4(b), determine Norton's equivalent across A and B. Find the current thorough the impedance (6 – j8) Ω connected to the terminals A and B. **(05 Marks)**

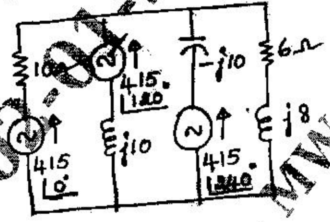

Fig Q4(a)

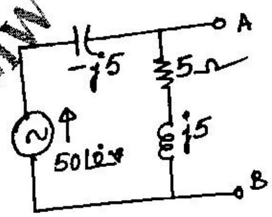

Fig Q4(b)

c. State and prove maximum power transfer theorem for AC circuit, where both R_L and X_L are varying. **(10 Marks)**

Module-3

5 a. In the Network shown in Fig Q5(a), a steady state is reached with the switch K open. At t = 0, the switch K is closed. Obtain the initial values of (i) i_1 (ii) i_2 (iii) v_c iv) $\frac{di_1}{dt}$ v) $\frac{di_2}{dt}$ and $\frac{di_1}{dt}$ at $t = \infty$. **(10 Marks)**

b. For the given circuit in Fig Q5(b), find the value of the loop currents, their first derivatives and their 2^{nd} derivatives, all evaluated at $t = 0^+$, given that $V_c(0^-) = 1$ volt, $i_2(0^-) = 0$ amp. At t = 0, sw_1 and sw_2 are closed. **(10 Marks)**

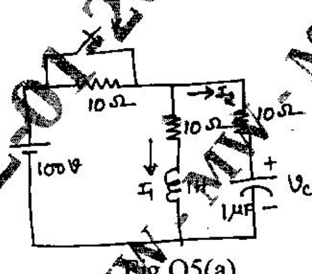

Fig Q5(a)

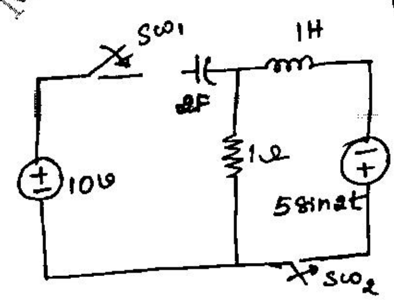

Fig Q5(b)

OR

6 a. In the circuit of Fig Q6(a), the source voltage is v(t) = 50sin 250t. Using Laplace transforms, determine the current when switch K is closed at t = 0. **(08 Marks)**

b. Synthesize the periodic waveform shown in Fig Q6(b) and find its Laplace transform and prove any formula used. **(12 Marks)**

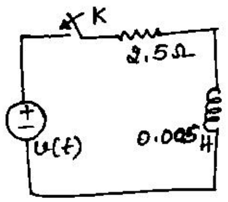

Fig Q6(a)

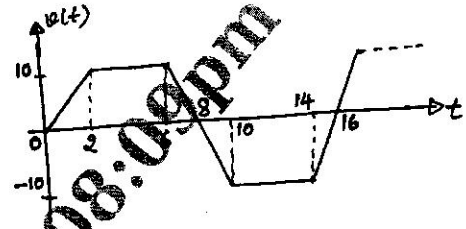

Fig Q6(b)

Module-4

7 a. Show that resonant frequency of series resonant circuit is equal to the geometric mean of two half power frequencies. **(05 Marks)**

b. A coil is connected in series with a variable capacitor across $v(t) = 10 \cos 1000t$. The current is maximum when $c = 10\mu F$. When $C = 12.5\mu F$, the current is 0.707 times the maximum value. Find L, R, and Q of the coil. **(08 Marks)**

c. A coil has resistance of 400Ω and inductance of 318μH. Find the capacitance of capacitor which when connected in parallel with the coil will produce resonance with a supply frequency of 1MHz. If a second capacitor of capacitance 23.42pF is connected in parallel with the first capacitor, find the frequency at which resonance will occur. **(07 Marks)**

OR

8 a. Derive the expression for the resonant frequency of the circuit shown in Fig Q8(a). Also show that the circuit will resonate at all frequencies if $R_L = R_c = \sqrt{\frac{L}{C}}$. **(12 Marks)**

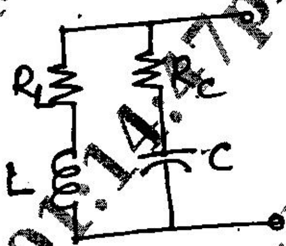

Fig Q8(a)

b. A coil of 10Ω resistance 0.2H inductance is connected in parallel with a variable condenser across 220V, 50Hz supply. Determine: (i) Capacitance of condenser so that current drawn may be in phase with the supply voltage (ii) Effective impedance of the circuit (iii) Power absorbed at resonance (iv) Current magnification factor. **(08 Marks)**

Module-5

9 a. Z-parameters of a Network are obtained from an experiment. Explain how y-parameters and transmission parameter can be computed from the experimental data. **(10 Marks)**

b. Find Z and Y parameters of the network shown in Fig Q9(b).

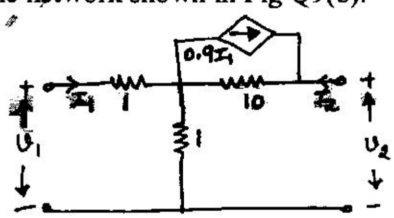

Fig Q9(b) **(10 Marks)**

OR

10 a. Find Z and h-parameters for the network shown in Fig Q10(a). **(12 Marks)**

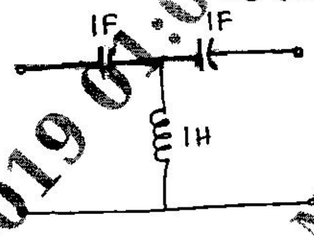

Fig Q10(a)

b. Write a note on hybrid p's with its equivalent circuit. **(04 Marks)**

c. Explain symmetry and reciprocal property of 2-port Networks. **(04 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

15EC34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Reduce the network shown in Fig.Q1(a) to a single voltage source in series with a resistance using source shift and source transformations. **(08 Marks)**

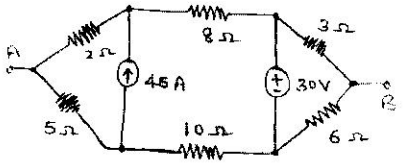

Fig.Q1(a)

b. Using star/delta transformation, determine the resistance between M and N for the network shown in Fig.Q1(b). **(08 Marks)**

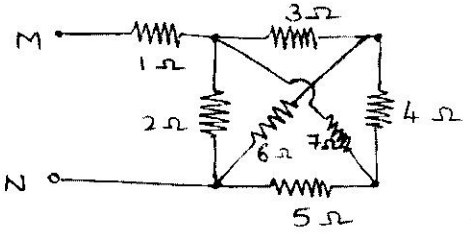

Fig.Q1(b)

OR

2 a. Find the power delivered by the dependent voltage source in the circuit shown in Fig.Q2(a) by Mesh current method. **(06 Marks)**

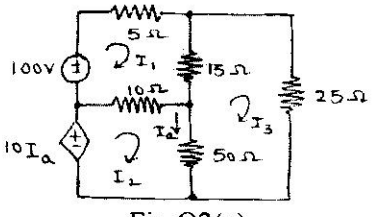

Fig.Q2(a)

b. Define super Mesh and super node. **(02 Marks)**

c. Use the node-voltage method to find the power developed by the 20V source in the circuit shown in Fig.Q2(c). **(08 Marks)**

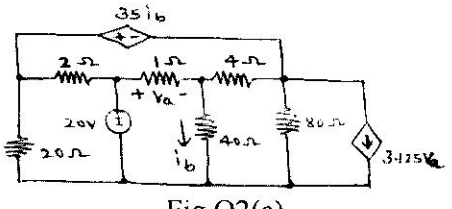

Fig.Q2(c)

Module-2

3 a. Use superposition theorem to find v_x in the circuit shown in Fig.Q3(a). **(08 Marks)**

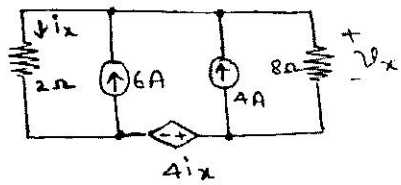

Fig.Q3(a)

b. State and prove reciprocity theorem. **(08 Marks)**

OR

4 a. State and prove Thevenin's theorem. **(06 Marks)**

b. Find the Norton's equivalent circuit across AB terminals for the network shown in Fig.Q4(b) and hence determine current through 5Ω resistor. **(06 Marks)**

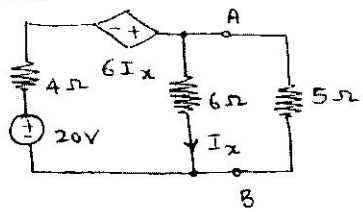

Fig.Q4(b)

c. Find the value of Z_L for which Maximum Power transfer occurs in the circuit shown in Fig.Q4(c). **(04 Marks)**

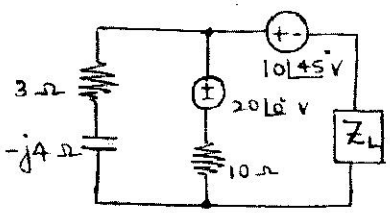

Fig.Q4(c)

Module-3

5 a. In the network shown in Fig.Q5(a), the switch k is closed at t = 0. Find the values of i_1, i_2 $\frac{di}{dt}$ and $\frac{d^2i_2}{dt^2}$ at t = 0. **(08 Marks)**

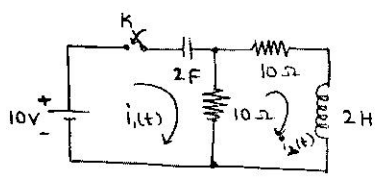

Fig.Q5(a)

b. In the circuit shown n Fig.Q5(b), the capacitor C_1 is charged to a voltage V_0 at t = 0, the switch is closed. Solve for the charge as a function of time. **(08 Marks)**

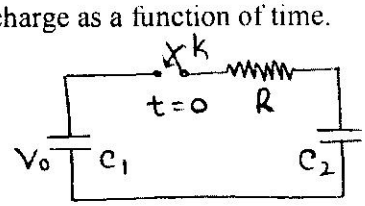

Fig.Q5(b)

OR

6 a. State and prove the following : i) Initial value theorem ii) Final value theorem. **(08 Marks)**

b. For the waveform shown in Fig.Q6(b), the equation of the waveforms is Sin(t) from 0 to π, and $-\sin(t)$ from π to 2π, show that the Laplace transform of this waveform is :

$$F(s) = \frac{1}{s^2+1}\coth\left(\frac{\pi s}{2}\right).$$ **(08 Marks)**

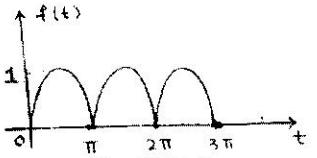

Fig.Q6(b)

Module-4

7 a. Define the following terms :
i) Resonance ii) Bandwidth. **(02 Marks)**

b. Prove that $f_0 = \sqrt{f_1 f_2}$ where f_1 and f_2 are the two half power frequencies of a resonant circuits. **(06 Marks)**

c. A series RLC circuit has R = 2Ω, L = 2 mH and C = 10μf calculate Q–factor, bandwidth, Resonant frequency and half power frequencies f_1 and f_2. **(08 Marks**

OR

8 a. Show that a two-branch parallel circuit is resonant at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(08 Marks)**

b. Find the values of L for which the circuit given in Fig.Q8(b) resonates at w = 5000 r/sec. **(08 Marks)**

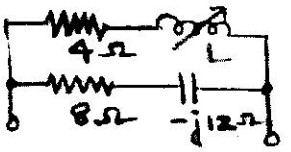

Fig.Q8(b)

Module-5

9 a. Express Z – parameters interms of Y-parameters. **(08 Marks)**

b. Obtain ABCD parameters interms of impedance parameters (Z) and hence show that AD–BC = 1. **(08 Marks)**

OR

10 a. For the network shown in Fig.Q10(a), contains an voltage controlled source and current controlled source, for the elemental values specified, determine Z and Y parameters. **(08 Marks)**

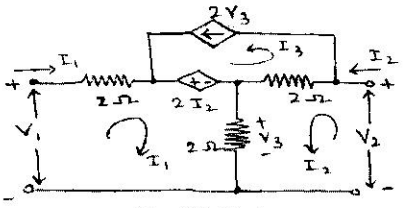

Fig.Q10(a)

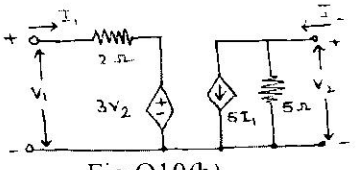

Fig.Q10(b)

b. Determine transmission parameters for the network shown in Fig.Q10(b). **(08 Marks)**

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15EC34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly explain the classification of electrical networks. **(08 Marks)**

b. Use source transformation to convert the circuit in Fig.1(b) to a single current source in parallel with a single resistor. **(08 Marks)**

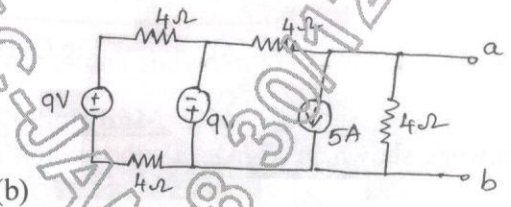

Fig.Q1(b)

OR

2 a. Determine the loop currents I_1, I_2, I_3 and I_4 for the network shown in Fig.Q2(a). **(08 Marks)**

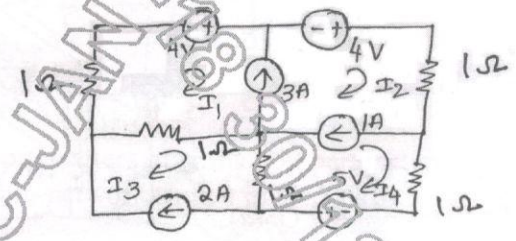

Fig.Q2(a)

b. Find the value of 'V' such that current through 4Ω resistor is zero, using nodal analysis, for the Fig.Q2(b). **(08 Marks)**

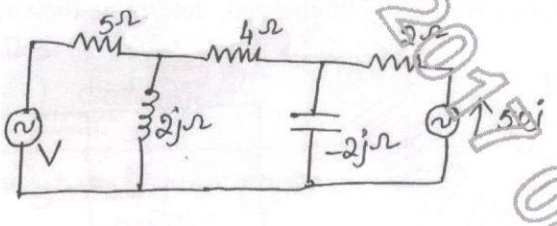

Fig.Q2(b)

Module-2

3 a. State and prove reciprocity theorem. **(07 Marks)**

b. Explain the procedure to find Norton's equivalent resistance in a network which has both dependent and independent sources with an example. **(03 Marks)**

c. Obtain the Thevenin's equivalent for the network shown in Fig.Q3(c). **(06 Marks)**

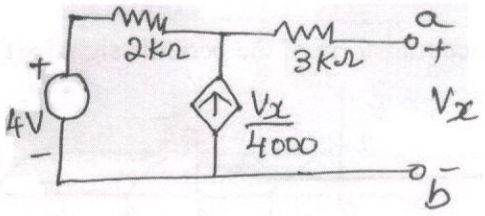

Fig.Q3(c)

OR

4 a. State and prove Miller's theorem. **(08 Marks)**

b. Find the value of Z_x for which maximum power transfer occurs. Also find maximum power for the network shown in Fig.Q4(b). **(08 Marks)**

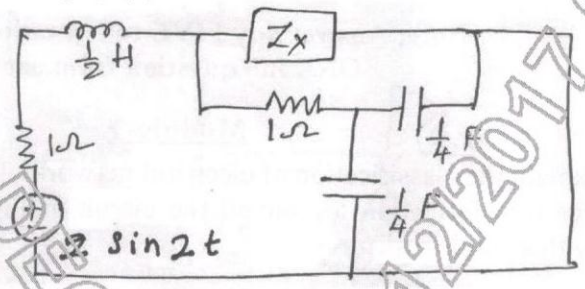

Fig.Q4(b)

Module-3

5 a. In the network shown in Fig.Q5(a), the switch is moved from position 1 to position 2 at t = 0. The steady – state has been reached before switching. Calculate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

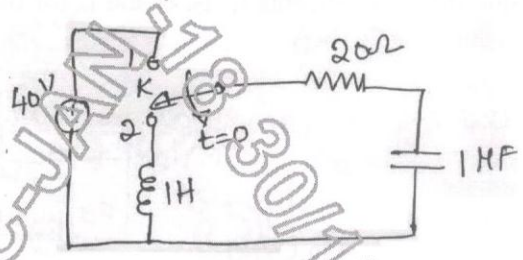

Fig.Q5(a)

b. In the network shown in Fig.Q5(b), $v_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. If the capacities is initially uncharged, determine the value of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_3}{dt^3}$ at $t = 0^+$. **(08 Marks)**

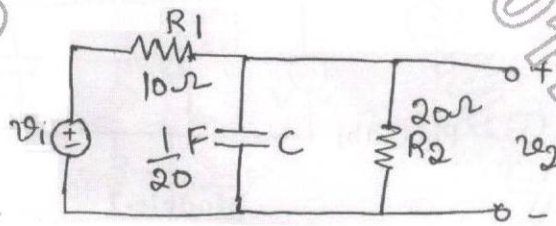

Fig.Q5(b)

OR

6 a. Obtain Laplace transform of i) step function, ii) Ramp function iii) Impulse function. **(09 Marks)**

b. Find the Laplace transform of the periodic signal x(t) as shown in Fig.Q6(b). **(07 Marks)**

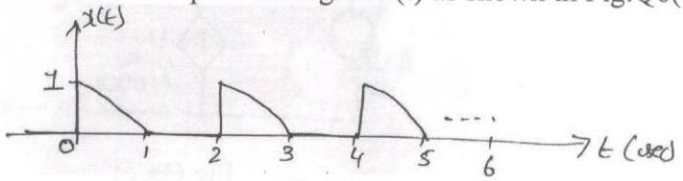

Fig.Q6(b)

Module-4

7 a. What is resonance? Derive an expression for half power cutoff frequency. **(08 Marks)**

b. Define Q-factor, selectivity and bandwidth. **(03 Marks)**

c. A series RLC circuit has R = 4Ω, L = 1mH, C = 10 μF. Calculate resonant frequency, Q-factor, half power frequencies and bandwidth. **(05 Marks)**

OR

8 a. Obtain an expression for resonant frequency in a parallel resonant circuit. **(06 Marks)**

b. Show that a two branch parallel resonant circuit is resonant at all frequencies if :

$R_L = R_C = \sqrt{\frac{L}{C}}$, where R_L = Resistance in the inductor branch, R_C = resistance in the capacitor branch. **(06 Marks)**

c. Find the value of R_L for which the circuit shown in Fig.Q8(c) at resonance condition. **(04 Marks)**

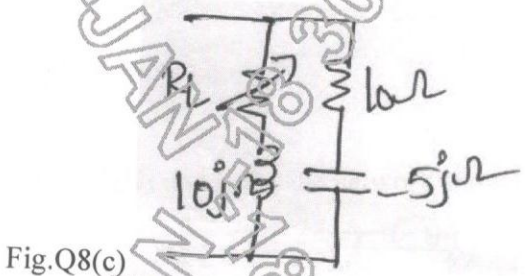

Fig.Q8(c)

Module-5

9 a. Define h-parameters. Express h-parameters in terms of z-parameters. **(08 Marks)**

b. Find y-parameters for the two-port–network shown in Fig.Q9(b). **(08 Marks)**

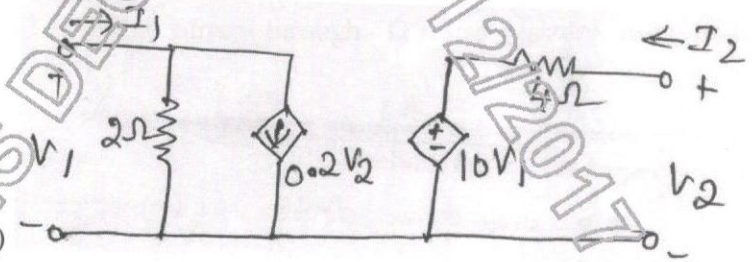

Fig.Q9(b)

OR

10 a. Define ABCD parameters. Express y-parameters in terms of ABCD parameters. **(08 Marks)**

b. Find the ABCD parameters for the circuit shown in Fig.Q10(b). **(08 Marks)**

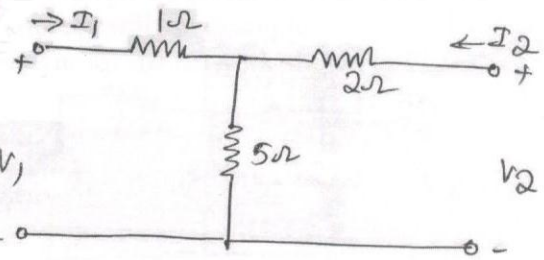

Fig.Q10(b)

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10ES34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Network Analysis

Time: 3 hrs. Max. Marks:100

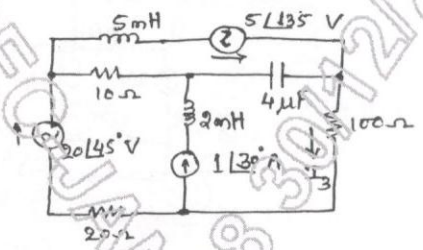
Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define the following terms with examples :
i) Lumped Element ii) Active Element iii) Practical Source. **(03 Marks)**

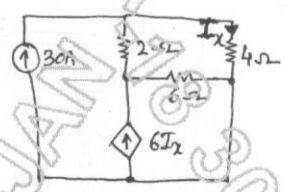
b. Find the current I_3 using mesh analysis for the circuit shown in fig.Q1(b), if the circuit is operating at frequency 5000 rad/s. **(07 Marks)**

Fig.Q1(b)



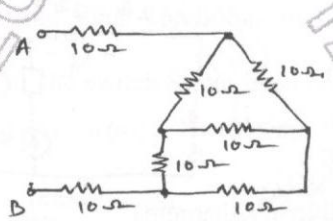
c. For the circuit shown in fig. Q1(c), find the power delivered by dependent source using node analysis. **(06 Marks)**

Fig.Q1(c)



d. Find the resistance R_{AB} for the network shown in fig.Q1(d), using Δ - Y conversion. **(04 Marks)**

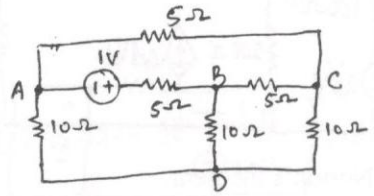
Fig.Q1(d)



2 a. Define the following terms with example :
i) Graph ii) Tree iii) Co - tree. **(03 Marks)**

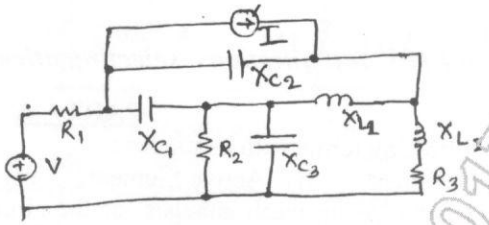
b. For the circuit in fig.Q2(b), write the tie – set matrix using AB, BC and CA or the links of the tree. Obtain the equilibrium equations in matrix from using KVL and calculate all loop currents and branch voltages. **(10 Marks)**

Fig.Q2(b)



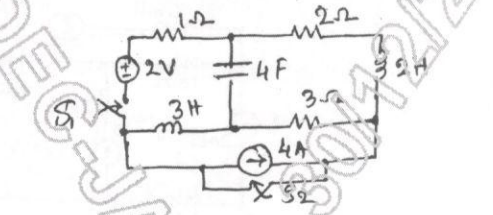
c. Draw the oriented graph for the circuit shown in fig.Q2(c). Also find fundamental cut – set schedule using X_{c1} , R_2 and X_{L1} or the twigs of the tree. Find admittance matrix also. **(04 Marks)**

Fig.Q2(c)



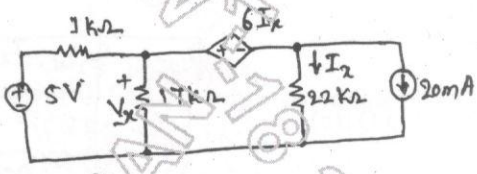
d. Find the dual of the circuit shown in fig.Q2(d). **(03 Marks)**

Fig.Q2(d)



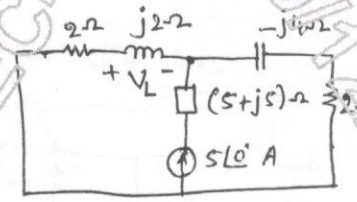
3 a. Find V_x using superposition for the circuit shown in fig.Q3(a). **(08 Marks)**

Fig.Q3(a)



b. Find the voltage V_L across the inductor and verify reciprocity theorem for the circuit shown in Fig.Q3(b). **(06 Marks)**

Fig.Q3(b)



c. State and prove Milliman's theorem. **(06 Marks)**

4 a. Find the Thevenin's equivalent circuit across terminals a & b for the circuit shown in fig.Q4(a). Also find the current I_L using this equivalent circuit. **(08 Marks)**

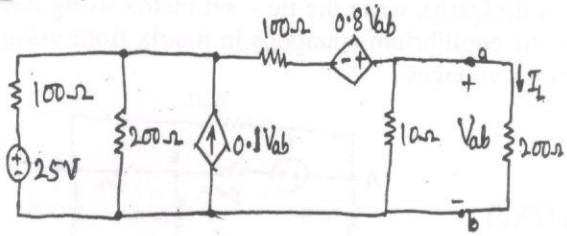


Fig.Q4(a)

b. State and prove Norton's theorem. **(05 Marks)**

c. Find Z_L for maximum power transfer for the circuit shown in fig.Q4(c). And also find the average maximum power absorbed by Z_L. **(07 Marks)**

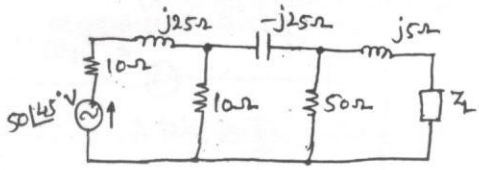


Fig.Q4(c)

PART – B

5 a. For the circuit shown in fig.Q5(a), find the transfer function, resonant frequency half power frequencies , banowidth and Q - factor. **(10 Marks)**

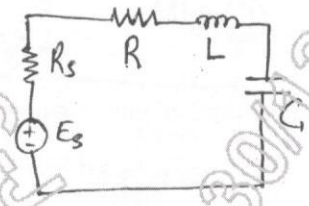


Fig.Q5(a)

b. Define the term Q – factor. Using this definition find the Q – factor of an inductor and a capacitor. **(05 Marks)**

c. For the network shown in fig.Q5(c), find the value of C for resonance to take place at w = 5000 rad/s. **(05 Marks)**

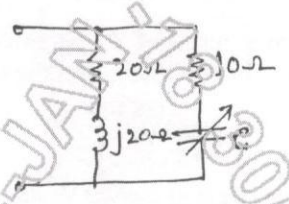


Fig.Q5(c)

6 a. Write a short note on Initial and Final conditions of circuit elements under switching conditions. **(06 Marks)**

b. In the circuit shown in fig.Q6(b), the switch S_1 has been open for a long time before closing at t = 0. Find $V_c(0^+)$, $i_L(0^+)$, $Vc(\infty)$, $i_L(\infty)$, $\frac{di_L}{dt}(0^+)$ and $\frac{d^2i_L}{dt^2}(0^+)$. **(06 Marks)**

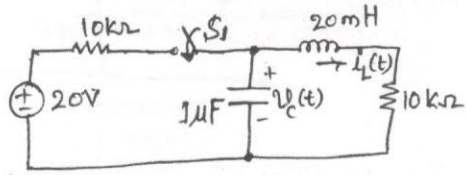


Fig.Q6(b)

c. For the circuit shown in fig.Q6(c), calculate $i_L(0^+)$ $\frac{di_L(0^+)}{dt}$, $\frac{d}{dt}V_c(0^+)$, $V_R(\infty)$, $V_c(\infty)$ and $i_L(\infty)$ **(08 Marks)**

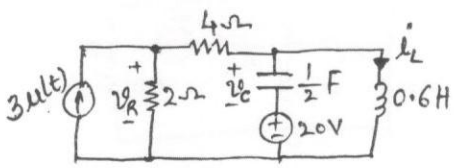


Fig.Q6(c)

CBCS Scheme

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15EC34

Third Semester B.E. Degree Examination, June/July 2017
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Calculate the current through 2Ω resistor for the circuit shown in Fig.Q1(a) using source transformation. **(08 Marks)**

b. Use mesh analysis to determine the three mesh currents I_1, I_2 and I_3 in the circuit shown in Fig.Q1(b). **(08 Marks)**

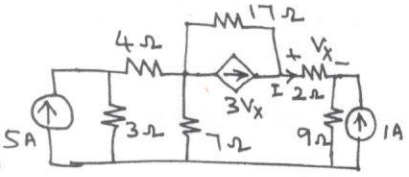

Fig.Q1(a)

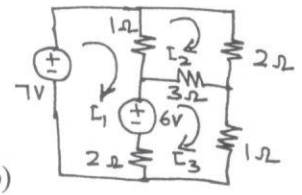

Fig.Q1(b)

OR

2 a. Find the equivalent resistance R_{AB} using star and delta transformation for network shown in Fig.Q2(a). **(08 Marks)**

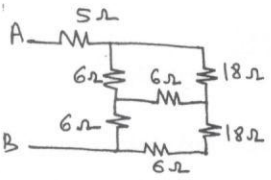

Fig.Q2(a)

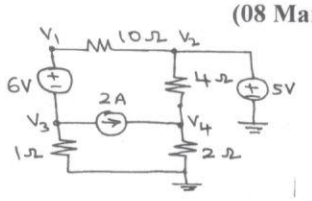

Fig.Q2(b)

b. For the circuit shown in Fig.Q2(b), determine all node voltages. **(08 Marks)**

Module-2

3 a. Using Millman's theorem, find the current through load resistance R_L for the circuit shown in Fig.Q3(a). **(08 Marks)**

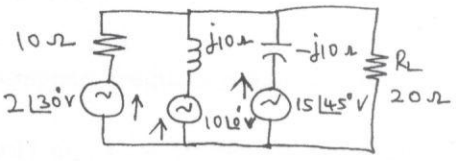

Fig.Q3(a)

b. State the maximum power transfer theorem and also prove that $P_{max} = \frac{V_{th}^2}{4R_L}$, where V_{th} = thevenins voltage. **(08 Marks)**

OR

4 a. Obtain the Thevenin's equivalent of the circuit shown in Fig.Q4(a). **(08 Marks)**

b. Using superposition theorem, find the current in 6Ω resistor in the network shown in Fig.Q4(b). **(08 Marks)**

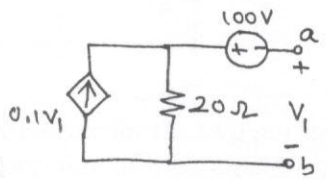

Fig.Q4(a)

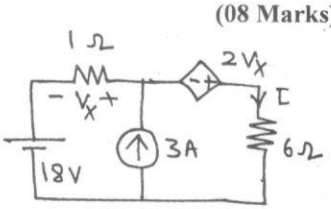

Fig.Q4(b)

Module-3

5 a. In the network shown in Fig.Q5(a), the switch is closed at t = 0, determine i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

b. For the network shown in Fig.Q5(b), the switch 's' is opened at t = 0 solve for V, DV and D^2V at $t = 0^+$. **(08 Marks)**

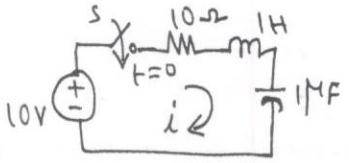

Fig.Q5(a)

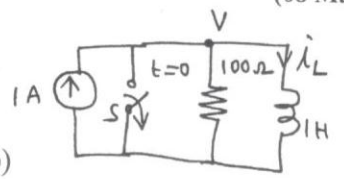

Fig.Q5(b)

OR

6 a. Find the Laplace transform of the periodic signal x(t) shown in Fig.Q6(a). **(08 Marks)**

b. Given the signal $x(t) = \begin{cases} 3, & t < 0 \\ -2 & 0 < t < 1 \\ 2t-4 & t > 1 \end{cases}$

Express x(t) interms of singularity functions. Also find the Laplace transform of x(t). **(08 Marks)**

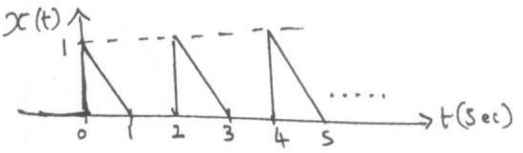

Fig.Q6(a)

Module-4

7 a. Derive the expressions of half power frequencies W_1 and W_2 and also bandwidth of a series resonance circuit. **(09 Marks)**

b. Find the values of L at which the circuit shown in Fig.Q7(b) resonates at a frequency of 500 r/s. **(07 Marks)**

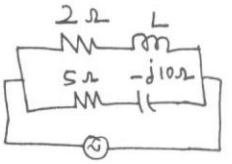

Fig.Q7(b)

OR

8 a. Derive the expressions of a resonance frequency and dynamic impedance of a parallel resonance circuit. **(09 Marks)**

b. A coil has a R = 20Ω, L = 80mH and C = 100pF are connected in series. Determine : i) impedance at resonance ii) resonance frequency iii) quality factor iv) circuit current if supply voltage is 50V. **(07 Marks)**

Module-5

9 a. Derive the expression of Z-parameters in term of h-parameter. **(07 Marks)**

b. Find the ABCD – parameters for the network shown in Fig.Q9(b). **(09 Marks)**

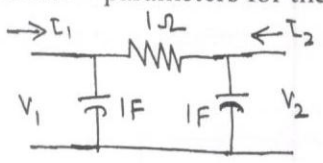

Fig.Q9(b)

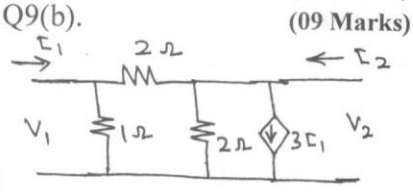

Fig.Q10(a)

OR

10 a. Find the Y-parameter for the two port network shown in Fig.Q10(a). **(08 Marks)**

b. Obtain the expression of h-parameters interms of Y-parameters. **(08 Marks)**

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10ES34

Third Semester B.E. Degree Examination, June/July 2017
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Calculate the current through 2Ω resistor in the network shown in Fig. Q1 (a) by source transformation method. **(06 Marks)**

b. Compute the resistance across the terminals A and B of the network shown in Fig. Q1(b) by star delta transformation. **(06 Marks)**

c. Use mesh analysis to determine what value of V_2 in the network shown in Fig. Q1(c). Cause voltage V = 0 across 20Ω resistor. **(08 Marks)**

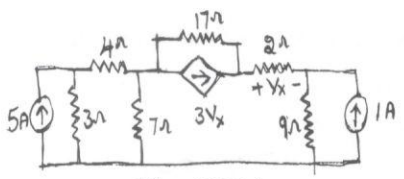

Fig. Q1(a)

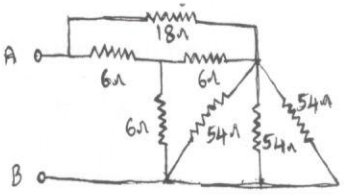

Fig. Q1(b)

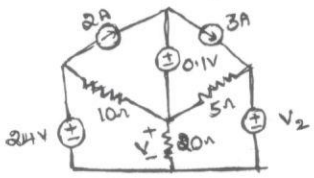

Fig. Q1(c)

2 a. Define with examples :
i) oriented graph ii) Tree iii) Cut set matrix iv) Tie set matrix. **(08 Marks)**

b. For the network shown in Fig. Q2(b) draw the graph. Select 2 and 4 as tree branches. Draw the tie set matrix. Write down the equilibrium equations with loop currents as variables. Solve these equations and find the various branch voltages and currents. The integers indicate branch numbers. Use matrix method. **(08 Marks)**

c. Draw the dual of the network shown in Fig. Q2(c). **(04 Marks)**

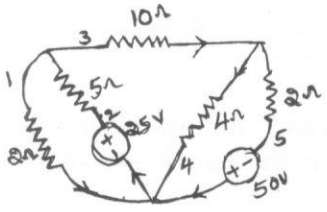

Fig. Q2(b)

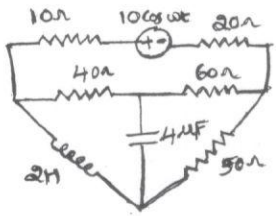

Fig. Q2(c)

3 a. Find V_a using superposition principle in the circuit shown in Fig. Q3(a). **(08 Marks)**

b. In the single current source circuit shown in Fig. Q3(b), find the voltge V_x. Interchange the current source and the resulting voltage V_x. Is the Reciprocity theorem verified? **(06 Marks)**

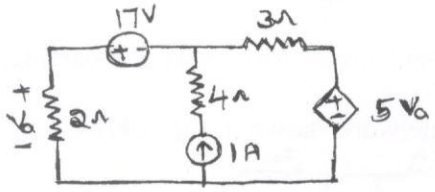

Fig. Q3(a)

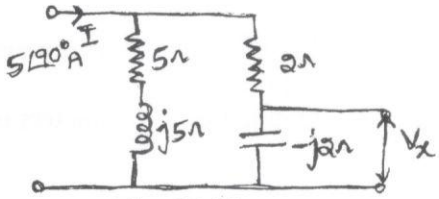

Fig. Q3(b)

c. State and explain Millman's theorem. **(06 Marks)**

4 a. For the network shown in Fig. Q4(a) , obtain the Thevinin's equivalent as seen from terminals p and q. **(08 Marks)**

b. Obtain Norton's equivalent circuit for the network shown in Fig. Q4(b). **(06 Marks)**

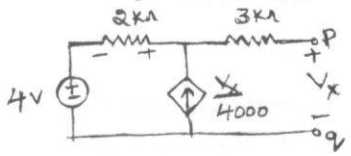

Fig. Q4(a)

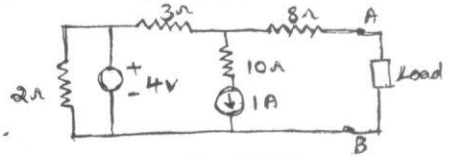

Fig. Q4(b)

c. Prove that an alternating voltage source transfers maximum power to a load when the load impedance is the conjugate of the source impedance. **(06 Marks)**

PART – B

5 a. Define quality factor and bandwidth. Also establish the relationship between them in a series resonance circuit. **(08 Marks)**

b. Show that resonant frequency of series resonance circuit is equal to the geometric mean of two half power frequencies. **(06 Marks)**

c. Find the value of R_L for which the circuit shown in Fig. Q5(c) is resonant. **(06 Marks)**

Fig. Q5(c)

6 a. Show that

i) The voltage of a capacitor cannot change instantaneously

ii) The current in an inductor cannot change instantaneously. **(10 Marks)**

b. In the circuit of Fig. Q6(b). Switch K is changed from 1 to 2 a t = 0 steady state having been attained in position 1. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0. **(10 Marks)**

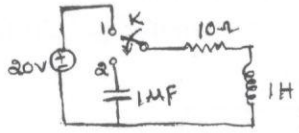

Fig. Q6(b)

7 a. State and prove i) Initial value theorem and ii) Final value theorem. **(10 Marks)**

b. Determine the response current i(t) in the circuit shown in Fig. Q7(b). Using Laplace transform. **(10 Marks)**

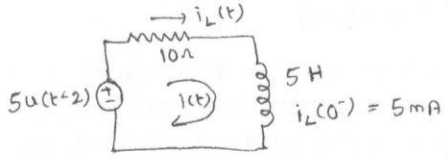

Fig. Q7(b)

8 a. Explain Z and Y parameters with equivalent circuit Also express Z parameters in terms of Y parameters. **(10 Marks)**

b. Obtain the Y parameters of the two port network shown in Fig. Q8(b). **(10 Marks)**

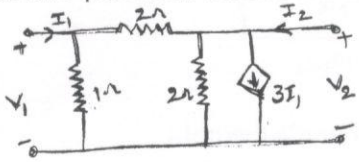

Fig. Q8(b)

* * * * *

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10ES34

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***1.Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data may be assumed suitably.

PART – A

1 a. Using source transformation and shifting, obtain the power consumed in 8Ω resistance of the network shown in Fig.Q1(a). **(06 Marks)**

b. Determine all the node voltages of the circuit shown in Fig.Q1(b) using nodal analysis. **(06 Marks)**

c. Find the value of Vs such that the current in –j11Ω is zero, use mesh analysis assuming all the loop currents are in clockwise directions. Refer Fig. 1(c). **(08 Marks)**

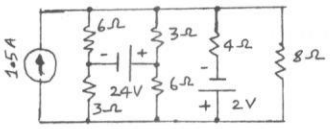

Fig. Q1(a)

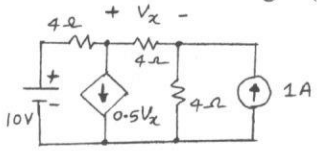

Fig. Q1(b)

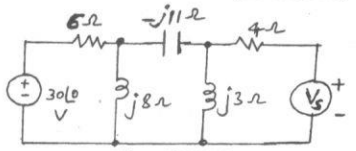

Fig. Q1(c)

2 a. Draw the dual of the network shown in Fig. 2(a). Write the corresponding equations for both networks. **(08 Marks)**

b. Draw the graph of the network shown in Fig. Q2(b), select links as the branches containing voltage sources. Write tie-set schedule and there from obtain all the branch currents and voltages. **(12 Marks)**

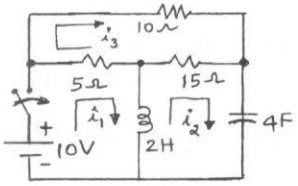

Fig.Q2(a)

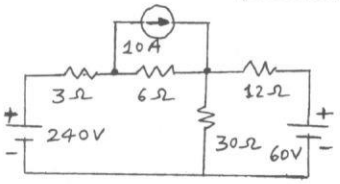

Fig. Q2(b)

3 a. Determine the current and voltage across 4Ω resistance of the network shown in Fig. Q3(a), using superposition theorem. **(06 Marks)**

b. Apply Millman's theorem to find V_0 and I_0 for the circuit shown in Fig. 3(b). **(08 Marks)**

c. State and explain the reciprocity theorem. **(06 Marks)**

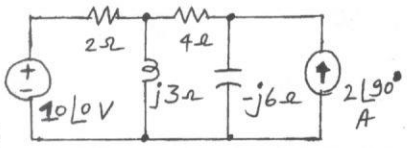

Fig.Q3(a)

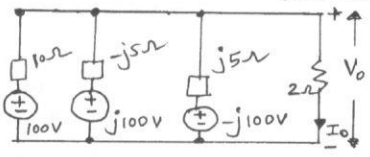

Fig.Q3(b)

4 a. A linear bilateral network consisting of passive elements is shown in Fig. 4(a), with $V_s = 10V$, V_{ab} is 5V. If 'ab' is shorted, $I_{ab} = 1A$ for $V_s = 15V$. Determine the current when $R_{ab} = 2.5\Omega$ with $V_s = 12V$. **(04 Marks)**

b. Determine the Norton's equivalent of the circuit shown in Fig. 4(b). **(08 Marks)**

c. What value of impedance Z_L results in maximum power transfer condition for the network shown in Fig. Q4(c)? Also determine the corresponding power. **(08 Marks)**

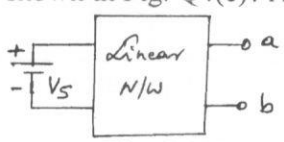

Fig. Q4(a)

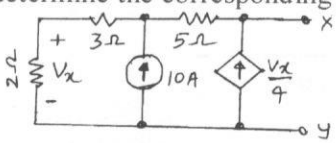

Fig. Q4(b)

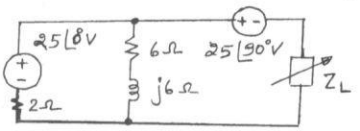

Fig. Q4(c)

PART – B

5 a. A series R – L – C circuit is fed with 50 V rms supply. At resonance, the current through the circuit is 25A and the voltage across inductor is 1250 volts. If G = 4 μF, determine the values of R, L Q, resonant frequency, bandwidth and half power frequencies. **(12 Marks)**

b. Obtain the condition for resonance of elements as shown in Fig. 5(b). Derive the expression for total impedance at resonance. **(08 Marks)**

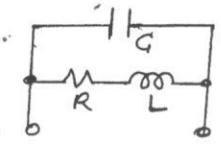

Fig. Q5(b)

6 a. The switch 'K' in the circuit shown in Fig. 6(a) is in open position for a long time and at time t = 0, it is closed. Determine the values of i_1 and i_2 along with their first and second derivatives at t = 0+. **(10 Marks)**

b. The switch 'S' is changed from position 1 to 2 at time t = 0. The circuit was under steady state before this action. Determine the value of v and i at t = 0+ and their first and second derivatives also. Refer Fig. 6(b). **(10 Marks)**

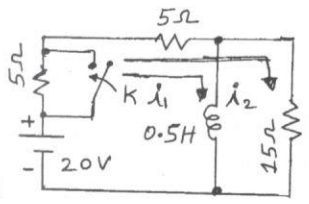

Fig. Q6(a)

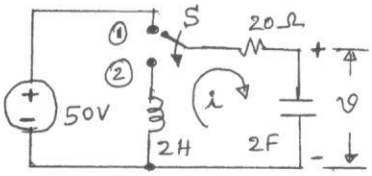

Fig. Q6(b)

7 a. Using Laplace transformation method obtain the expression for i(t). The capacitor charge is zero initially. Also obtain the expression for capacitor voltage in 'S' domain, refer Fig. 7(a). **(10 Marks)**

b. Using standard waveforms, express the waveform given (periodic) in Fig. 7(b) and obtain its Laplace transform. **(10 Marks)**

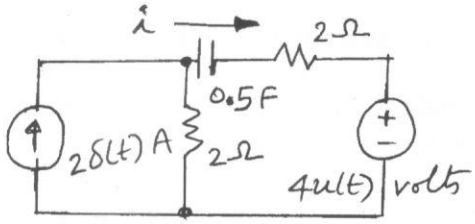

Fig. Q7(a)

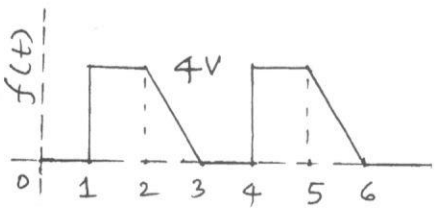

Fig. Q7(b)

8 a. Determine the Y–parameters of the network shown in Fig. Q8(a), **(10 Marks)**

b. Replace the circuit shown in Fig. 8(b) with its hybrid parameter equivalent network. **(10 Marks)**

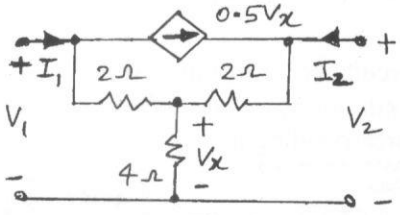

Fig. Q8(a)

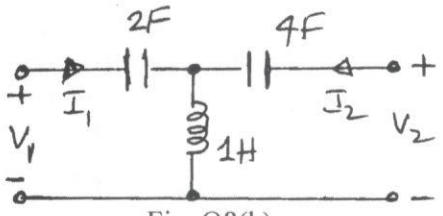

Fig. Q8(b)

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CBCS Scheme

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15EC34

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Network Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. Derive the expression for i) Δ to Y transformation ii) Y to Δ transformation. **(10 Marks)**

b. Using source Transformation, find power delivered by 50V source. Shown in Fig Q1(b). **(06 Marks)**

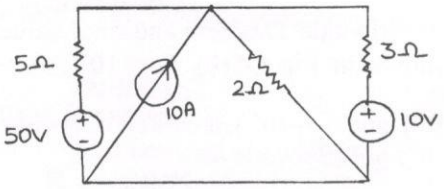

Fig Q1(b)

OR

2 a. Find the voltage across 20Ω resistor in the Network. Shown in Fig Q2(a) by Mesh analysis. **(08 Marks)**

b. Find i, using nodal analysis for the circuit shown in Fig Q2(b). **(08 Marks)**

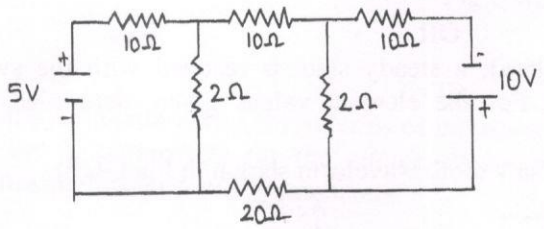

Fig Q2(a)

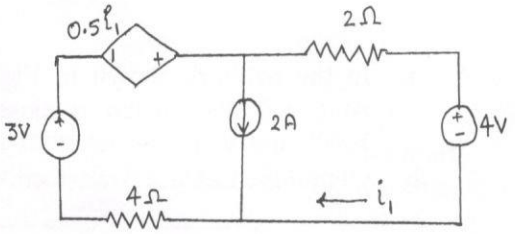

Fig Q2(b)

Module-2

3 a. State and prove maximum power transfer Theorem for AC circuits. **(08 Marks)**

b. For the network shown in Fig Q3(b), obtain the Thevenin's equivalent as seen from terminals p and q. **(08 Marks)**

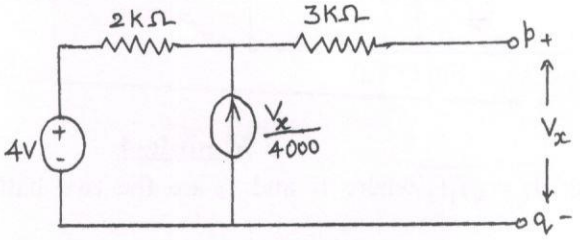

Fig Q3(b)

OR

4 a. State and explain Millman's theorem. **(08 Marks)**

b. Verify reciprocity theorem for the circuit shown in Fig Q4(b). **(08 Marks)**

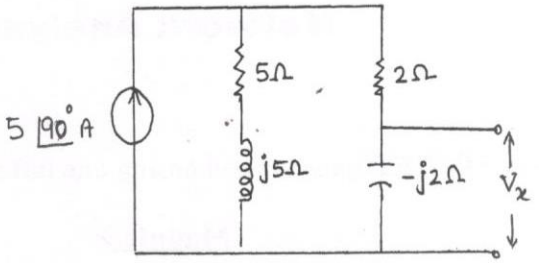

Fig Q4(b)

Module-3

5 a. Stat and prove initial value Theorem and final value theorem. **(08 Marks)**

b. In the circuit shown in Fig Q5(b) V = 10V, R = 10Ω, L = 1H, C = 10μF and V_c = 0. Find $i(0^+)$, $\frac{di}{dt}(0^+)$ and $\frac{d^2i}{dt^2}(0^+)$, it switch K is closed at t = 0. **(08 Marks)**

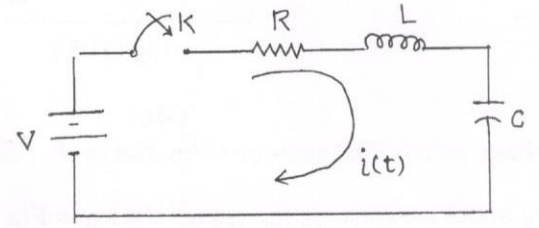

Fig Q5(b)

OR

6 a. In the network shown in Fig Q6(a), a steady state is reached with the switch K open. At t = 0, the switch is closed. For the element values given, determine the values of $V_a(0^-)$ and $V_a(0^+)$. **(08 Marks)**

b. Obtain the Laplace Transform of saw tooth waveform shown in Fig Q6(b). **(08 Marks)**

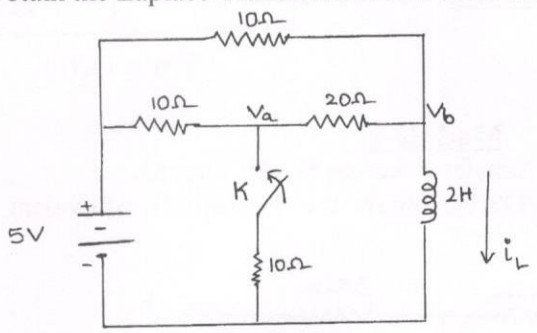

Fig Q6(a)

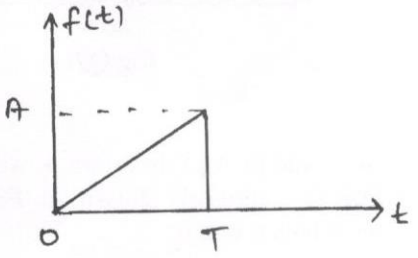

Fig Q6(b)

Module-4

7 a. Prove that $f_0 = \sqrt{f_1 f_2}$ where f_1 and f_2 are the two half power frequencies of a resonant circuits. **(08 Marks)**

b. A series RLC circuit consists of R = 10Ω, L = 0.01H and C = 0.01μF is connected across a supply of 10mV. Determine, i) f_0 ii) Q-factor iii) BW iv) f_1 and f_2 and v) I_0. **(08 Marks)**

OR

8 a. Obtain the expression for the resonant frequency for the circuit shown in Fig Q8(a) **(08 Marks)**

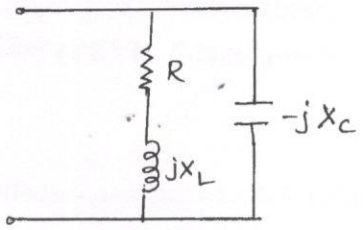

Fig Q8(a)

b. An RLC series circuit has an inductive coil of 'R' Ω resistance and inductance of 'L' H is in series with a capacitor 'C' F. The circuit draws a maximum current of 15A when connected to 230V, 50Hz supply. If the Q-factor is 5, find the parameter of the circuit. **(08 Marks)**

Module-5

9 a. Derive the z-parameters in terms of Y parameters. **(08 Marks)**

b. Determine Y parameter of the two – port network shown in Fig Q9(b). **(08 Marks)**

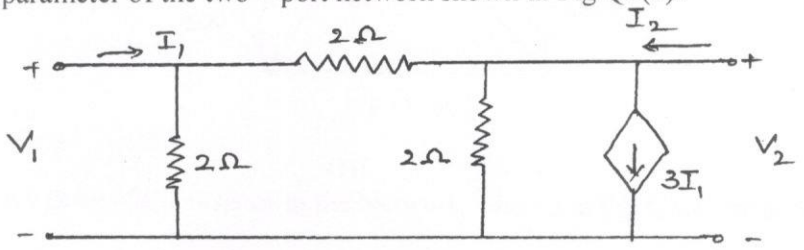

Fig Q9(b)

OR

10 a. Obtain hybrid parameters (h) in terms of impedance parameters (z). **(08 Marks)**

b. Find the Y parameters for the circuit shown in Fig Q10 (b). Then use the parameter relationship to find ABCD parameters. **(08 Marks)**

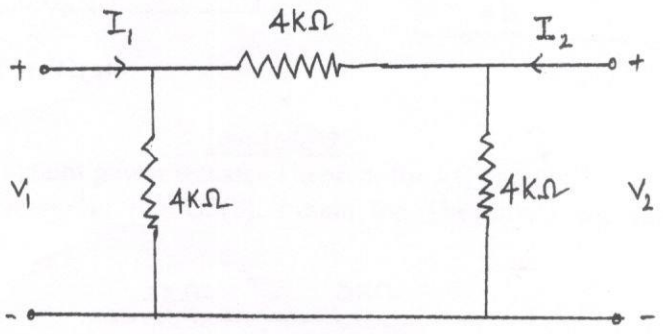

Fig Q10(b)

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10ES34

Third Semester B.E. Degree Examination, June/July 2016
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Using source transformation find current through R_L in the circuit shown in Fig. Q1(a). **(06 Marks)**

b. Using mesh current method find current through 10Ω resistor in the circuit shown in Fig. Q1(b). **(07 Marks)**

c. Find all the nodal voltages in the circuit shown in Fig Q1 (c). **(07 Marks)**

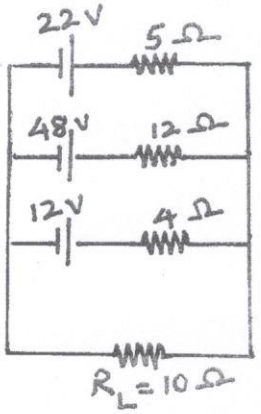


Fig. Q1(a)

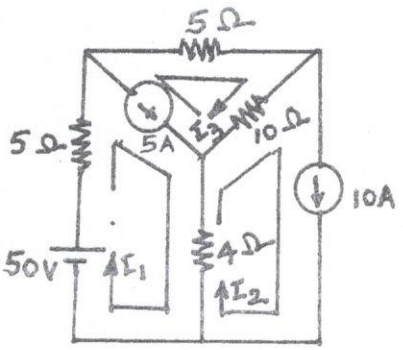


Fig. Q1(b)

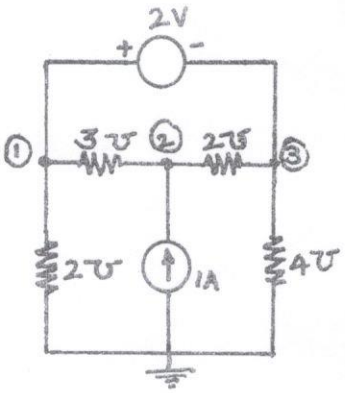


Fig. Q1(c)

2 a. With neat illustrations, distinguish between
i) Oriented and Non-oriented graphs
ii) Connected and un-connected graphs
iii) Tree and co-tree. **(06 Marks)**

b. For the network shown in Fig. Q2(b), draw the oriented graph. By selecting braches 4, 5 and 6 as twigs, write down tie-set schedule. Using this tie-set schedule, find all the branch currents and branch voltages. **(14 Marks)**

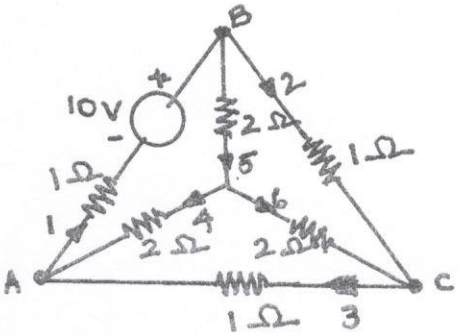


Fig. Q2(b)

3 a. State and illustrate superposition theorem. **(05 Marks)**

b. Using superposition theorem, find value of i in the circuit shown in Fig.Q3(b). **(08 Marks)**

c. Find the value of V_x in the circuit shown in Fig. Q3(c). Verify it using Reciprocity theorem. **(07Marks)**

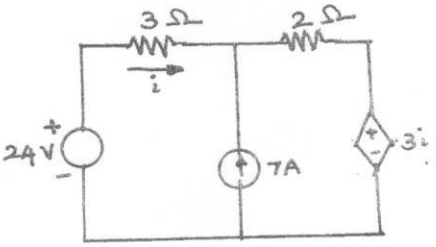


Fig.Q3(b)

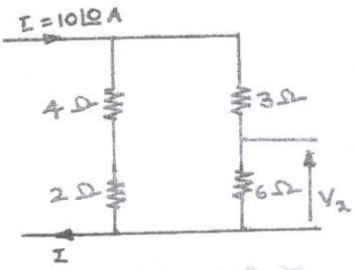
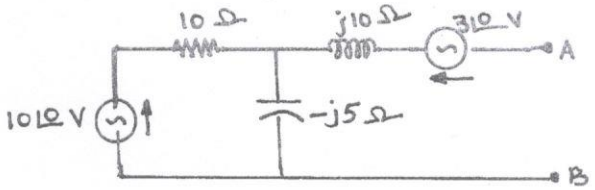


Fig. Q3(c)

4 a. Show that the power delivered to load, when the load impedance consists of variable resistance and variable reactance is maximum when the load impedance(Z_L) is equal to complex conjugate of source impedance (Z_g). **(10 Marks)**

b. Obtain Thevenin's equivalent network of the circuit shown in Fig. Q4(b) and thereby find current through 5Ω resistor connected between terminals A and B. **(10 Marks)**

Fig. Q4(b)



PART – B

5 a. With respect to series resonant circuit, define resonant frequency (f_r) and half power frequencies (f_1 and f_2). Also show that the resonant frequency is equal to the geometric mean of half power frequencies. **(10 Marks)**

b. A series circuit is energized by a constant voltage and constant frequency supply. Resonance takes place due to variation of inductance and the supply frequency is 300Hz. The capacitance in the circuit is 10μF. Determine the value of resistance in the circuit if the quality factor is 5. Also find the value of the inductance at half power frequencies. **(10 Marks)**

6 a. In the circuit shown in Fig. Q6(a), the switch K is changed from position A to B t = 0. After having reached steady state in position A. Find i, $\frac{di}{di}, \frac{d^2i}{dt^2}$ and $\frac{d^3i}{dt^3}$ at $t = 0^+$. **(10 Marks)**

b. In the circuit shown in Fig. Q6(b) switch K is opened at t = 0. Find i, $, \frac{di}{dt}$, V_3 and $\frac{dV_3}{dt}$ at $t = 0^+$. **(10 Marks)**

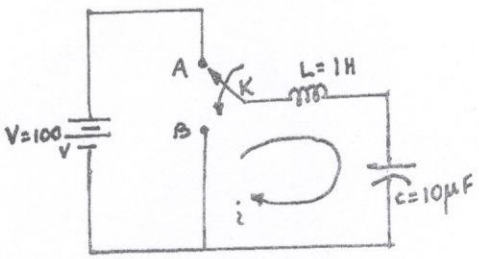


Fig. Q6(a)

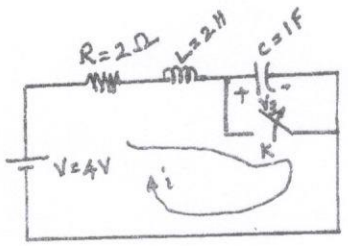


Fig. Q6(b)

7 a. Using convolution theorem find the inverse Laplace transform of following functions.

i) $F(s) = \frac{1}{(s-a)^2}$ and ii) $F(s) = \frac{1}{s(s+1)}$ **(10 Marks)**

b. Obtain the Laplace transform of the triangular waveform shown in Fig Q7(b). **(10 Marks)**

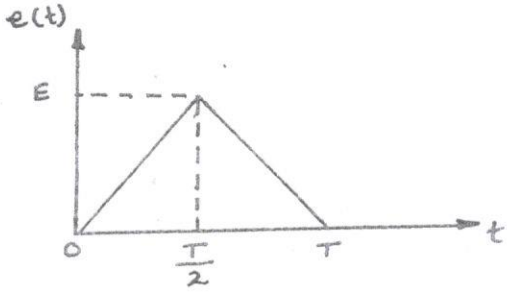


Fig. Q7(b)

8 a. Define h and T parameters of a two – port network. Also, derive the expressions for h parameters in terms of T parameters. **(10 Marks)**

b. Find Y and Z parameters for the network shown in Fig. Q8(b). **(10 Marks)**

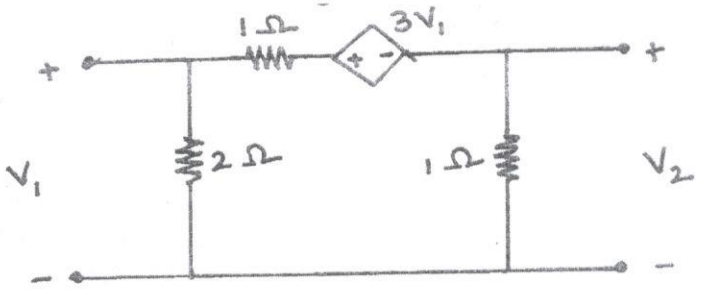


Fig. Q8(b)

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10ES34

Third Semester B.E. Degree Examination, Dec.2015/Jan.2016

Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Find the equivalent resistance between the terminals A and B in the network shown in Fig Q1 (a) using Star – Delta transformation. **(06 Marks)**

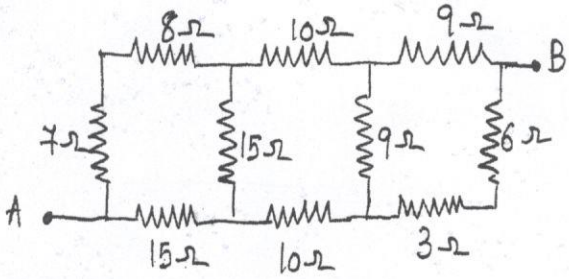


Fig. Q1(a)

b. Find the power delivered by the dependent voltage source in the circuit shown in Fig Q1 (b) by mesh current method. **(06 Marks)**

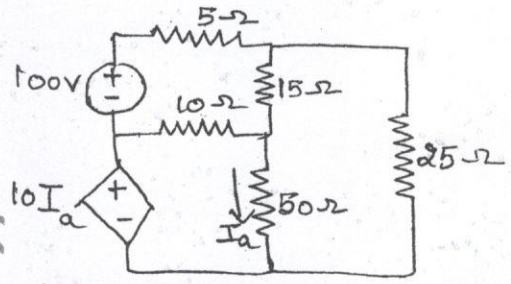


Fig. Q1(b)

c. Find the current i, in the circuit shown in Fig Q1 (c) using Nodal Analysis. **(08 Marks)**

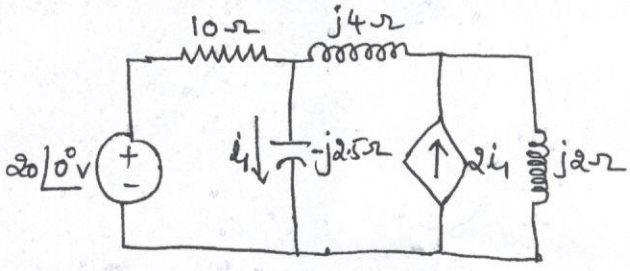


Fig. Q1(c)

2 a. Define the terms tree, cotree, link, cutset schedule and Tie set schedule. **(10 Marks)**

b. Draw the graph of the network shown in Fig Q2 (b). Write the cut set schedule and find all node voltages, branch voltages and branch currents. Assume branches (2) and (3) to form the tree. **(10 Marks)**

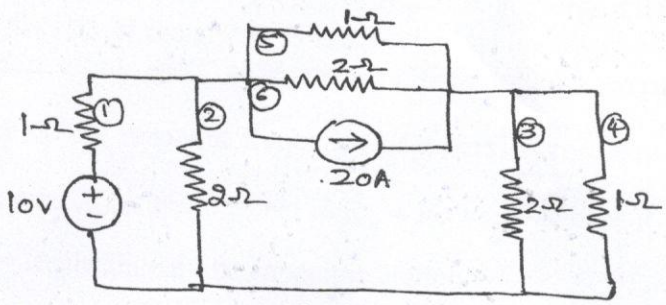


Fig. Q2(b)

3 a. Find I_x for the circuit shown in figure Q3(a) using the principle of superposition. **(06 Marks)**

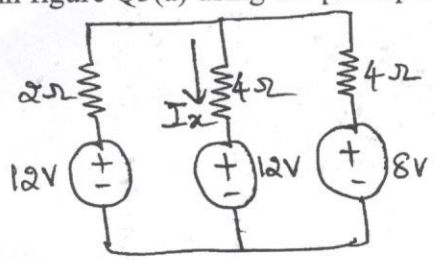


Fig. Q3(a)

b. State and explain Millman's theorem. **(06 Marks)**

c. Verify reciprocity theorem for the circuit shown in Fig Q 3(c) with response I. **(08 Marks)**

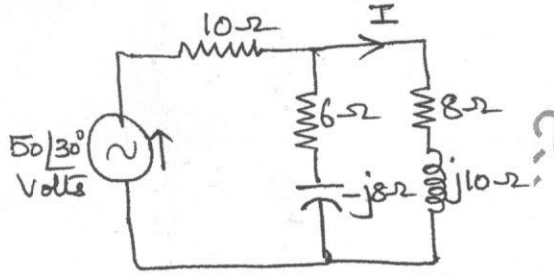


Fig. Q3(c)

4 a. State and explain the Vinin's theorem. **(06 Marks)**

b. In the circuit shown in Fig Q4(b), find the value of the current through the 667Ω resistor using Norton's theorem. **(06 Marks)**

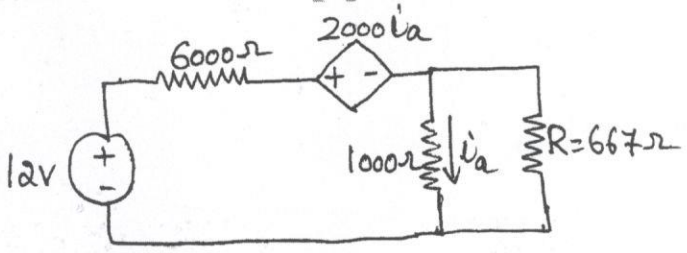


Fig Q4(b)

c. In the circuit shown in Fig Q4(c), find the value of R_L for which maximum power is delivered. Also find the maximum power that is delivered to the load R_L. **(08 Marks)**

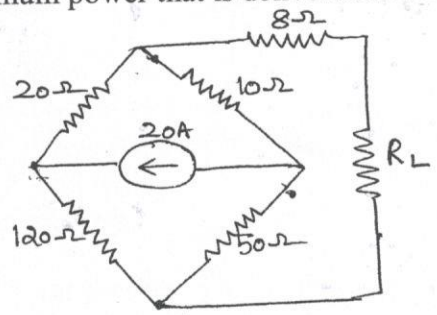


Fig. Q4(c)

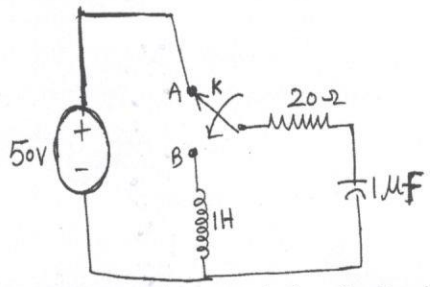
PART – B

5 a. It is required that a series RLC circuit should resonate at 500KHz. Determine the values of R, L and C if the Bandwidth of the circuit is 10KHz and its impedance is 100Ω at resonance. Also find the voltages across L and C at resonance if the applied voltage is 75 volts. **(10 Marks)**

b. Derive an expression for the resonant frequency of a parallel resonant circuit. Also shown that the circuit is resonant at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$ where R_L = Resistance in the indicator branch, R_C = Resistance in the capacitor branch. **(10 Marks)**

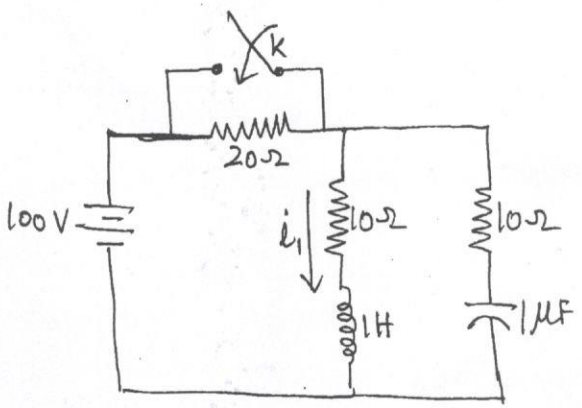
6 a. In the circuit shown in Fig Q6(a), the switch K is changed from position A to B at t = 0, steady state having been leached before switching. Calculate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

Fig. Q6(a)



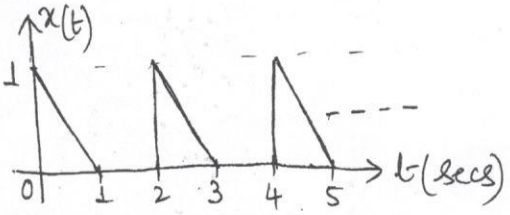
b. In the Network shown in Fig Q6(b), steady state is leached with switch K open. The switch is closed at time t = 0. Solve for i_1, i_2, $\frac{di_1}{dt}$ and $\frac{di_2}{dt}$ at $t = 0^+$. **(10 Marks)**

Fig. Q6(b)



7 a. Obtain the Laplace transform of the Periodic signal shown in Fig.Q 7(a) **(10 Marks)**

Fig. Q7(a)



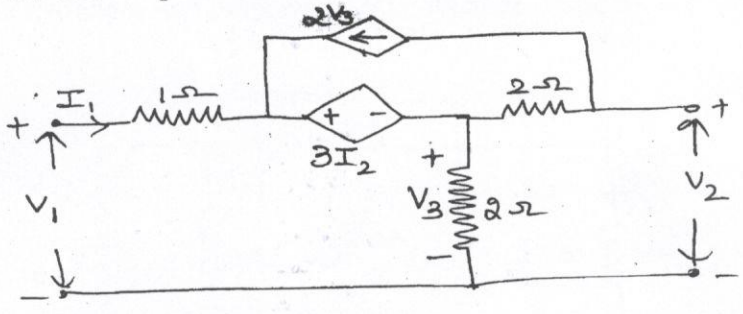
b. Find the convolution of $h(t) = e^{-t}$ and $f(t) = e^{-2t}$. **(04 Marks)**

c. State and prove the initial value theorem. **(06 Marks)**

8 a. Derive Y–parameters and Transmission parameters of a circuit in terms of its z – parameters. **(10 Marks)**

b. Find the z parameters and h – parameters for the circuit shown in Fig. Q8(b) **(10 Marks)**

Fig. Q8(b)



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10ES34

Third Semester B.E. Degree Examination, June/July 2015

Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Derive expression for
i) Star to delta transformation ii) Delta to star transformation **(10 Marks)**

b. For the Network shown find the node voltages Vd and Vc Fig. Q No. 1 (b). **(10 Marks)**

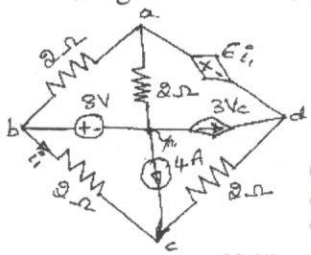


Fig.Q1(b)

2 a. Define the following with examples
i) Oriented graph ii) Tree iii) Fundamental cut set iv) Fundamental tie set **(08 Marks)**

b. For the network, Shown Fig. Q No.2 (b) write the tie set schedule, tie set matrix and obtain equilibrium equation in matrix form using KVL. Calculate branch currents and branch voltage. Follow the same orientation and branch numbers use 4, 5 and 6 as tree branches. **(12 Marks)**

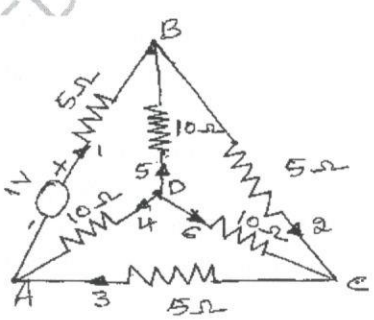


Fig.Q2(b)

3 a. State and prove Reciprocity theorem. **(07 Marks)**

b. Find the output voltage Eo of the Network shown Using Millman's theorem. Fig. Q No. 3(b)

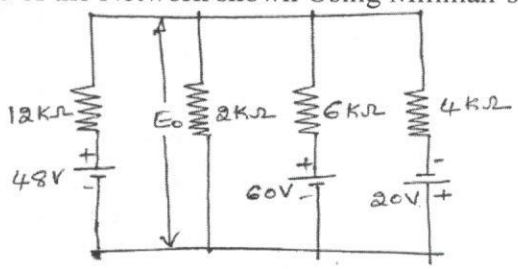
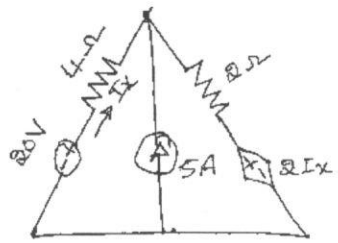


Fig.Q3(b)

(06 Marks)

c. Using superposition theorem, find the current IX the network shown in Fig. Q No.3(c)

Fig.Q3(c)

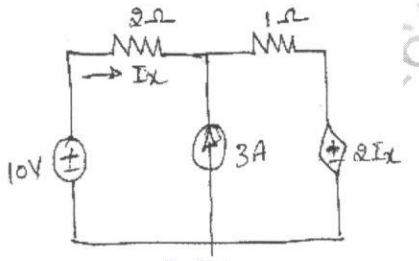


(07 Marks)

4 a. State Norton's theorem. Show that Thevenin's equivalent circuit is the dual of Norton's equalent circuit. **(06 Marks)**

b. Obtain the current I_x by using Thevenin's theorem for the network shown in Fig Q No.4(b)

Fig.Q4(b)



(08 Marks)

c. State maximum power transfer theorem. Prove that $Z_L = Z_o^*$ for Ac circuits. **(06 Marks)**

PART – B

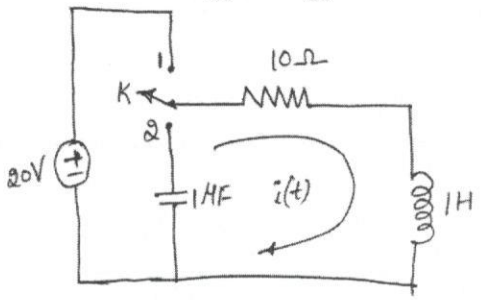
5 a. Show that $f_0 = \sqrt{f_1 f_2}$ fro series Resonance circuit. **(06 Marks)**

b. A voltage of 100 sin wt is applied to an RLC series circuit at resonant frequency. The voltage across a capacitor was found to be 400V. The bandwidth is 75Hz. The impedence at resonance is 100Ω. Find the resonant frequency and constants of the circuit. **(06 Marks)**

c. Derive an expression for the resonant frequency of a resonant frequency of a resonant circuit consisting of R_L L in parallel with R_c C. Draw the frequency response curve of the above circuit. **(08 Marks)**

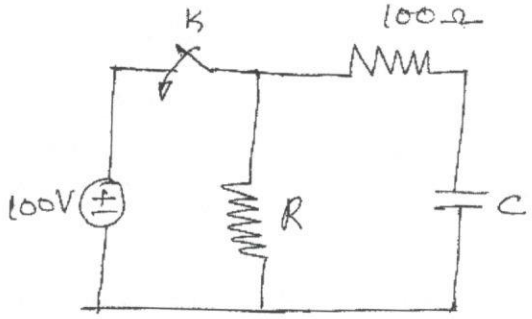
6 a. In the circuit shown, switch K is changed from 1 to 2 at t = 0, steady state having been attained in position 1. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

Fig.Q6(a)



b. In the circuit shown, switch K is kept open for very long time, on closing K, after 10ms, Vc = 80V. Then the switch K is kept closed for a long time. When the switch is opened again, Vc = 90V after half second, calculate values of R and C. Fig. Q No.6 (b)

Fig.Q6(b)

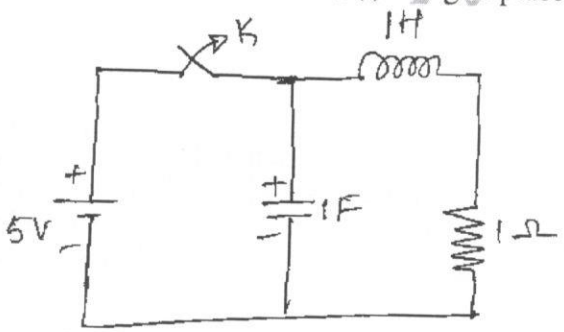


(10 Marks)

7 a. State and prove i) Initial value theorem ii) Final value theorem as applied to Laplace transform. What are the limitations of each theorem. **(10 Marks)**

b. In the circuit shown, in Fig.Q No.7 (b) switch is initially closed. After steady the switch is opened, Determine the nodal voltages V_a (t) and V_b (t) using Laplace transform method.

Fig.Q7(b)



(10 Marks)

8 a. Define z-parameters. Express z-parameters in terms of y – parameters. **(10 Marks)**

b. Find y parameters and z parameters for the circuit shown.

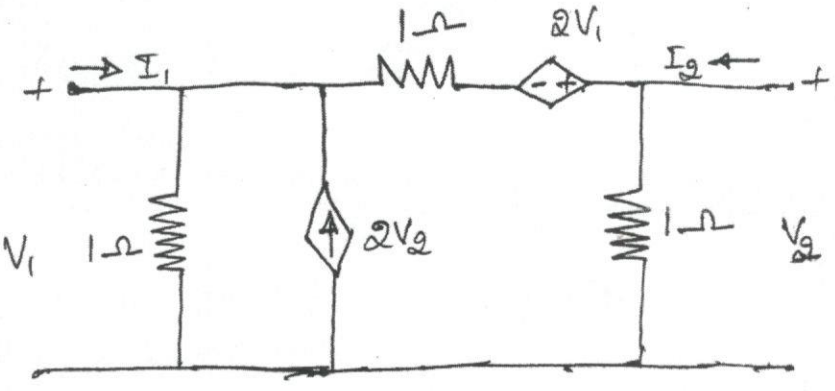


Fig.Q8(b)

10 Marks)

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10ES34

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. For the network shown in Fig. Q1(a). Find the potential difference between M and N using source transformation. **(04 Marks)**

b. Using star/ delta transformation, determine the resistance between M and N of network shown in Fig. Q1(b). **(04 Marks)**

c. For the network shown in Fig. Q1(c), find power supplied by 10V source using mesh current analysis. **(06 Marks)**

d. For the network shown in Fig. Q1(d), find the magnitude of source voltage such that current in 4 ohm is zero. Use node voltage analysis. **(06 Marks)**

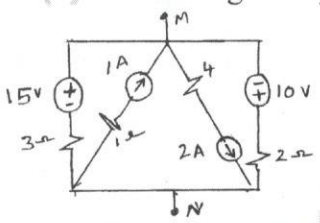

Fig. Q1(a)

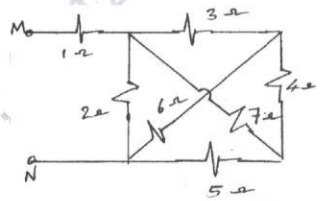

Fig. Q1(b)

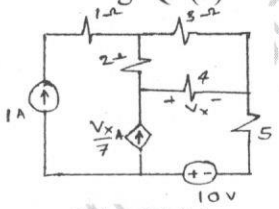

Fig. Q1(c)

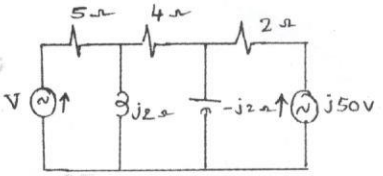

Fig. Q1(d)

2 a. Explain element – node incidence matrix with example. List the properties of the element node incidence matrix. **(06 Marks)**

b. For the network shown in Fig. Q2(b). Determine branch voltages. On voltage basis. **(08 Marks)**

c. Write KVL equation for the network shown. Draw the dual of this a write KCL equation and show that these two networks are dual. (Fig. Q2(c)). **(06 Marks)**

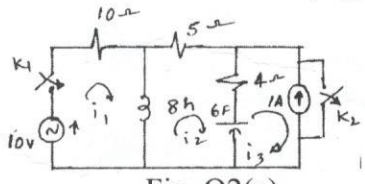

Fig. Q2(c)

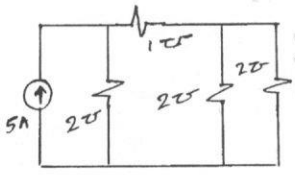

Fig. Q2(b)

3 a. Use superposition theorem to find I_x of the network shown in Fig. Q3(a). **(08 Marks)**

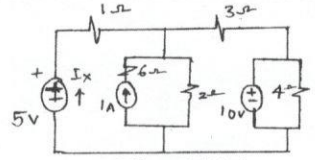

Fig. Q3(a)

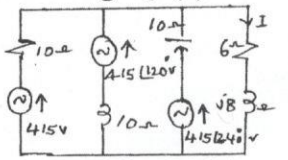

Fig. Q3(b)

b. For the circuit shown in Fig. Q3(b), find current 'I' using Millimun's theorem. **(06 Marks)**

c. State and prove reciprocity theorem. **(06 Marks)**

4 c. Find the current through 16 Ω resistor using Nortons theorem in Fig. Q4 (c). **(06 Marks)**

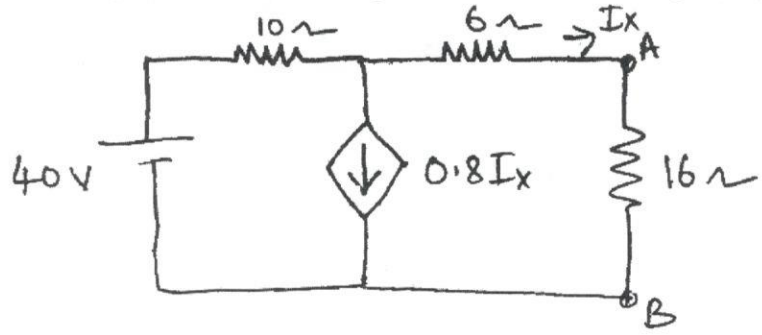

Fig. Q4 (c)

PART – B

5 a. Define the following terms: i) Resonance ii) Q-Factor iii) Selectivity of series RLC circuit iv) Bandwidth **(04 Marks)**

b. Prove that $f_0 = \sqrt{f_1 f_2}$ where f_1 and f_2 are the two half power frequencies of a resonant circuits. **(08 Marks)**

c. A series RLC circuit has R = 4 Ω, L = 1 mH and C = 10 μF. Calculate Q factor, band width, resonant frequency and the half power frequencies f_1 and f_2. **(08 Marks)**

6 a. For the circuit shown in Fig. Q6 (a), determine complete solution for current when switch K is closed at t = 0. Applied voltage is v(t) which is given as $100\cos\left(10^3 t + \frac{\pi}{2}\right)$. **(10 Marks)**

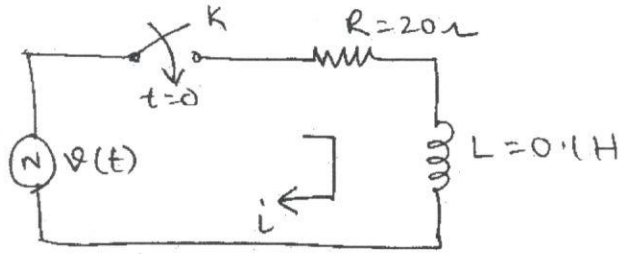

Fig. Q6 (a)

b. For the given circuit of Fig. Q6 (b) switch K is changed from position 1 to position 2 at t = 0, the steady state having been reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

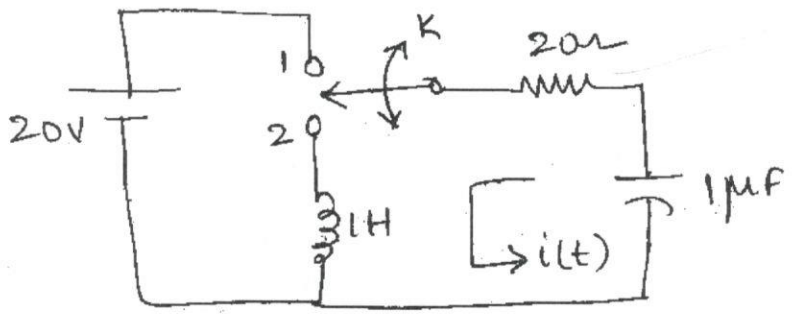

Fig. Q6 (b)

7 a. State and prove initial value and final value theorem. **(08 Marks)**

b. Obtain the Laplace transform of the saw tooth waveform shown in Fig. Q7 (b). **(08 Marks)**

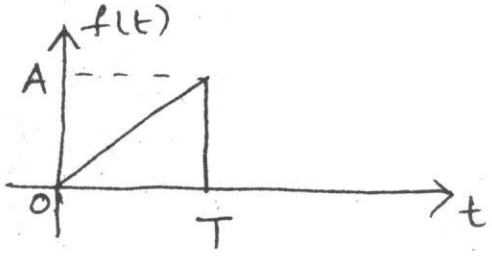

Fig. Q7 (b)

c. Find the Laplace transform of , (i) t (ii) $\delta(t)$. **(04 Marks)**

8 a. Obtain the relationship between h and y parameters of a two port network. **(08 Marks)**

b. Determine the transmission parameters for the network shown in Fig. Q8 (b). **(08 Marks)**

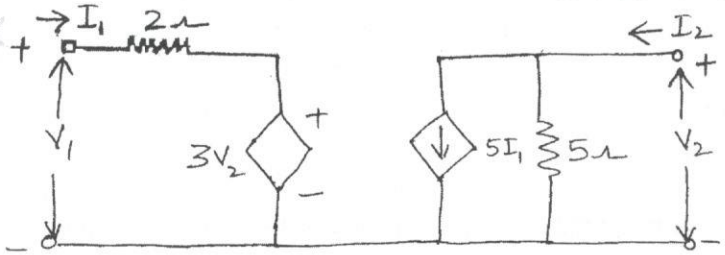

Fig. Q8 (b)

c. Define z parameters and draw the equivalent network in terms of z parameters. **(04 Marks)**

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4 a. State and explain maximum power transfer theorem when load impedance consisting of variable resistance and variable reactance. **(08 Marks)**

b. For the network shown in Fig. Q4(b). Draw the Thevenin's equivalent circuit. **(05 Marks)**

c. Using Norton's theorem, find the current 'I' of the network shown in Fig. Q4(C). **(07 Marks)**

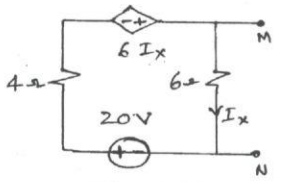

Fig. Q4(b)

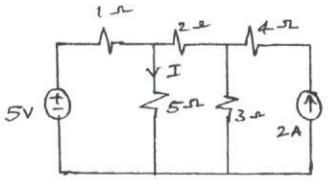

Fig. Q4(c)

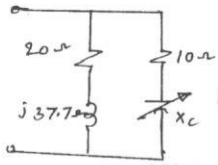

Fig. Q5(c)

PART – B

5 a. What is resonance? Derive an expression for cut-off frequencies. **(08 Marks)**

b. Calculate half power frequencies of series resonant circuit where the resonance frequency is 150 KHz and band width is 75 KHz. **(04 Marks)**

c. For the circuit shown in Fig. Q5(c), find two values of capacitor for the resonance. Derive the formula used Take f = 50 Hz. **(08 Marks)**

6 a. What is initial and final condition? Explain the behaviour of R, L and C for the initial condition. **(06 Marks)**

b. For the circuit shown in Fig. Q6(b), switch k is opened at t = 0, after reaching the steady state condition. Determine voltage drop across switch and its first and second derivative at $t = 0^+$. **(08 Marks)**

c. In the circuit shown, in Fig. Q6(c), switch k is closed at t = 0. Find $v_a(0-)$ and $V_a(0+)$. **(06 Marks)**

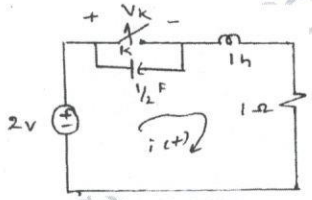

Fig. Q6(b)

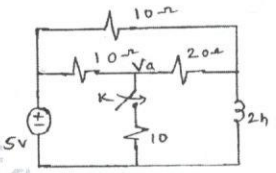

Fig. Q6(c)

7 a. For the circuit shown in Fig. Q7(a), switch 'k' is closed at t = 0. The initial current through inductance is 1A and initial voltage across the capacitor is 1V. Obtain expression for current i(+) for t ≥ 0. **(08 Marks)**

b. For the circuit shown in Fig. Q7(b) switch is closed at t = 0. The initial current through an inductance is 2A. Obtain expression for $V_0(+)$ for t ≥ 0. **(06 Marks)**

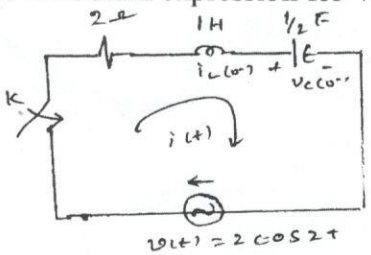

Fig. Q7(a)

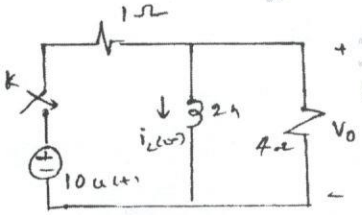

Fig. Q7(b)

c. Synthesis the waveform shown in Fig. Q7(c) and find the Laplace transform of the periodic waveform. **(06 Marks)**

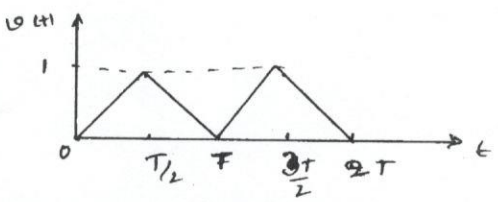

Fig. Q7(c)

8 a. Obtain transmission parameters in terms of hybrid parameters. **(06 Marks)**

b. For the network shown in Fig. Q8(b). Find the z – parameters. **(08 Marks)**

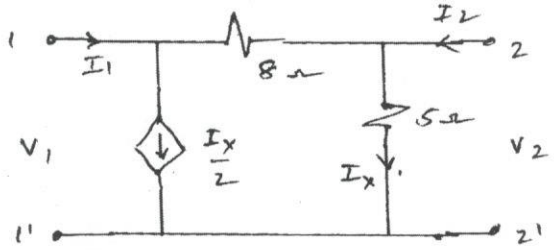

Fig. Q8(b)

c. Following short circuit currents and voltages are obtained experimentally for a two port network :

i) With output short circuited : $I_1 = 5$ mA ; $I_2 = -0.3$ mA and $V_1 = 25$ V

ii) With input short circuited : $I_1 = -5$ mA ; $I_2 = +10$mA and $V_2 = 30$ V.

Determine Y – parameters. **(06 Marks)**

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10ES34

Third Semester B.E. Degree Examination, June / July 2014
Network Analysis

Time: 3 hrs. Max. Marks:100

Note:1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume suitable missing data if any.***

PART – A

1 a. The node equations of a network are $\left[\frac{1}{5}+\frac{1}{2}j+\frac{1}{4}\right]V_1-\frac{1}{4}V_2=\frac{50\angle 0^\circ}{5}$ and $-\frac{1}{4}V_1+\left[\frac{1}{4}-\frac{1}{2j}+\frac{1}{2}\right]V_2=\frac{50\angle 90^\circ}{2}$. Derive the network. **(10 Marks)**

b. Find the current I in 28 Ω resistor by mesh analysis in Fig. Q1 (b). **(05 Marks)**

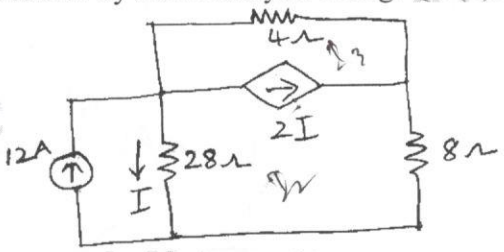

Fig. Q1 (b)

c. Using source transformation find power delivered by 50 V source in given network of Fig. Q1 (c). **(05 Marks)**

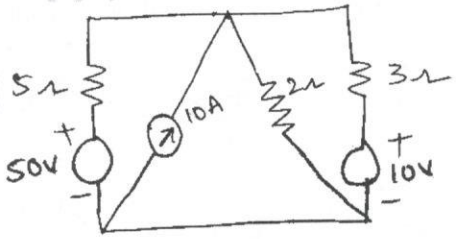

Fig. Q1 (c)

2 a. Define the following terms with respect to network topology and give examples:
i) Oriented and unoriented graphs.
ii) Isomorphic graphs.
iii) Fundamental cut set. **(06 Marks)**

b. For the network shown in Fig. Q2 (b), write the tie set schedule selecting centre star as tree and find all the branch currents by solving equilibrium equations. **(10 Marks)**

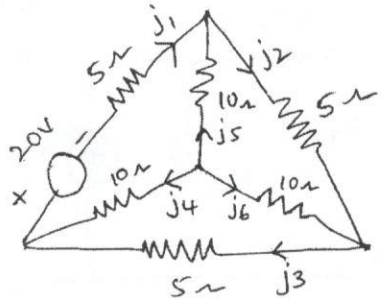

Fig. Q2 (b)

c. For the network shown in Fig. Q2 (c) draw the dual network. **(04 Marks)**

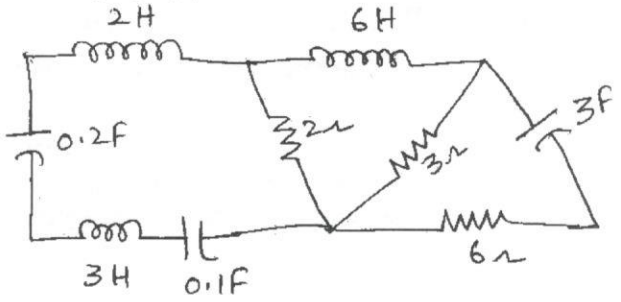

Fig. Q2 (c)

3 a. State and prove superposition theorem. **(06 Marks)**

b. Find i_x and hence verify reciprocity theorem for the network in Fig. Q3 (b). **(08 Marks)**

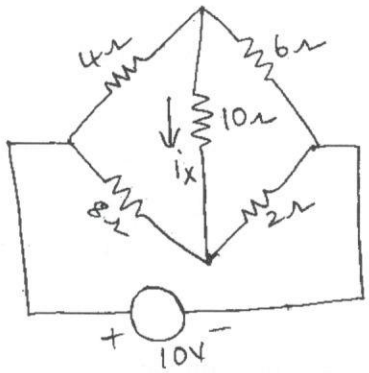

Fig. Q3 (b)

c. Using Millman's theorem find I_L through R_L for the network of Fig. Q3 (c). **(06 Marks)**

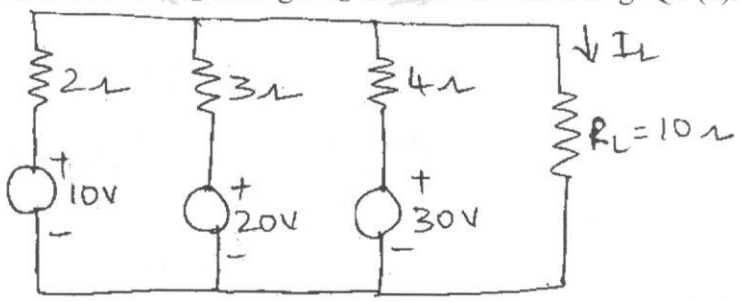

Fig. Q3 (c)

4 a. State and prove Thevenin's theorem. **(06 Marks)**

b. Find the value of load resistance when maximum power is transferred across it and also find the value of maximum power transferred for the network of Fig. Q4 (b). **(08 Marks)**

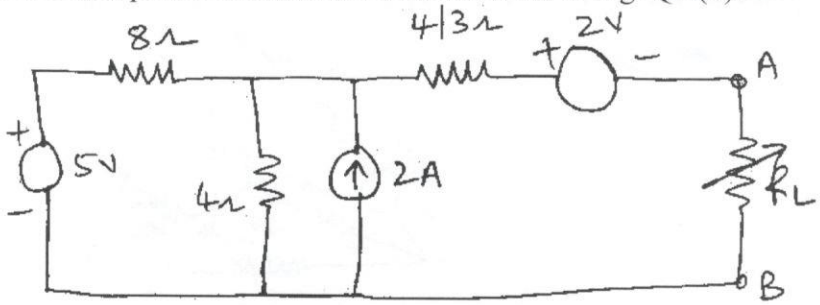

Fig. Q4 (b)

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10ES34

Third Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Find the equivalent resistance at AB using Y - Δ transformation technique for the circuit shown in Fig. Q1(a). (All the resistors connected are 30 Ω each). **(05 Marks)**

b. Find 'i_x' and 'v_x' for the circuit shown in Fig. Q1(b) by Mesh analysis. **(05 Marks)**

c. For the network given in Fig. Q1(c), find 'I_0' using nodal analysis. **(10 Marks)**

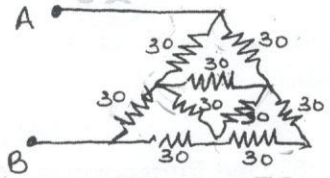

Fig. Q1(a)

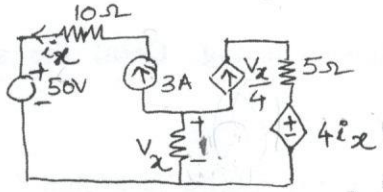

Fig. Q1(b)

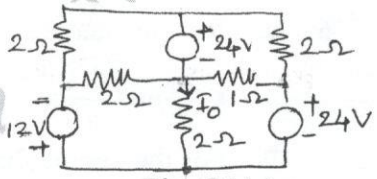

Fig. Q1(c)

2 a. Write the tie – set schedule for the network shown in Fig. Q2(a), and using the tie set schedule determine all branch currents. (Take inner resistors as tree branch elements). **(10 Marks)**

b. For the network shown in Fig. Q2(b), draw the dual circuit. Also write the nodal equations for the dual circuit. **(10 Marks)**

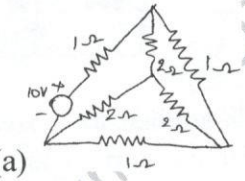

Fig. Q2(a)

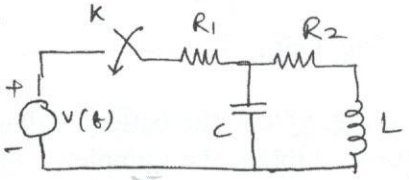

Fig. Q2(b)

3 a. Find the voltage 'V' across 3Ω resistor using superposition theorems for the circuit sown in the Fig. Q3(a). **(10 Marks)**

b. State Millman's theorem. Using Millman's theorem find current through the load resistor R_L for the circuit shown in Fig .Q3(b). **(10 Marks)**

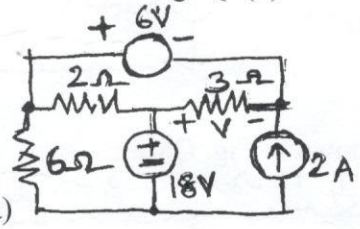

Fig. Q3(a)

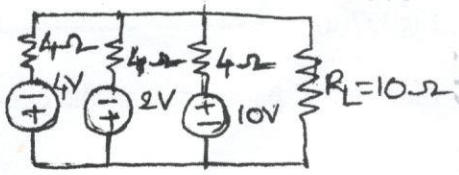

Fig. 3(b)

4 a. Find the Thevenin's equivalent of the network shown in Fig. Q4(a). **(10 Marks)**

b. State maximum power transfer theorem. For the circuit shown in Fig. Q4(b), what should be the value of 'R' such that maximum power transfer can take place from the rest of the network to 'R'. Obtain the amount of this power. **(10 Marks)**

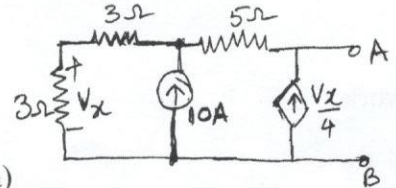

Fig.Q4(a)

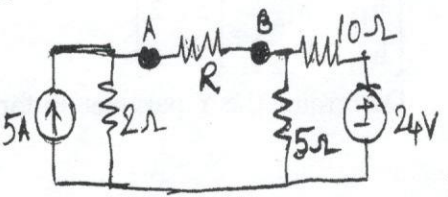

Fig.Q4(b)

Important Note : 1. On completing your answers, 2. Any revealing of identificatic

draw diagonal cross lines on the remaining valuator and /or equations written eg, 42+8

reated as malpractice.

PART – B

5 a. A 220 V, 100 Hz AC source supplies a series RLC circuit with a capacitor and a coil. If the coil has 50 m Ω resistance and 5 mH inductance, find at a resonance frequency of 100 Hz what is the value of capacitor. Also calculate the Q factor and half power frequencies of the circuit. **(10 Marks)**

b. Find the value of R_1 such that the circuit given in Fig. Q5(b) is resonant. **(06 Marks)**

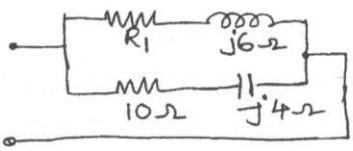

Fig. Q5(b)

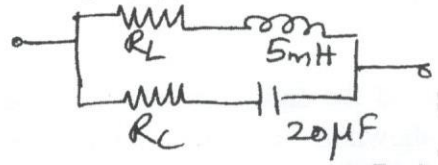

Fig. Q5(c)

c. Determine R_L and R_C that causes the circuit to be resonant at all frequencies for the circuit shown in Fig. Q5(c). **(04 Marks)**

6 a. In the network shown in Fig. Q6(a) the switch is closed at t = 0. Determine i, $\frac{d_i}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = o^+$. **(10 Marks)**

b. For the circuit shown in Fig. Q6(b), the switch 'K' is changed from position – 1 to position - 2 at t = 0 steady – state condition having been reached at position – 1. Find the values of i, $\frac{d_i}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

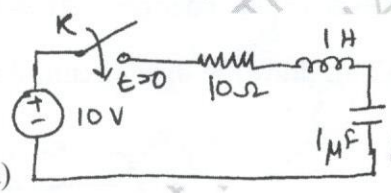

Fig. Q6(a)

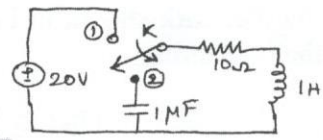

Fig. Q6(b)

7 a. In the Fig. Q7(a), the battery voltage '10'V is applied for a steady state period with switch 'K' open. Obtain the complete expression for the current after closing the switch K. Use Laplace transforms. **(10 Marks)**

b. Referring to the Fig. Q7(b), solve for $i_L(t)$, using Laplace transformation. **(10 Marks)**

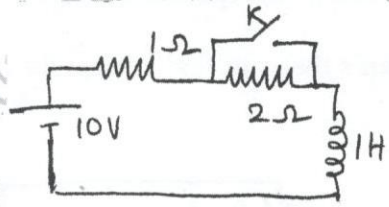

Fig.Q7(a)

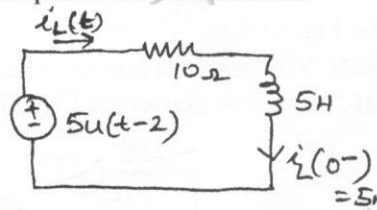

Fig.Q7(b)

8 a. Find the 'z' parameters of the circuit shown in Fig. Q8(a). **(10 Marks)**

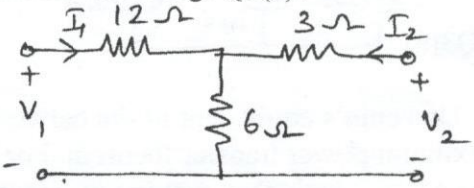

Fig. Q8(a)

b. Following are the hybrid parameters for a network

$$\begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ 3 & 6 \end{bmatrix}.$$

Determine the Y parameters for the network. **(10 Marks)**

* * * * *

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10ES34

Third Semester B.E. Degree Examination, June/July 2013
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data, if any, may be suitable assumed.

PART – A

1 a. Find the voltage across resistance R in the networking Fig. Q1(a) by mesh analysis. **(08 Marks)**

b. For the network of Fig. Q1(b) determine the node voltage by nodal analysis. **(06 Marks)**

c. Determine V_{23} by mesh analysis in the network of Fig. Q1(c). **(06 Marks)**

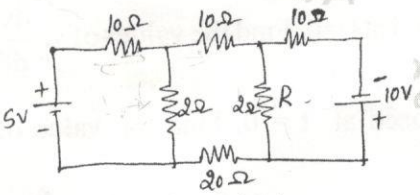

Fig. Q1(a)

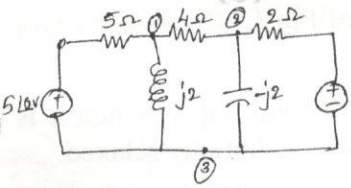

Fig. Q1(b)

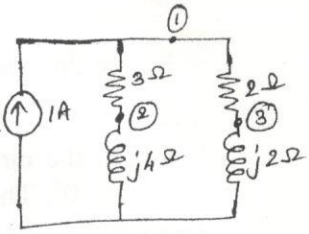

Fig. Q1(c)

2 a. Solve for loop and branch currents for the circuit of Fig. Q2(a) using tie set schedule and network equilibrium equations on the loop basis. Take OA, OB and OC as tree branches. **(10 Marks)**

b. Write the f-cut set matrix and solve for tree branch voltages. Take OA, OB and OC as the tree branches for the network of Fig. Q2(b). **(06 Marks)**

c. Draw the dual of the network of Fig. Q2(c). **(04 Marks)**

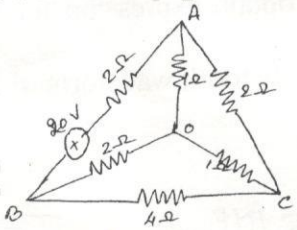

Fig. Q2(a)

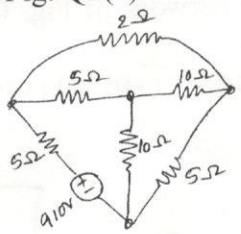

Fig. Q2(b)

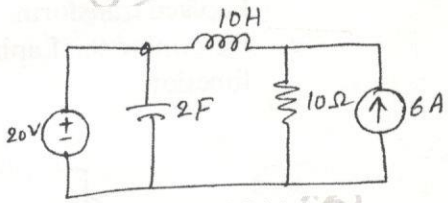

Fig. Q2(c)

3 a. State and explain super position theorem. **(06 Marks)**

b. Find the load current I in the circuit of Fig. Q3(b) by using Millman's theorem. **(06 Marks)**

c. Verify reciprocity theorem for the network of Fig. Q3(c) with response I_3. **(08 Marks)**

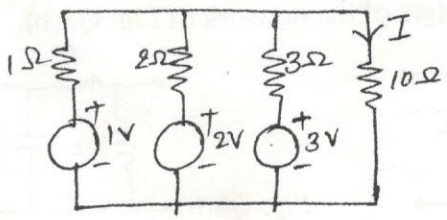

Fig. Q3(b)

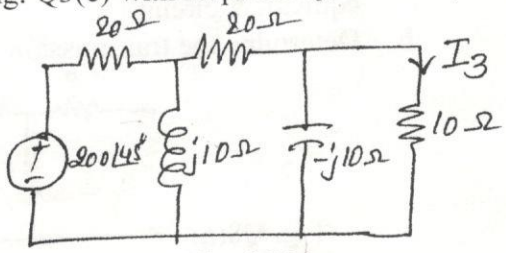

Fig. Q3(c)

4 a. State and explain Thevenin's theorem. **(07 Marks)**

b. Obtain Norton equivalent of the network of Fig. Q4(b) between terminals A and B. **(07 Marks)**

c. Find the value of Z_L for maximum power transfer through Z_L in the network of Fig. Q4(c). **(06 Marks)**

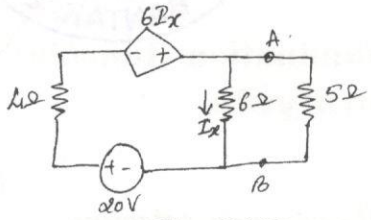

Fig. Q4(b)

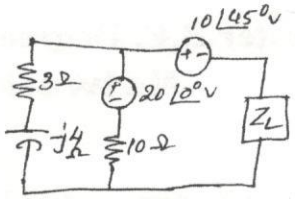

Fig. Q4(c)

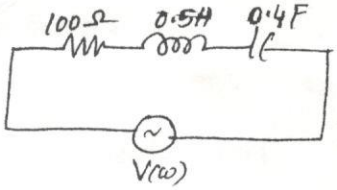

Fig. Q5(a)

PART – B

5 a. For the series RLC circuit of Fig. Q5(a) find the resonant frequency, half power frequencies, band width and quality factor. **(10 Marks)**

b. Derive expression for f_r, Q and bandwidth of a parallel resonant circuit with lossless capacitor in parallel with a coil of resistance R and inductance L. **(10 Marks)**

6 a. In the circuit of Fig. Q6(a), switch K is changed from position 1 to 2 at t = 0, steady state condition having reached before switching. Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(08 Marks)**

b. In the circuit of Fig. Q6(b), switch k is opened at t = 0. Find the values of v, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$ **(06 Marks)**

c. In the circuit of Fig. Q6(c) switch k is closed at t = 0. Find the value of v_1, v_2 and v_3 at $t = 0^+$. The circuit is initially relaxed. **(06 Marks)**

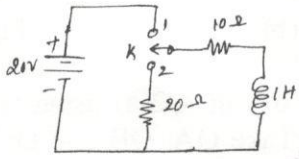

Fig. Q6(a)

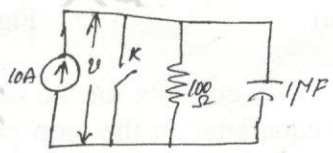

Fig. Q6(b)

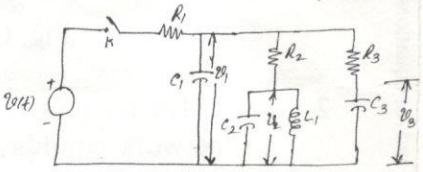

Fig. Q6(c)

7 a. Using Laplace transform obtain an expression for the current i(t) in the network of Fig. Q7(a). Assume zero critical conditions. **(06 Marks)**

b. For the critically related network of Fig. Q7(b) obtain expression for the current i(t). Use Laplace transform. **(06 Marks)**

c. Determine the Laplace transform of the periodic saw tooth waveform of Fig. Q7(c). Use g function. **(08 Marks)**

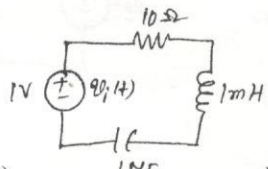

Fig. Q7(a)

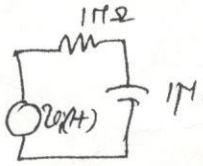

Fig.Q7(b) $v_i(t) = \delta(t)$

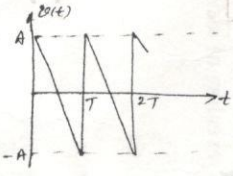

Fig. Q7(c)

8 a. For the network of Fig. Q8(a) obtain the Z – parameters. Also draw the Z – parameter equivalent circuit. **(12 Marks)**

b. Determine the transmission parameters of the network of Fig. Q8(b). **(08 Marks)**

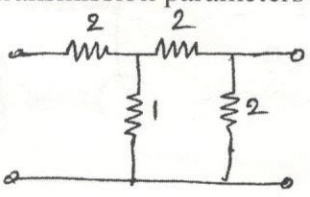

Fig. Q8(a)

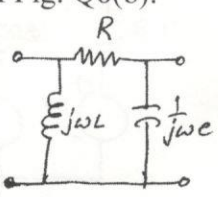

Fig. Q8(b)

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10ES34

Third Semester B.E. Degree Examination, December 2012

Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define and distinguish the following network elements:
i) Linear and non-linear ii) Active and passive
iii) Lumped and distributed iv) Ideal and practical current sources **(08 Marks)**

b. Write the mesh equation for the circuit shown in Fig.Q1(b) and determine mesh currents using mesh account analysis. **(06 Marks)**

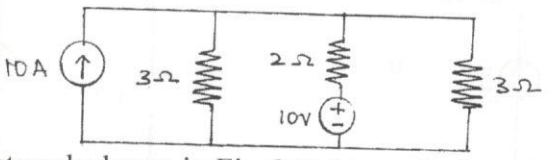

Fig.Q1(b)

c. Reduce the network shown in Fig.Q1(c) to a single voltage source in series with a resistance using source shift and source transformations. **(06 Marks)**

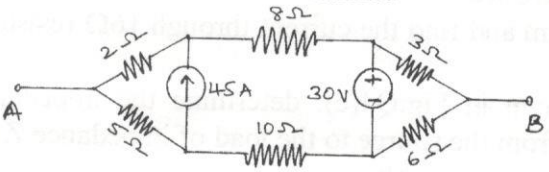

Fig.Q1(c)

2 a. Define the following terms with reference to network topology. Give examples.
i) Tree ii) Graph iii) Sub-graph iv) Tie-set v) Cut-set **(10 Marks)**

b. Construct a tree for the network shown in Fig.Q2(b) so that all loop currents pass through 7Ω. Write the corresponding the set matrix. **(06 Marks)**

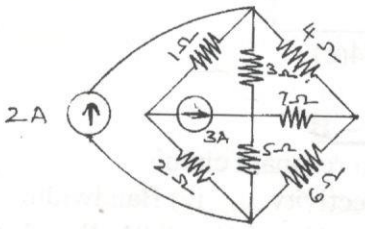

Fig.Q2(b)

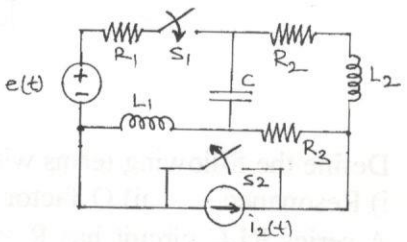

Fig.Q2(c)

c. What are dual networks? Draw the dual of the circuit shown in Fig.Q2(c). **(04 Marks)**

3 a. Using superposition theorem, obtain the response I for the network shown in Fig.Q3(a).

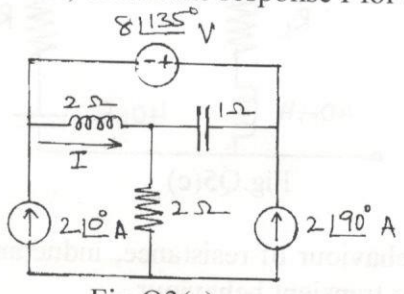

Fig.Q3(a)

(08 Marks)

3 b. Verify reciprocity theorem for the circuit shown in Fig.Q3(b). **(06 Marks)**

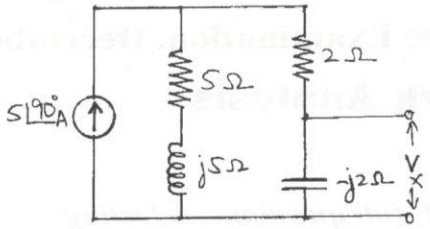

Fig.Q3(b)

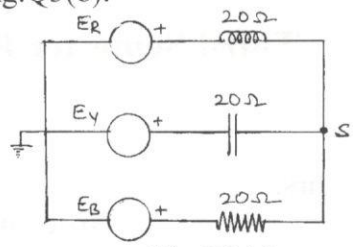

Fig.Q3(c)

c. Use Millman's theore to determine the voltage VS of the network shown in Fig.Q3(c), given that $E_R = 230\angle 0$ V ; $E_Y = 230\angle -120°$ V and $E_B = 230\angle 120°$ V. **(06 Marks)**

4 a. For the network shown in Fig.Q4(a), obtain the Thevenin's equivalent as seen from the terminals p and q. **(08 Marks)**

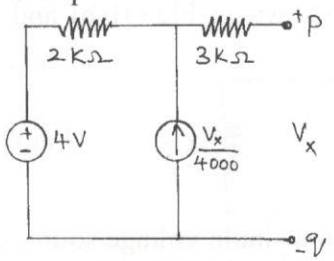

Fig.Q4(a)

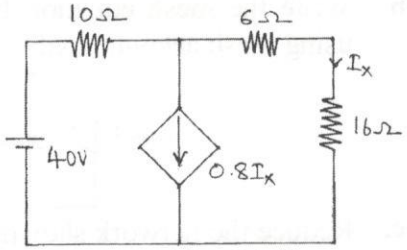

Fig.Q4(b)

b. State Norton's theorem and find the current through 16Ω resistor using Norton's theorem in Fig.Q4(b). **(06 Marks)**

c. For the network shown in Fig.Q4(c), determine the impedance Z_X such that maximum power is transferred from the source to the load of impedance Z_X.

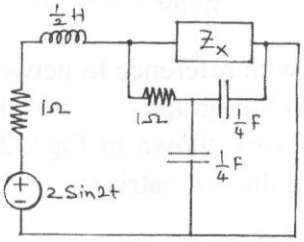

Fig.Q4(c) **(06 Marks)**

PART – B

5 a. Define the following terms with reference to resonant circuit:
i) Resonance ii) Q-factor iii) Selectivity iv) Bandwidth **(06 Marks)**

b. A series RLC circuit has R = 10Ω, L = 0.01H and C = 0.01μF and it is connected across 10 mV supply. Calculate: i) f_o ; ii) Q_o ; iii) Bandwidth ; iv) f_1 and f_2 ; v) I_o **(10 Marks)**

c. Determine R_L and R_C for which the circuit shown in Fig.Q5(c) resonates at all frequencies.

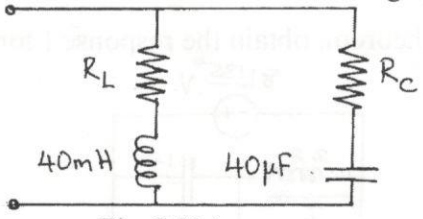

Fig.Q5(c) **(04 Marks)**

6 a. Explain the transient behaviour of resistance, inductance and capacitance. Also explain the procedure for evaluating transient behaviour. **(10 Marks)**

6 b. In the network shown in Fig.Q6(b), 'K' is changed from position 'a' to 'b' at t = 0. Solve for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$, if R = 1000 Ω, L = 1H and C = 0.1μF and V = 100V. Assume that the capacitor is initially uncharged. **(10 Marks)**

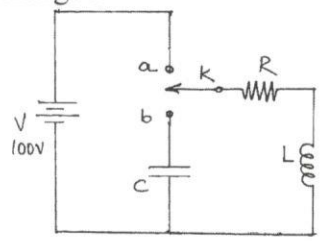

Fig.Q6(b)

7 a. Assuming that the staircase waveform of Fig.Q7(a) is not repeated, find its Laplace transform. If this voltage wave is applied to a RL series circuit with R = 1Ω and L = 1H, find the current i(t). **(10 Marks)**

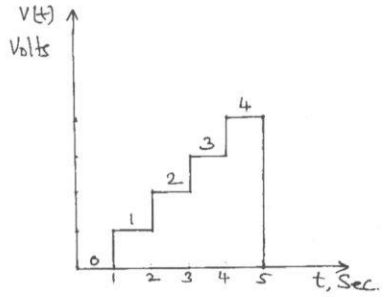

Fig.Q7(a)

b. The network shown in Fig.Q7(b) was in steady state before t = 0. The switch is opened at t = 0. Find i(t) for t > 0, using Laplace transform. **(10 Marks)**

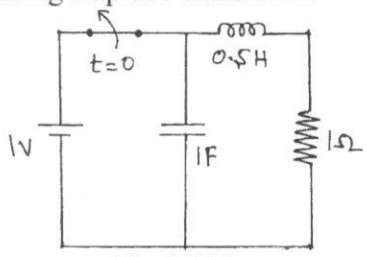

Fig.Q7(b)

8 a. Obtain the h-parameters for the network shown in Fig.Q8(a). **(10 Marks)**

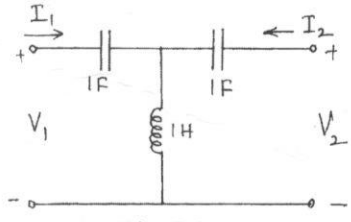

Fig.Q8(a)

b. Obtain ABCD parameters in terms of z-parameters and hence show that AD – BC = 1. **(10 Marks)**

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10ES34

Third Semester B.E. Degree Examination, June 2012
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data, if any, may suitably be assumed.

PART – A

1 a. Find the equivalent resistance at AB using Y - Δ transformation technique in Fig. Q1(a). **(05 Marks)**

b. Find the current I in 28 Ω resistor by Mesh analysis in Fig. Q1(b). **(05 Marks)**

c. Find the power dissipated in 10 Ω resistor by node voltage method in Fig. Q1(c). **(10 Marks)**

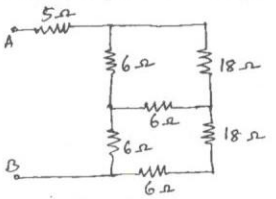

Fig. Q1(a)

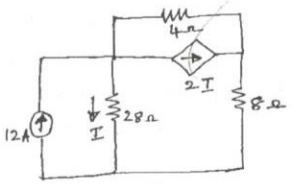

Fig. Q1(b)

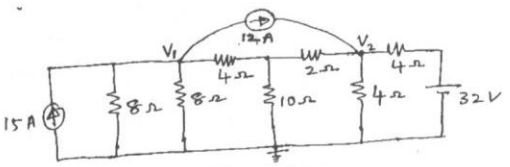

Fig. Q1(c)

2 a. Write the oriented graph of the network shown in Fig. Q2(a). The numerical values of resistances also indicate the branch numbers. Select a tree with branches 1, 2, 3 as the tree branches, write tieset and cutest schedule. **(10 Marks)**

b. For the network shown in Fig. Q2(b), draw the dual network and write the node equations. **(10 Marks)**

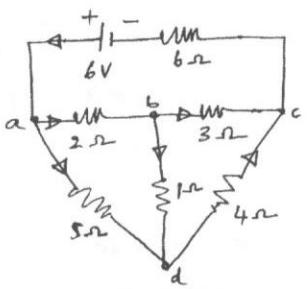

Fig. Q2(a)

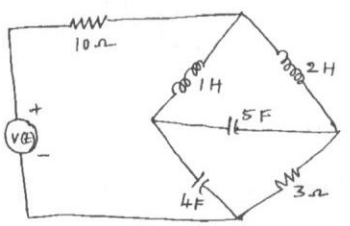

Fig. Q2(b)

3 a. Determine the current through 10 Ω resistance of the network shown in Fig.Q3(a), using superposition theorem. **(10 Marks)**

b. State Milliman's theorem. Using Milliman's theorem, find I_L through R_L for the network shown in Fig. Q3(b). **(10 Marks)**

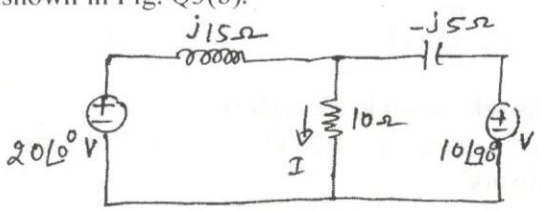

Fig. Q3(a)

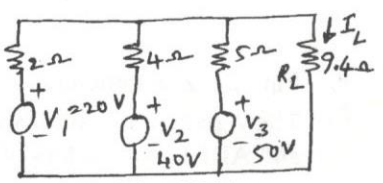

Fig. Q3(b)

4 a. State Thevenin's theorem. For the circuit shown in Fig. Q4(a), find the current through R_L using Thevenin's theorem. **(10 Marks)**

b. State maximum power transfer theorem. For the circuit shown in Fig. Q4(b), find the value of Z_L for which maximum power transfer occurs. Also find P_{max}. **(10 Marks)**

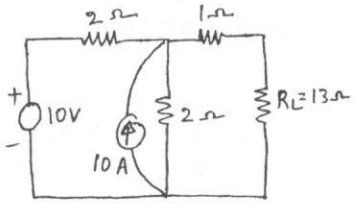

Fig. Q4(a)

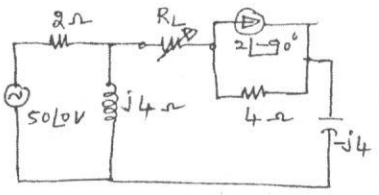

Fig. Q4(b)

PART – B

5 a. Define quality factor and bandwidth. Also establish the relationship between quality factor and bandwidth in a series resonance circuit and thereby prove that $Q = \frac{f_0}{BW}$, where f_0 is the resonance frequency. **(10 Marks)**

b. A series RLC circuit with R = 10 Ω, L = 10mH and C= 1μF has an applied voltage of 200 V at resonant frequency. Calculate the resonant frequency f_0, the current in the circuit at resonance, voltage across the elements at resonance. Also find quality factor and bandwidth. **(10 Marks)**

6 a. Determine : i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t=0+ when the switch is closed at t = 0 in Fig. Q6(a). **(10 Marks)**

b. Determine : i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0 + when the switch K is moved from position 1 to 2 at t = 0 in the network shown in Fig. Q6(b), steady state having reached before switching. **(10 Marks)**

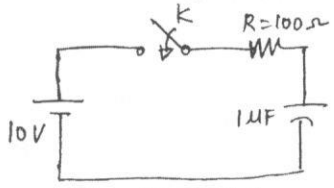

Fig. Q6(a)

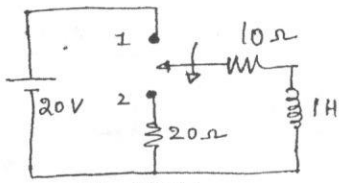

Fig. Q6(b)

7 a. Find the expression for the resultant current i(t) when switch K is closed at t = 0 in Fig. Q7(a). **(10 Marks)**

b. Find the Laplace transform of the given function $f(t) = 5 + 4e^{-2t}$. **(04 Marks)**

c. Find the L.T of the saw tooth waveform in Fig. Q7(c). **(06 Marks)**

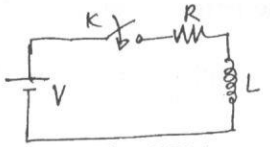

Fig. Q7(a)

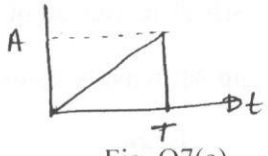

Fig. Q7(c)

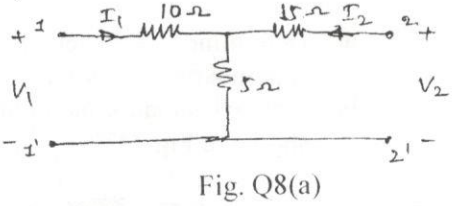

Fig. Q8(a)

8 a. Find the z-parameters for the network shown in Fig. Q8(a). **(10 Marks)**

b. The z-parameters of a two port network are $Z_{11} = 20\ \Omega$, $Z_{22} = 30\ \Omega$, $Z_{12} = Z_{21} = 10\Omega$. Find Y and ABCD parameters of the network. **(10 Marks)**

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10ES34

Third Semester B.E. Degree Examination, December 2011

Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Using the mesh current method, determine V_2 that results zero current in 4Ω resistor.

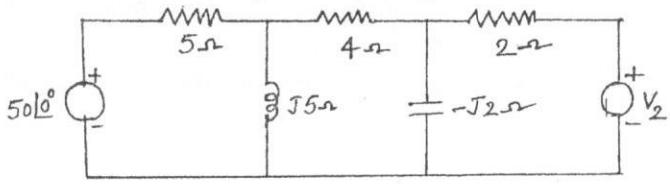

Fig.Q1(a) **(10 Marks)**

b. Find the currents in all resistors by Node voltage method. **(10 Marks)**

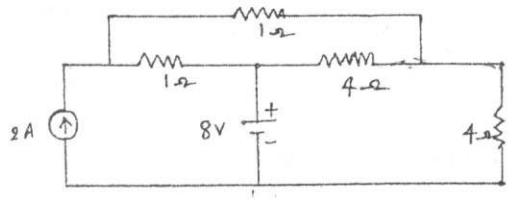

Fig.Q1(b)

2 a. Define the terms : i) Tree, ii) Co-tree, iii) Tie set schedule, iv) Cut set schedule, with respect to a graph of a network. **(04 Marks)**

b. For the network shown, draw the graph, select a tree, write the tie set schedule and obtain the equilibrium equations. Hence currents in various branches. **(16 Marks)**

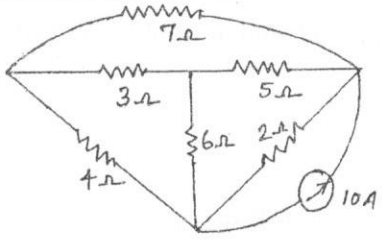

Fig.Q2(b)

3 a. Find the current through Z_3 by superposition theorem. **(10 Marks)**

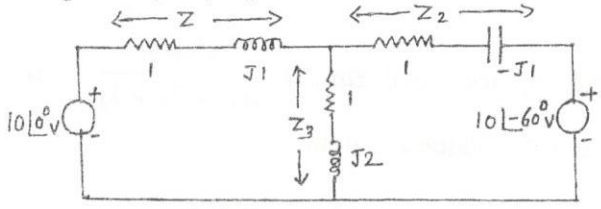

Fig.Q3(a)

b. State and explain reciprocity theorem. **(04 Marks)**

c. Use Millman's theorem to find current in Z_1 : **(06 Marks)**

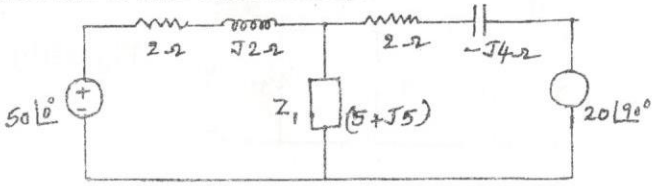

Fig.Q3(c)

4 a. For the circuit shown in Fig.Q4(a), find the value of R that will receive maximum power. Determine this power. **(08 Marks)**

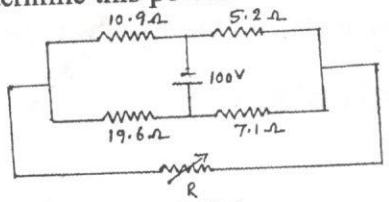

Fig.Q4(a)

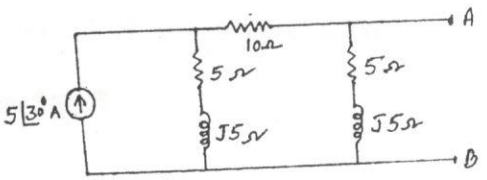

Fig.Q4(b)

b. Obtain the Thevenin and Norton equivalent circuits at terminals AB for the network shown. Hence, find the current through 10Ω resistor across AB. **(12 Marks)**

PART – B

5 a. Define the terms : i) Resonance, ii) Q factor, iii) Half power frequency, iv) Band width, v) Selectivity pertaining to a series RLC circuit. **(05 Marks)**

b. Obtain an expression for the resonance frequency for the circuit shown in Fig.Q5(b).

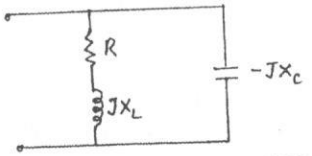

Fig.Q5(b)

(08 Marks)

c. Obtain the condition for maximum value of V_L by variation of inductance. **(07 Marks)**

6 a. In the network shown, switch 'K' is closed at t = 0 with the capacitor uncharged. Find the values for $i(0^+)$ $\frac{di(t)0^+}{dt}$ at $t = 0^+$ and also find $\frac{d^2i(0^+)}{dt^2}$. **(10 Marks)**

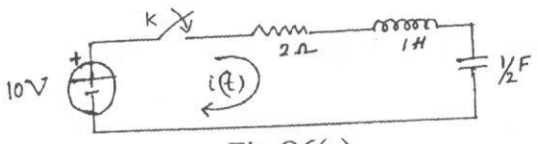

Fig.Q6(a)

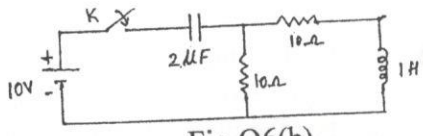

Fig.Q6(b)

b. In the given circuit, switch K is closed at time t = 0. Find the values of i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_1}{dt^2}$, $\frac{d^2i_2}{dt^2}$ at $t = 0^+$. **(10 Marks)**

7 a. Find the Laplace transform of the following :

i) $\sin^2 t$ ii) $\cos^2 t$ iii) $\sin wt$ iv) $\int_0^t i(t).dt$ **(08 Marks)**

b. Find the inverse Laplace transform : i) $\frac{s^2+5}{s(s^2+2s+4)}$, ii) $\frac{2s+6}{s^2+6s+25}$. **(08 Marks)**

c. State and prove initial value theorem. **(04 Marks)**

8 a. Express Z parameters in terms of h parameters. **(06 Marks)**

b. For the network shown, find Z and Y parameters. **(14 Marks)**

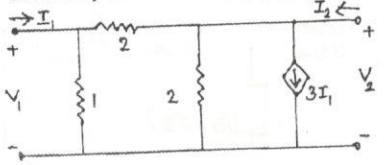

Fig.Q8(b)

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