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EE34

Third Semester B.E. Degree Examination, June / July 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Convert the network in Fig. Q 1(a) in to a single voltage source by source transformation. **(06 Marks)**

b. Determine the equivalent resistance at terminals AB in the network in Fig. Q 1(b). **(07 Marks)**

c. Find the voltage 'V' across 3 Ω using nodal technique, in the network in Fig. Q 1(c). **(07 Marks)**

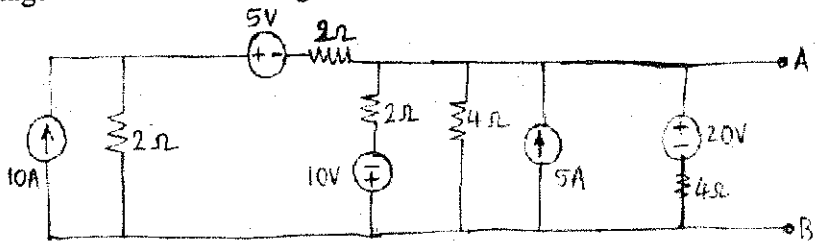

Fig. Q 1(a)

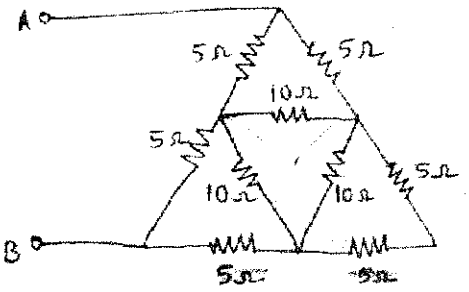

Fig. Q 1(b)

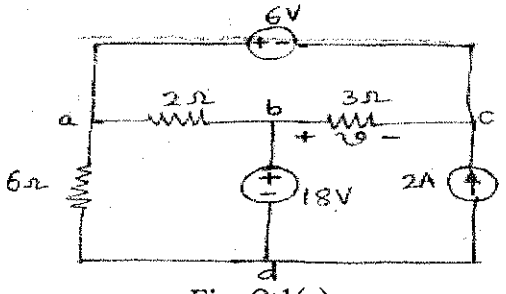

Fig. Q 1(c)

2 a. Find the branch currents using Tie – set schedule for the network in Fig. Q 2(a). **(10 Marks)**

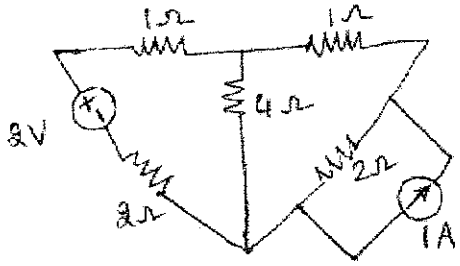

Fig. Q 2(a)

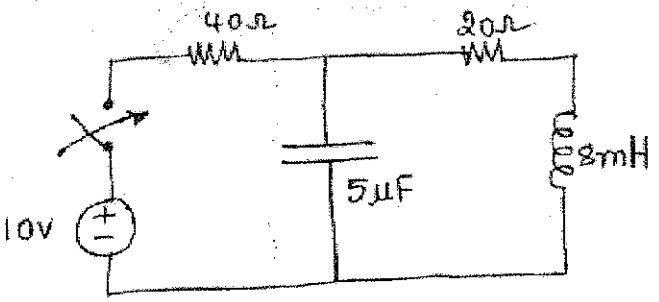

Fig. Q 2(b)

b. Explain Duality in electric networks. Draw the dual of the network in Fig. Q 2(b). Write mesh equation for the given network and Nodal equations for the dual networks. **(10 Marks)**

3 a. State superposition theorem. Find Vx using superposition principle in the network in Fig. Q 3(a). **(10 Marks)**

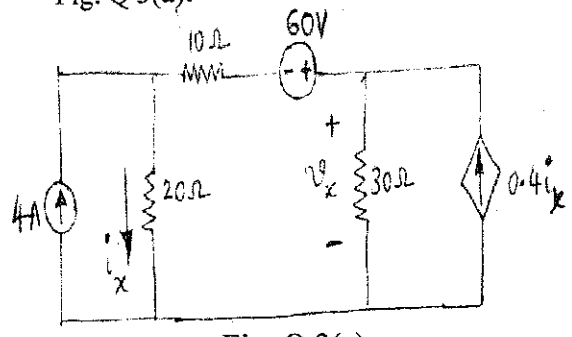

Fig. Q 3(a)

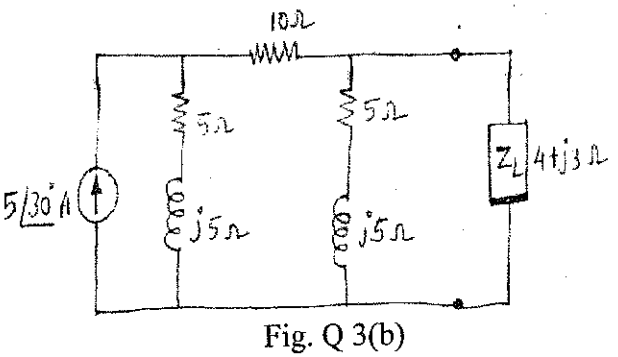

Fig. Q 3(b)

b. Find the current in ZL using Thevenin's theorem in the network in Fig. Q 3(b). State Thevenin's theorem. **(10 Marks)**

4 a. State Reciprocity theorem. Find the current through 5 Ω resistors and verify Reciprocity theorem in the network in Fig. Q 4(a). **(10 Marks)**

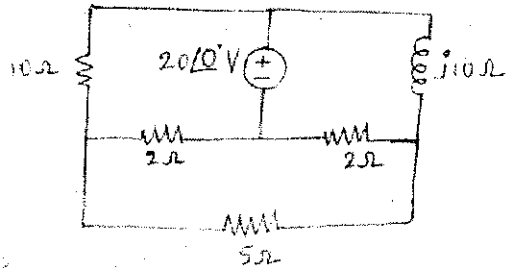

Fig. Q 4(b)

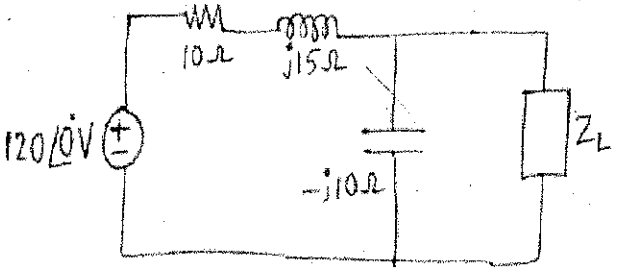

Fig. Q 4(b)

b. State maximum power transfer theorem. Find the value of ZL for which it receives the maximum power in the network in fig 4(b). Find the maximum power. **(10 Marks)**

5 a. In a R – L – C series circuit, determine the expression for the resonant frequency and expressions for half power frequencies and bandwidth. **(10 Marks)**

b. in the network in Fig. Q 5(b) find i) Resonant frequency ii) quality factor iii) bandwidth iv) Half power frequencies v) maximum power dissipated at resonance. **(10 Marks)**

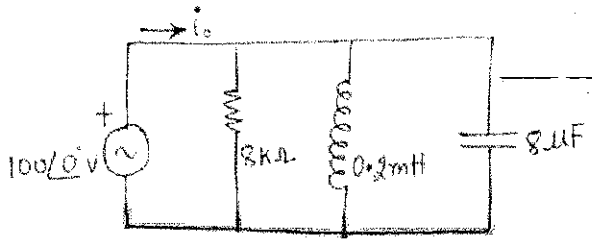

Fig. Q 5(b)

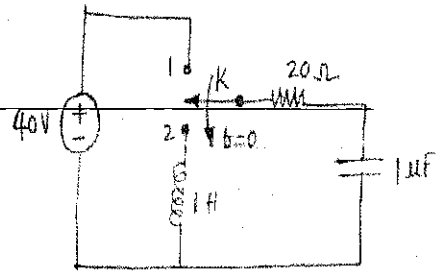

Fig. Q 6(b)

6 a. Explain the behaviour of network elements during switching, both at t = 0+ and t = ∞. **(10 Marks)**

b. In the network in Fig. Q 6(b) the switch is moved from position 1 to 2 at t = 0, steady state having reached before switching. Calculate i, di/dt and d^2i/dt^2 at $t = 0^+$. **(10 Marks)**

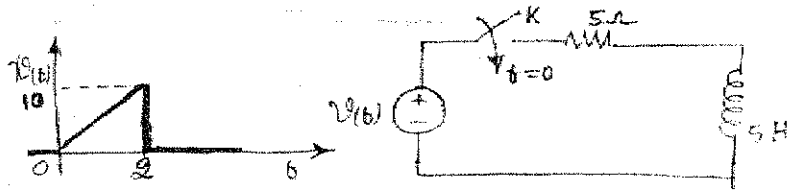

Fig. Q 7(c)

7 a. State and prove Initial and Final value theorem. **(06 Marks)**

b. Find the Initial and final values of i(t) if $I(s) = \dfrac{s+1}{(s+1)^2+9}$. **(04 Marks)**

c. Find the current i(t) for t > 0 when an input voltage signal V(t) of the form shown in Fig. Q 7(c) is applied to the network. Assume zero Initial condition. **(10 Marks)**

8 a. Define Z parameters. Find Z parameters for the network shown in Fig. Q 8(a) and there from find Y parameters. **(10 Marks)**

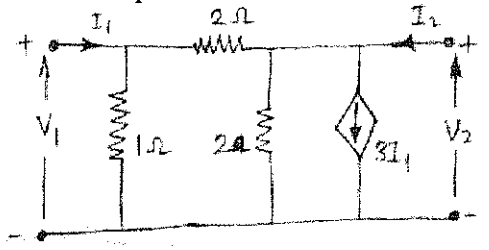

Fig. Q 8(a)

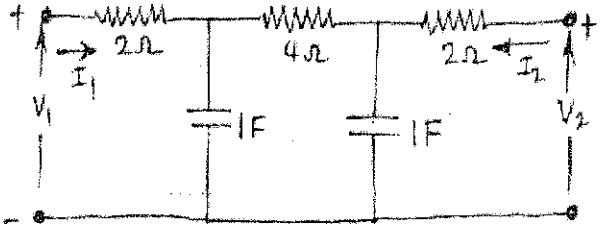

Fig. Q 8(b)

b. Define Hybrid parameters. Find h parameters for the 2 port network in Fig. Q 8(b). **(10 Marks)**

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06ES34

Third Semester B.E. Degree Examination, June / July 08
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. Explain mesh method of analysis. **(06 Marks)**

b. Calculate the power delivered by the source in the circuit, shown in Fig. Q 1(b) using node method. **(14 Marks)**

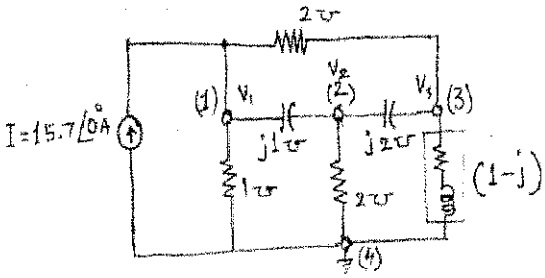

Fig. Q 1(b)

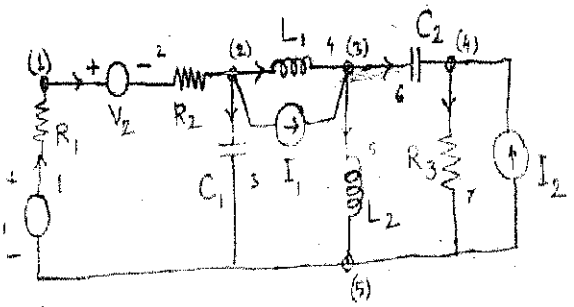

Fig. Q 2(a)

2 a. Obtain the complete incidence matrix for the network shown in Fig. Q 2(a) after writing its graph and oriented graph. **(05 Marks)**

b. For the network shown in Fig. Q 2(b) write the tie set schedule, tie set matrix and obtain equilibrium equation in matrix form using KVL, calculate loop currents. Follow the same orientation and branch numbering as shown in Fig. Q 2(b). Use branches 4, 5 and 6 as tree branches. **(15 Marks)**

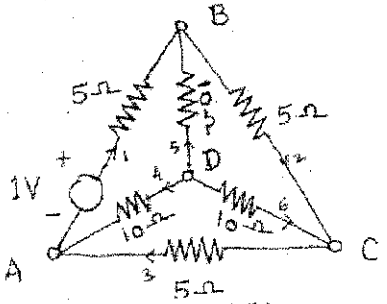

Fig. Q 2(b)

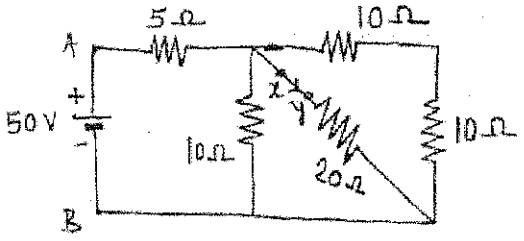

Fig. Q 3(c)

3 a. Define the following theorems. **(04 Marks)**

i) Super position theorem ii) Reciprocity theorem.

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

c. Show the validity of reciprocity theorem for the following circuit given in Fig. Q 3(c) for AB and XY ports. **(10 Marks)**

4 a. State the following theorems – **(04 Marks)**

i) Norton's theorem ii) Maximum power transfer theorem.

b. State and prove Thevenin's theorem. **(07 Marks)**

c. Find the Thevenin's equivalent circuit of the network shown in Fig. Q 4(b) across load.

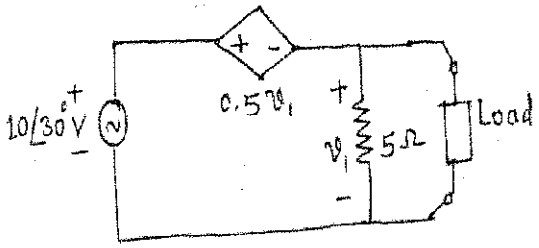

Fig. Q 4(c) **(09 Marks)**

PART - B

5 a. Define the following terms – i) Resonance, ii) A – factor, iii) Selectivity, iv) Band Width. **(04 Marks)**

b. Derive the expression for parallel resonance circuit. Containing resistance in both the branches. **(06 Marks)**

c. A series R L C circuit has R = 10 Ω, L = 0.01 H and C = 0.01 μ F and it is connected across 10 mV supply. Calculate – i) f_0 ii) Q_0 iii) Band Width iv) f_1 and f_2, v) Io. **(10 Marks)**

6 a. Why to study initial conditions? **(03 Marks)**

b. For the network diagram shown in Fig. Q6 (b) find out $i(0^+)$, $\frac{di(0^+)}{dt}$ and $\frac{d^2i(0^+)}{dt^2}$, take $V_c(0) = 0$ if K is closed at t = 0. **(07 Marks)**

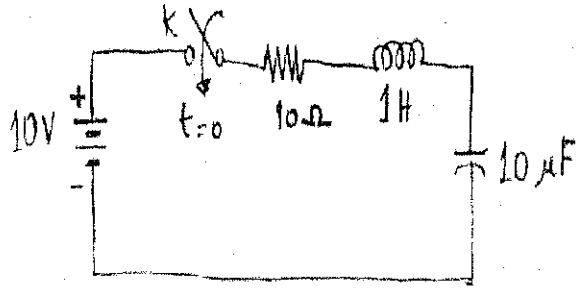

Fig. Q 6(b)

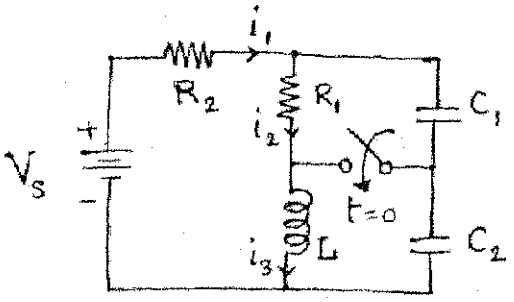

Fig. Q 6(c)

c. Determine the currents at t = (0^+) for the circuit shown in Fig. Q 6(c). **(10 Marks)**

7 a. Define impulse function. Draw diagram of approximate impulse function. Obtain L. T of impulse function. **(05 Marks)**

b. For the circuit shown in Fig. Q 7(b) find out the current i(t) if K is closed at t = 0, use L. T. method. **(05 Marks)**

c. Find the equivalent impedance for the circuit, shown in Fig. Q 7(c) L. T. **(10 Marks)**

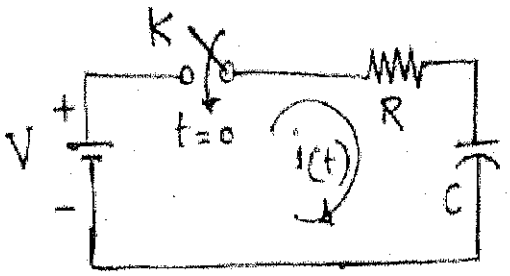

Fig. Q 7(b)

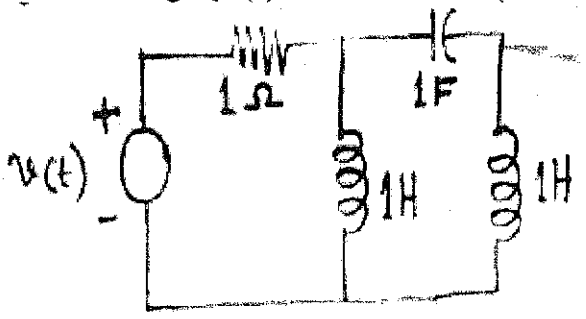

Fig. Q 7(c)

8 a. What is the use of hybrid parameters? Define hybrid parameters. **(05 Marks)**

b. Derive expressions for Y – parameters in terms transmission parameters. **(05 Marks)**

c. For the network shown in Fig. Q 8 (c) obtain the O.C. impedance parameters.

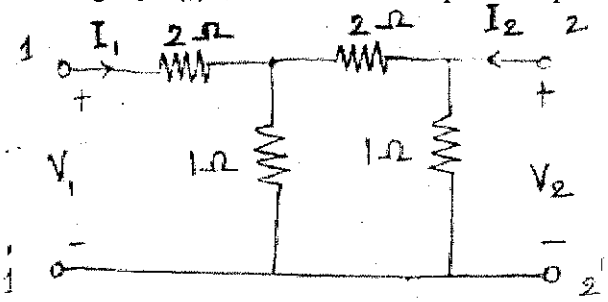

Fig. Q 8(c) **(10 Marks)**

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06ES34

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

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

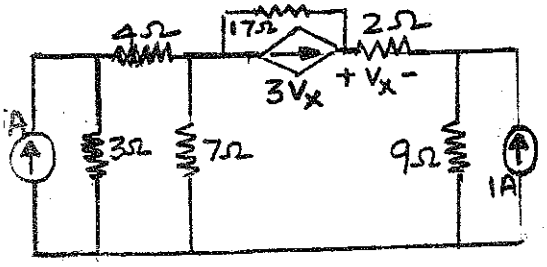

Fig. Q1 (a)

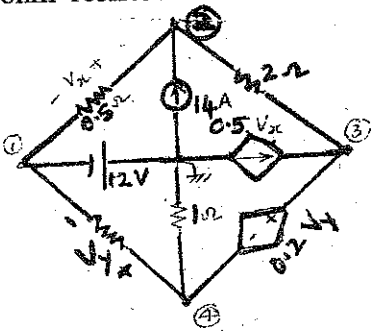

Fig. Q1 (b)

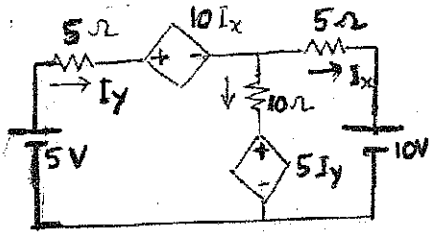

Fig. Q1 (c)

b. Find the voltages at nodes 1, 2, 3, 4 for the network shown in figure Q1 (b) using nodal analysis. **(07 Marks)**

c. Using mesh analysis find the current through 10 ohm resistor in the network shown in figure Q1 (c). **(07 Marks)**

2 a. Find the maximum possible number of trees for the network shown in figure Q2 (a).

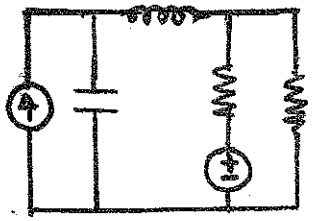

Fig. Q2 (a)

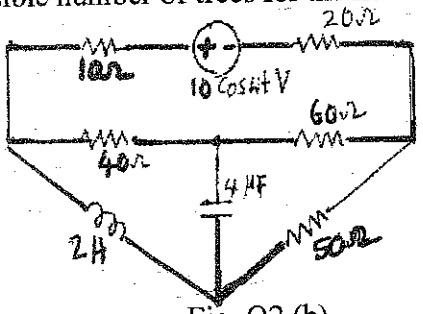

Fig. Q2 (b)

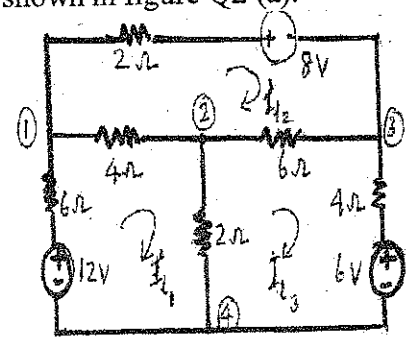

Fig Q 2(c)

b. Draw the dual of the network shown in figure Q2 (b). **(06 Marks)**

c. For the network shown in figure Q2 (c), calculate I_{l_1}, I_{l_2}, I_{l_3} using graph theory and network equilibrium equation based on KVL. **(10 Marks)**

3 a. Using superposition principle, find the current in 6 ohm resistor in the network shown in figure Q3 (a). **(06 Marks)**

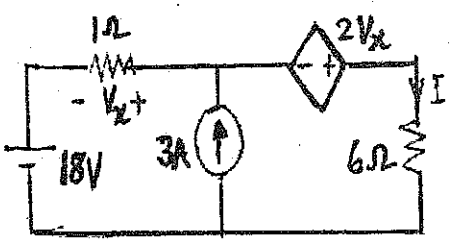

Fig. Q3 (a)

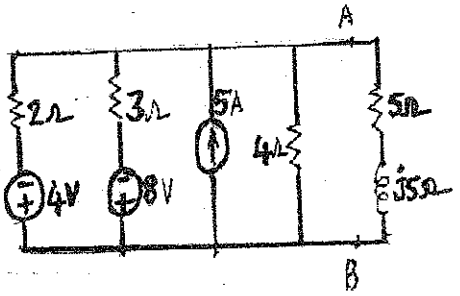

Fig. Q3 (c)

b. State and explain reciprocity theorem. **(07 Marks)**

c. Find Thevenin's equivalent circuit across AB using Millman's theorem and find the current through the load (5+J5)Ω shown in figure Q3 (c). **(07 Marks)**

4 a. Calculate Thevenin's equivalent circuit across AB for the network shown in figure Q4 (a). **(07 Marks)**

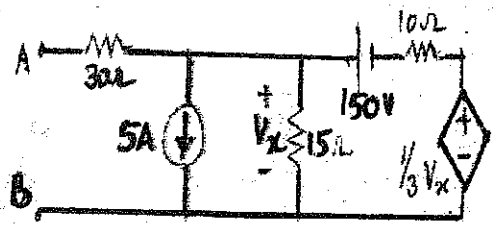

Fig. Q4 (a)

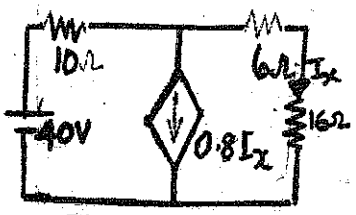

Fig. Q4 (b)

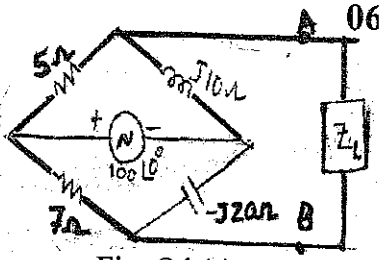

Fig. Q4 (c)

b. State Norton's theorem and find the current through 16 ohm resistor using Norton's theorem in figure Q4 (b). **(07 Marks)**

c. Find the value of Z_L for which maximum power is transferred to the load Z_L from the network in figure Q4 (c). **(06 Marks)**

5 a. A series RLC circuit has R = 50 Ω, L = 0.01 H and C = 0.04 μF and is connected to ac source of 100 V. Find the i) resonant frequency ii) Circuit impedance at resonant frequency iii) Maximum value of voltage across capacitance and the frequency at which it occurs iv) Voltage across inductance at resonance. **(06 Marks)**

b. For the network shown in figure Q5 (b) determine the following: i) f_o ii) Q iii) half power frequencies iv) Band width. **(07 Marks)**

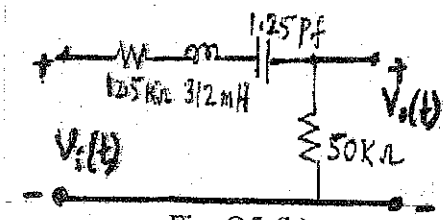

Fig. Q5 (b)

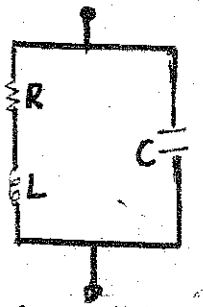

Fig. Q5 (c)

c. Derive the expression for resonant frequency for the parallel resonant circuit shown in figure Q5 (c). If R =25 Ω, L =0.5 H and C = 5μF, find W_0, Q and bandwidth for the circuit. **(07 Marks)**

6 a. For the network shown in figure Q6 (a), find i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_2}{dt^2}$ at $t = 0^+$. The circuit was in steady state before the closure of the switch. Assume all initial conditions zero. **(10 Marks)**

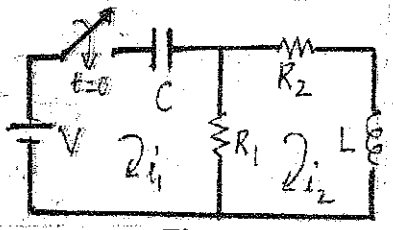

Fig. Q6 (a)

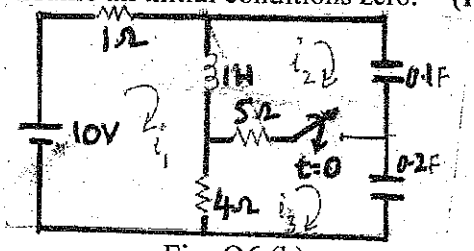

Fig. Q6 (b)

b. The network shown in figure Q6 (b) was in steady state before t = 0. The switch is closed at t = 0. Determine the three mesh currents i_1, i_2, i_3 at $t = 0^+$. **(10 Marks)**

7 a. The network shown in figure Q7 (a) 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)**

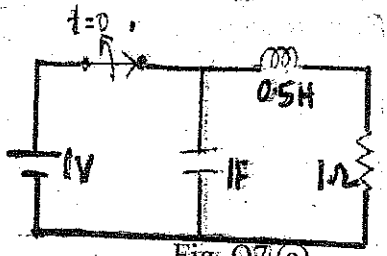

Fig. Q7 (a)

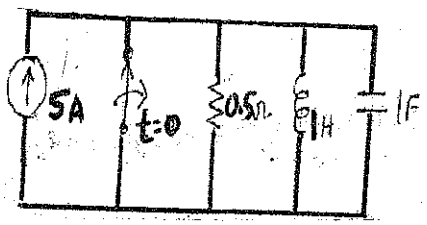

Fig. Q7 (b)

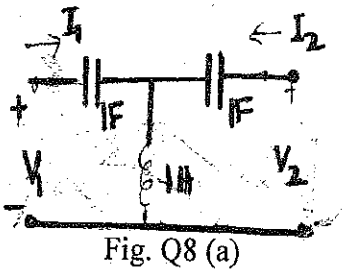

Fig. Q8 (a)

b. For the network shown in figure Q7 (b) find the voltage across 0.5 Ω resistor, when the switch is opened at t=0. Assume all initial conditions zero. **(10 Marks)**

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

b. Z – parameters of a network are obtained from an experiment. Explain how Y-parameters and transmission parameters can be computed from the experimental data. **(10 Marks)**

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EC/TE/ML302

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. With the help of an example explain the following for a network graph:
i) Complete incidence matrix and reduced incidence matrix ii) Tie-set and Tie-set schedule iii) Cut-set and cut-set schedule. **(12 Marks)**

b. For the network shown in fig.1(b) write the fundamental cut-set matrix and determine the nodal voltages. Consider branches (1) and (3) as tree branches. **(08 Marks)**

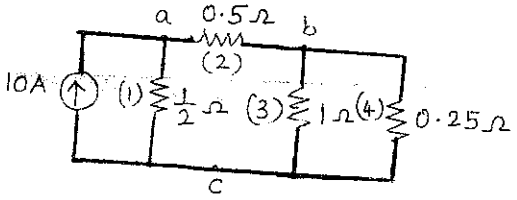

Fig.1(b)

2 a. Establish relationship between star and delta networks. **(04 Marks)**

b. Determine the voltage V_{23} of fig.2(b) by nodal analysis. **(08 Marks)**

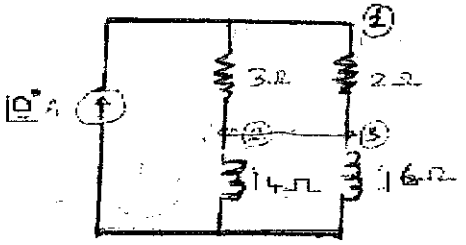

Fig.2(b)

c. Determine the current flowing through the load impedance 3+j4 using mesh current method for the network shown in fig.2(c). **(08 Marks)**

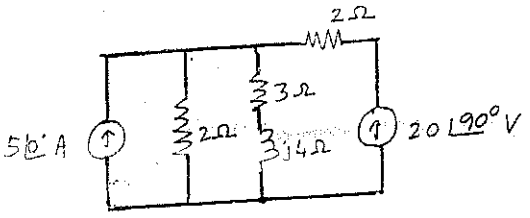

Fig.2(c)

3 a. A 200 V, 50 Hz source is connected to a series circuit consisting of an inductance of 0.5 H and a resistance that varies between 20 Ω and 70 Ω. Draw the current locus and indicate thereon the circle diameter, maximum and minimum currents and their phase angles. **(10 Marks)**

b. Two coils having 1000 turns and 1600 turns respectively are placed close to each other such that 60% of the flux produced by one coil links the other. If a current of 10A flowing in the first coil produces a flux of 0.5 mwb, find the inductance of the second coil. **(10 Marks)**

4 a. State and prove Thevenin's theorem. Also prove that Thevenin's equivalent is the dual of the Norton's equivalent. **(10 Marks)**

b. In the single source network shown in fig.4(b). Find V_x and interchange current source and verify reciprocity theorem. **(10 Marks)**

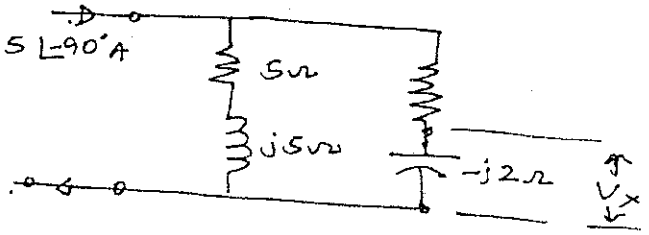

Fig.4(b)

5 a. Define coefficient of coupling K and show that $M = K\sqrt{L_1, L_2}$ for a mutually coupled circuit. **(08 Marks)**

b. Determine V_2/V_1 when i) $i_1 = 0$ ii) $i_2 = 0$ and I_2/I_1 when i) $v_1 = 0$ ii) $v_2 = 0$. For the circuit shown in fig.5(b). **(12 Marks)**

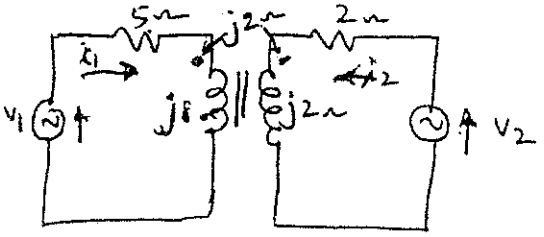

Fig.5(b)

6 a. What are the uses of knowing initial conditions in a circuit? Explain the initial conditions in i) Resistor ii) Inductor and iii) Capacitor. **(10 Marks)**

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

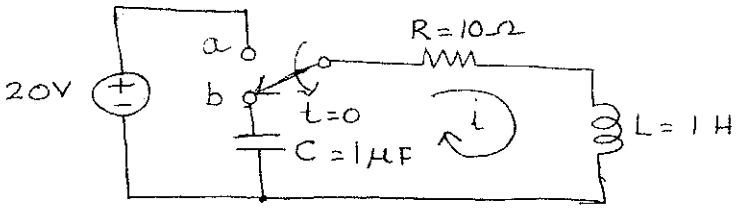

Fig.6(b)

7 a. State and prove initial and final value theorem. Also find initial and final value of the following:

$$I(s) = \frac{s+6}{s(s+3)}$$ **(10 Marks)**

b. State and prove convolution theorem. Using the same find f(t) of the following:

$$F(s) = \frac{1}{s(s+a)}$$ **(10 Marks)**

8 a. List the restrictions on the locations of poles and zeros for driving point functions. **(10 Marks)**

b. Define Z and Y parameters for a two-port network. Express Z parameters in terms of Y-parameters. **(10 Marks)**

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EE34

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Define the term 'CONTROLLED SOURCE' and explain the various types of controlled sources used in practice in electrical circuits. **(06 Marks)**

b. Find the power delivered by the 6 volt source in the circuit shown in fig.1(b). Use loop analysis. **(08 Marks)**

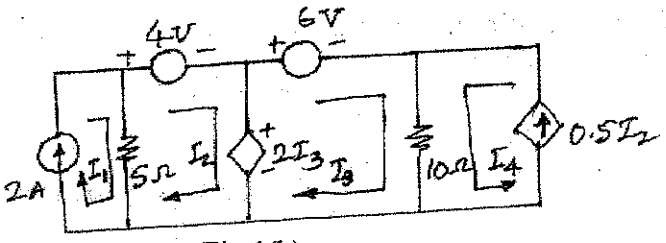

Fig.1(b)

c. The voltage of a node of a network is given by.

$$V_2 = \frac{\begin{vmatrix} 2 & 1 & -1 \\ -1 & 0 & -1 \\ -1 & 1 & 2 \end{vmatrix}}{\begin{vmatrix} 2 & -1 & -1 \\ -1 & 3 & -1 \\ -1 & -1 & 2 \end{vmatrix}}$$

(06 Marks)

Construct the network.

2 a. Reduce the network shown in fig.2(a) into a single series impedance and find the power dissipated in the branch b-c of the network. **(10 Marks)**

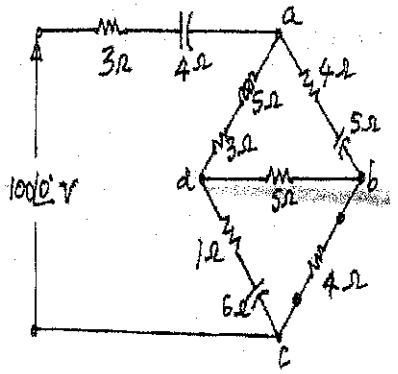

Fig.2(a)

b. Calculate the voltage and power output of the dependent source shown in fig.2(b). **(10 Marks)**

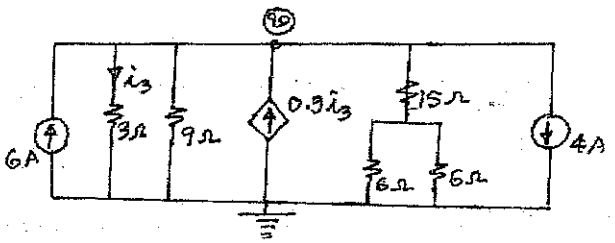

Fig.2(b)

3 a. Define the following : i) Co – tree ii) Tie – set. **(02 Marks)**

b. Construct a tree for the circuit shown in fig.3(b) so that all the loop currents flow through the 6 ohm resistor and obtain the i) cut set and ii) Tie set matrices. **(10 Marks)**

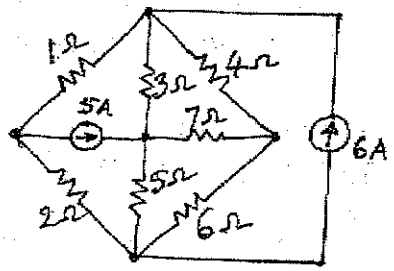

Fig.3(b)

c. Briefly explain the principle of quality in electrical networks and obtain the dual of the network graph shown in fig.3(c). **(08 Marks)**

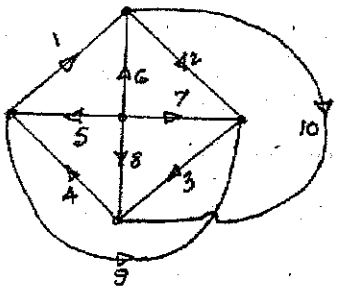

Fig.3(c)

4 a. State Thevinin's theorem, and obtain the Thevinin's and Nortan's equivalent circuit of the fig.4(a) shown. **(10 Marks)**

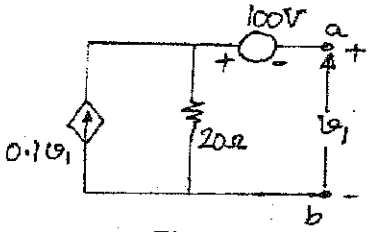

Fig.4(a)

b. In a circuit shown in fig.4(b), find the value of R_L for P_{max} and also find the value of P_{max}. **(10 Marks)**

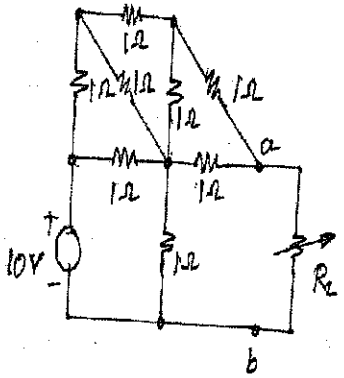

Fig.4(b)

5 a. Show that the value of the capacitor for maximum voltage across it in case of capacitor tuning of series resonance is $C = \frac{L}{R^2 + X_L^2}$ **(08 Marks)**

b. Give the comparison between series resonance and parallel resonance. **(04 Marks)**

c. A coil has resistance of 400Ω and inductance of 318μH. Find the capacitance of a 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. **(08 Marks)**

a. In the network shown in fig.6(a), the switch k is closed at t = 0. Find i) i_1, ii) i_2 iii) Di_1, and iv) Di_2 at $t = 0_+$ for zero initial conditions. **(10 Marks)**

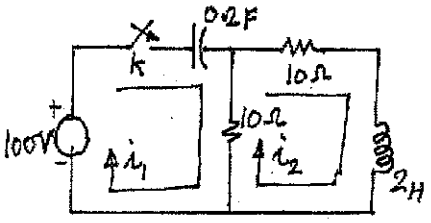

Fig.6(a)

b. Sketch the following sinusoidal functions and give their Laplace transformations.
i) A Sinωt ii) A Sinω(t-t_0), iii) A Sinωt u(t-t_0) **(10 Marks)**

a. State and prove Initial and Final value theorems. **(08 Marks)**

b. Synthesize the periodic waveform shown in fig.7(b) and find its Laplace Transform and prove any formula used. **(12 Marks)**

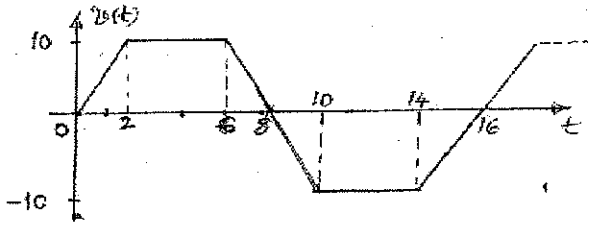

Fig.7(b)

a. Using Convolution theorem, find the Laplace inverse of $F(s) = \frac{s}{(s+1)(s+2)(s+3)}$. **(10 Marks)**

b. Find the Z – parameters of the two port network shown in fig.8(b). **(05 Marks)**

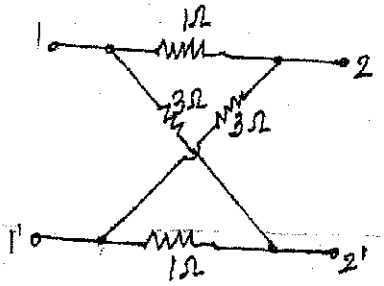

Fig.8(b)

c. Write the Π - equivalent circuit of a two port network described by.
$I_1 = 2V_1 - V_2$
$I_2 = -V_1 + 4V_2$. **(05 Marks)**

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EE34

USN

NEW SCHEME

Third Semester B.E. Degree Examination, July 2007
EE / EC / TE / IT / BM / ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Compute the resistance across the terminals A and B of the network shown in fig.1(a) using star-delta transformation. **(06 Marks)**

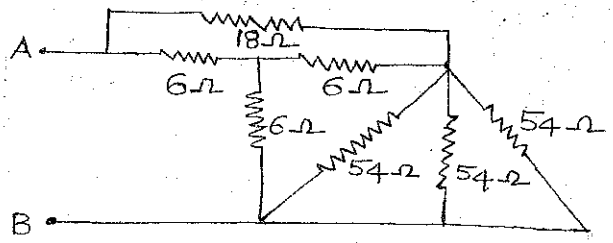

Fig.1(a)

b. In the circuit shown in fig.1(b), determine V_2 which results in zero current through 4Ω resistor. Use mesh current analysis. **(09 Marks)**

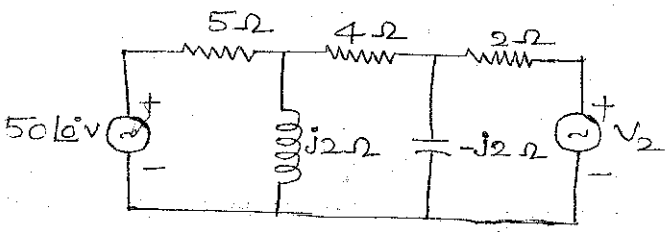

Fig.1(b)

c. Explain the following terms as applied to network topology. **(05 Marks)**
i) Orient graph ii) Tree iii) Link iv) Planar graph and non planar graph.

2 a. The reduced incidence matrix of a graph of a network is given below. Draw the oriented graph corresponding to it. **(05 Marks)**

$$\begin{bmatrix} -1 & +1 & 0 & 0 & 0 & -1 \\ 0 & -1 & -1 & +1 & 0 & 0 \\ 0 & 0 & +1 & 0 & -1 & +1 \end{bmatrix}$$

b. Determine the current in 10Ω resistor for the circuit shown in fig.2(b), using cut set schedule. **(10 Marks)**

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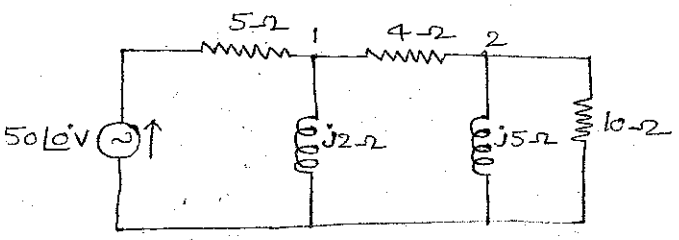

Fig.2(b)

c. Draw the dual network of the circuit shown in fig.2(c) **(05 Marks)**

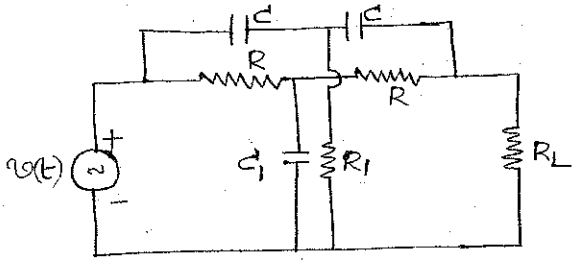

Fig.2(c)

3 a. State and prove Thevenin's theorem. **(08 Marks)**

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

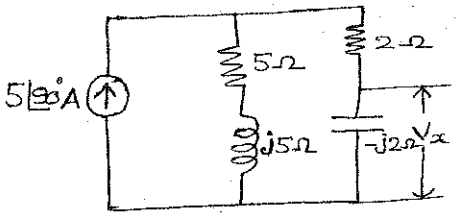

Fig.3(b)

c. For the circuit shown in fig.3(c), find the current "I" using super position theorem. **(06 Marks)**

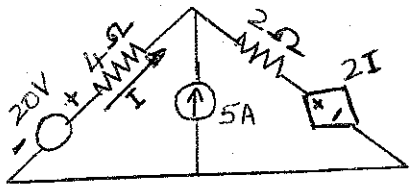

Fig.3(c)

4 a. Derive the expression for the resonant frequency of the circuit shown in fig.4(a). Also show that the circuit will resonate at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$ **(10 Marks)**

Contd...3

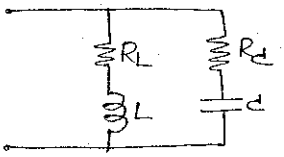

Fig.4(a)

b. A constant voltage at a frequency of 1MHz is applied to an inductor coil in series with a variable capacitor. When the capacitor is set at 500 pF, the current has its maximum value, while the current is reduced to one half when the capacitance is 600 pF. Find the following.
   i) The resistance and induction of the coil ii) The Q factor of the coil. **(10 Marks)**

5 a. Explain the behavior of resistor, Inductor and capacitor elements under transient conditions. **(06 Marks)**

b. In the network shown in fig.5(b), $v_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. if the capacitor is initially uncharged, determine the values of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_2}{dt^3}$ at $t = 0^+$. **(10 Marks)**

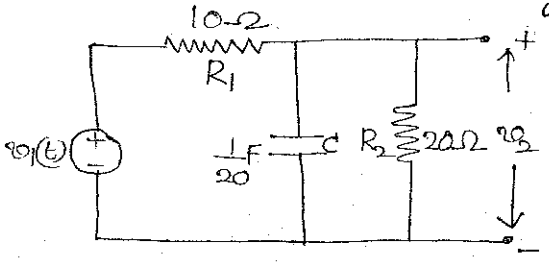

Fig.5(b)

c. Sketch the waveforms :
   i) $t\,u(t-T)$; ii) $(t-T)\,u(t-T)$; iii) $u(-t)$ iv) $t\,u(t+T)$ **(04 Marks)**

6 a. State and prove Initial and final value theorems. **(06 Marks)**

b. For the circuit shown in fig.6(b), determine the voltage across the capacitor for $t \geq 0$. The capacitor was initially charged to the extent of 2V, before the switch k is closed at $t = 0$. **(10 Marks)**

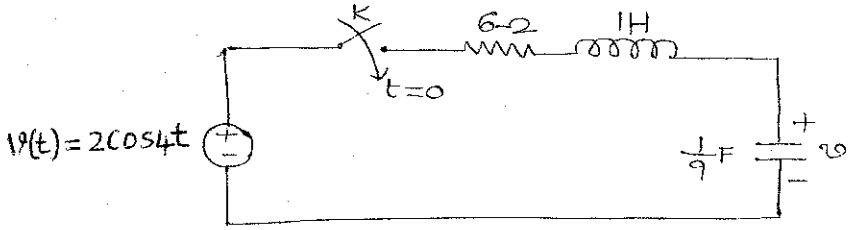

Fig.6(b)

c. Explain step, ramp and impulse functions. **(04 Marks)**

7 a. Obtain the Laplace transform of the function shown in fig.7(a). **(08 Marks)**

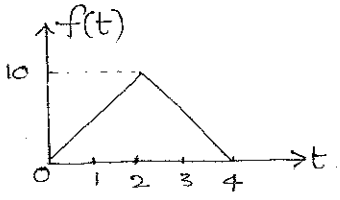

Fig 7(a)

Contd..4

b. Using initial and final value theorems, determine f (0) and f (∞) for the following.

i) $F(S) = \dfrac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$ ii) $F(S) = \dfrac{s(s+4)(s+8)}{(s+1)(s+6)}$ **(06 Marks)**

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

8 a. Obtain ABCD parameters in terms of impedance (Z) parameters and hence show that AD – BC = 1. **(08 Marks)**

b. Determine Y parameters of the two-port network shown in fig. 8(b). **(08 Marks)**

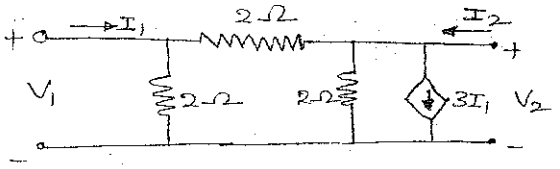

Fig.8(b)

c. A two port network has the following z-parameters :
Z_{11}=10Ω, Z_{22} = 12 Ω, Z_{12} = Z_{21} = 5 Ω. Compute the Y – parameters for the same network. **(04 Marks)**

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Third Semester B.E. Degree Examination, July 2007
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note : ***1. Answer any FIVE full questions.***
2. Justify any assumptions made.

1 a. Define the following for a network:
i) Branch ii) Graph iii) Tree and Co-tree iv) Cut-set. **(08 Marks)**

b. Obtain the oriented graph from the following node incidence matrix: **(06 Marks)**

Branches

Nodes	1	2	3	4	5	6
a	1	1	0	0	0	-1
b	0	-1	-1	1	0	0
c	0	0	0	-1	1	1
d	-1	0	1	0	1	0

$A_a =$

c. For the oriented graph shown in fig.1(c) select the tree formed of branches 4, 5 and 6 and write the tie-set schedule. **(06 Marks)**

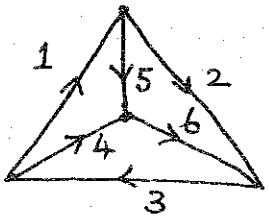

Fig.1(c)

2 a. For the network shown in fig.2(a) find the mesh currents i_1, i_2 and i_3. Use mesh analysis. **(10 Marks)**

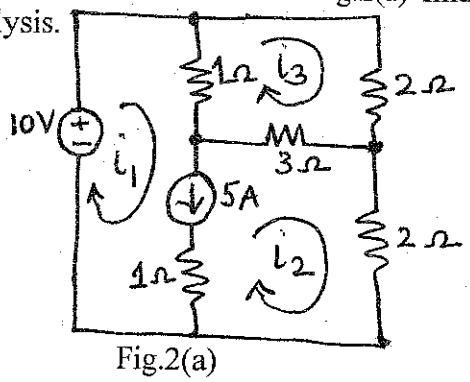

Fig.2(a)

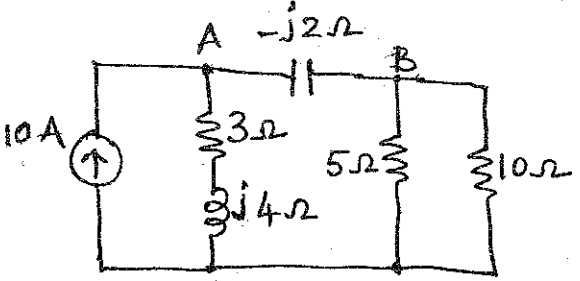

Fig.2(b)

b. Determine the voltage across branch AB, V_{AB}, of the network shown in fig.2(b). Use nodal analysis. **(10 Marks)**

3 a. Determine the star connected equivalent network for the delta connected network shown in fig.3(a). **(06 Marks)**

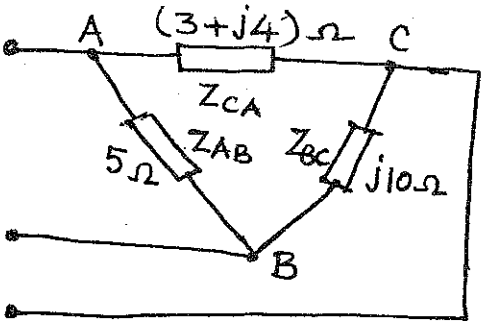

Fig 3(a)

Contd.... 2

b. Two coupled coils of self-inductances 0.8 H and 0.2 H have a coefficient of coupling 0.9. Find the mutual inductance and turns ratio. **(06 Marks)**

c. An impedance coil having a resistance of 4 Ω and inductive reactance of 2 Ω is connected in series with a reactor that is variable between 1 Ω and 11.4 Ω. Assuming a constant applied voltage of 120 V, draw the current locus for the circuit indicating there on: i) the circle diameter ii) I_{max}, I_{min} and iii) $\phi_{I_{max}}$, $\phi_{I_{min}}$. **(08 Marks)**

4 a. Using superposition theorem find the current flowing through the load resistance $R_L = 10\ \Omega$ in the circuit shown in fig.4(a) **(10 Marks)**

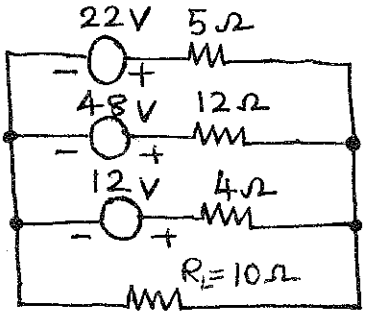

Fig.4(a)

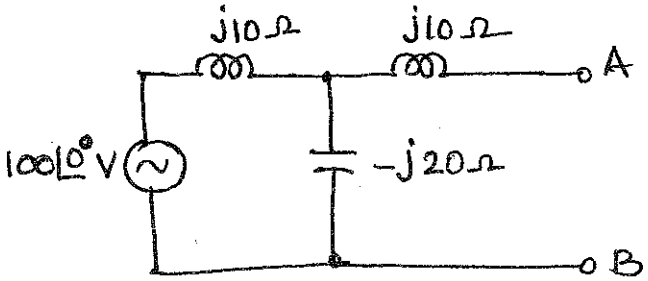

Fig.4(b)

b. Obtain Thevenin's and Norton's equivalent circuits for the circuit shown in fig.4(b) at the terminals AB and hence find the current through the load impedance $Z_L = 30^0 \angle 0^0 \Omega$ connected across AB. **(10 Marks)**

5 a. Determine the value of R_L in the network shown in fig.5(a) for maximum power transfer and calculate the value of power. **(07 Marks)**

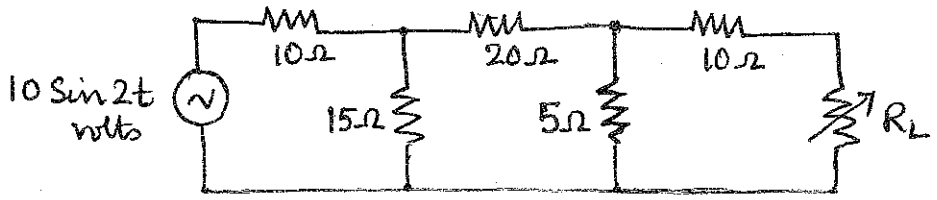

Fig.5(a)

b. For a series resonant circuit show that $f_r = \sqrt{f_1 f_2}$ where f_r = resonant frequency and f_1, f_2 = half power or cut off frequencies. **(06 Marks)**

c. For the circuit shown in fig.5(c) show that $f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$ **(07 Marks)**

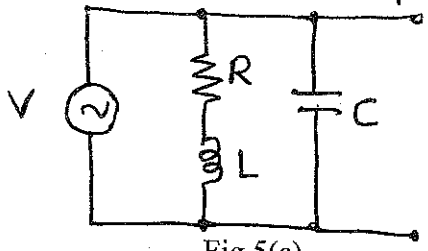

Fig.5(c)

6 a. What is the need to study initial and final conditions? Explain the initial conditions in R, L and C elements. **(10 Marks)**

Contd.... 3

b. In the network shown in fig.6(b) the switch is moved from position a to b at t = 0, the steady state having reached before switching. Calculate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **(10 Marks)**

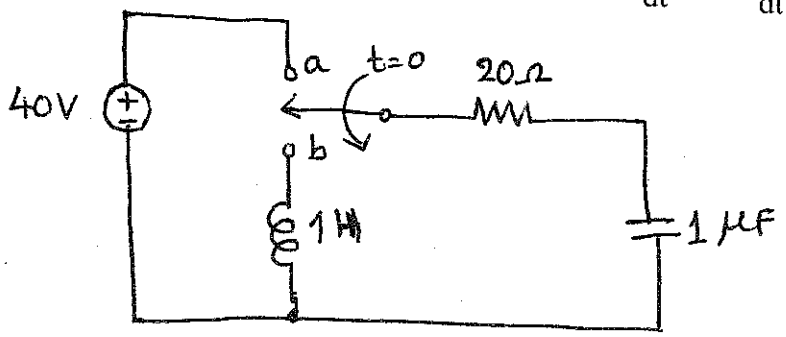

Fig.6(b)

7 a. Define Laplace transform. Explain the following properties of Laplace transform: i) Linearity ii) Time shifting iii) Time scaling. **(08 Marks)**

b. Find the inverse Laplace transform of:

$$X(s) = \frac{2s+4}{s^2+4s+3}$$ **(06 Marks)**

c. Find the Laplace transform of the periodic waveform shown in fig.7(c). **(06 Marks)**

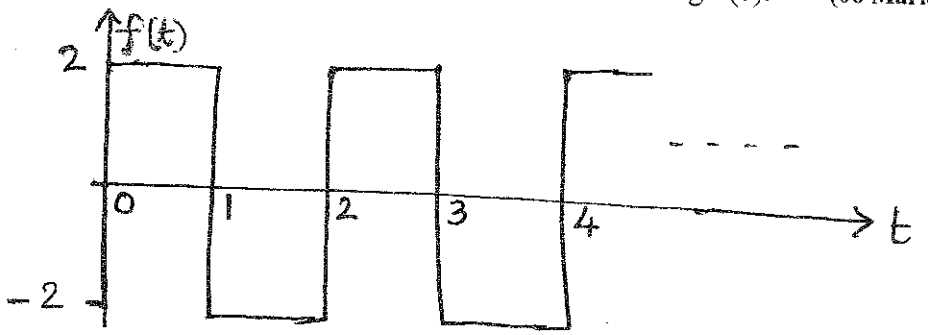

Fig.7(c)

8 a. Express the following in terms of Z-parameters: i) Y-parameters ii) T-parameter. **(12 Marks)**

b. Find the h-parameters for the two-port network shown in fig.8(b) **(08 Marks)**

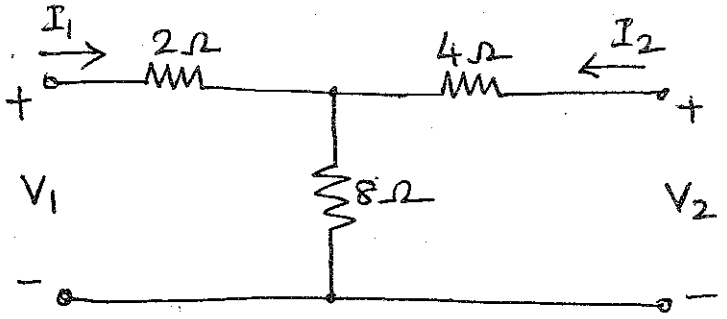

Fig.8(b)

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NEW SCHEME

Third Semester B.E. Degree Examination, Dec. 06 / Jan. 07
EE / TC / EC / IT / BM / ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

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

b. In the circuit of Fig.1(b), find I through loop analysis

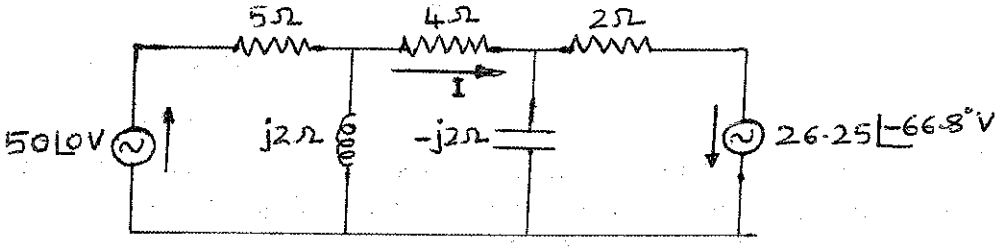

Fig.1(b) **(10 Marks)**

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

b. In the circuit of Fig.2(b) the ohmic values also represent the branch numbers. Form a tree using 4 Ω, 5 Ω, and 6 Ω branches and find the branch currents using cut set matrix.

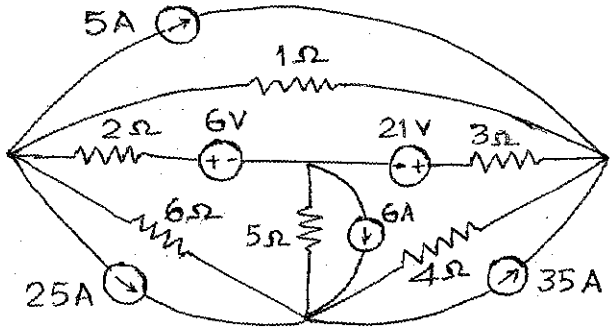

Fig.2(b) **(12 Marks)**

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

b. In the circuit of Fig.3(b) obtain I by Thevenin's theorem.

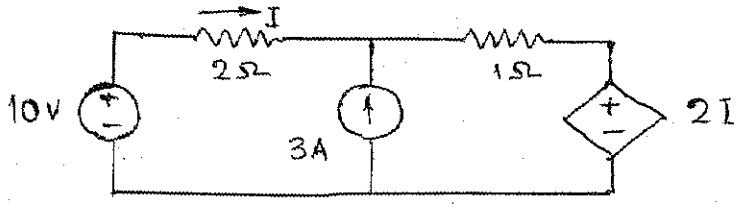

Fig.3(b) **(12 Marks)**

4 a. Define i) Bandwidth ii) Selectivity.
Derive an expression for bandwidth. **(08 Marks)**

b. A coil is connected in series with a variable capacitor across v(t) = 10 cos 1000t. The capacitor is varied and the current is maximum when C = 10 μF. When C = 12.5 μF, the current is 0.707 times the maximum value. Find L, R and Q of the coil. **(12 Marks)**

Contd.... 2

5 a. In the circuit of Fig.5(a) switch K is charged 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)**

b. In the circuit of Fig.5(b), switch K is kept open for a very long time. On closing K, after 10 ms, V_c = 80 V. Then the switch K is kept closed for a long time. When the switch is opened again, V_c = 90 V after half second. Calculate values of R and C. **(10 Marks)**

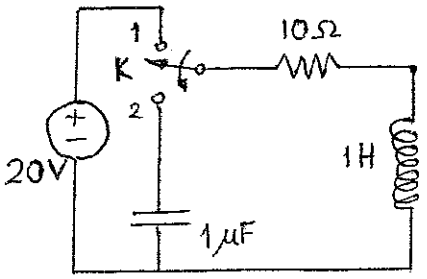

Fig.5(a)

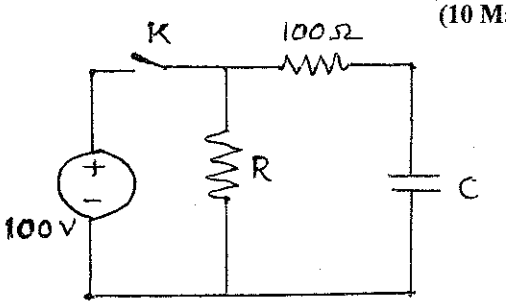

Fig.5(b)

6 a. In the circuit of Fig.6(a), the source voltage is V(t) = 50 sin 250t. Using Laplace transforms, determine the current when switch K is closed at t = 0. **(10 Marks)**

b. In the circuit of Fig.6(b), the switch is closed at t = 0. Derive an expression for V(t) after the switch closes. **(10 Marks)**

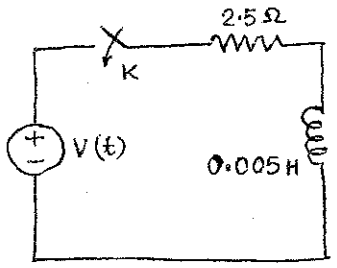

Fig.6(a)

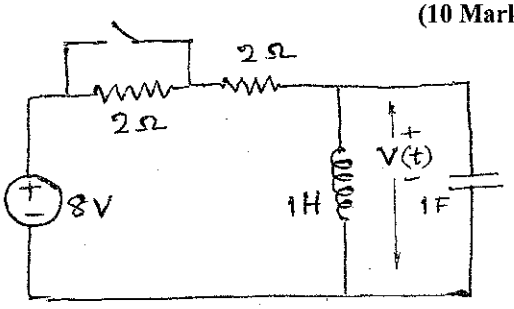

Fig.6(b)

7 a. Derive the Z-parameters in terms of Y parameters. **(08 Marks)**

b. Find the Y-parameters for the circuit shown in Fig.7(b). Then use the parameter relationship to find the ABCD parameters.

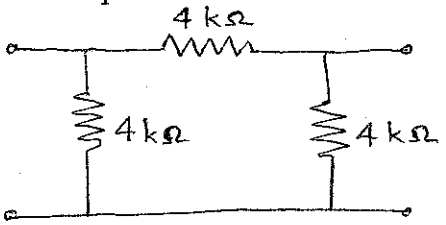

Fig.7(b) **(12 Marks)**

8 a. Construct the dual of the network shown in Fig.8(a). **(10 Marks)**

b. What should be the value of a pure resistance to be connected across the terminals a and b in the circuit of Fig.8(b), so that max power is transferred to the load. What is the max power? **(10 Marks)**

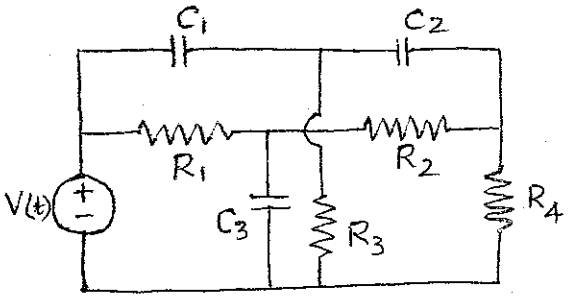

Fig 8(a)

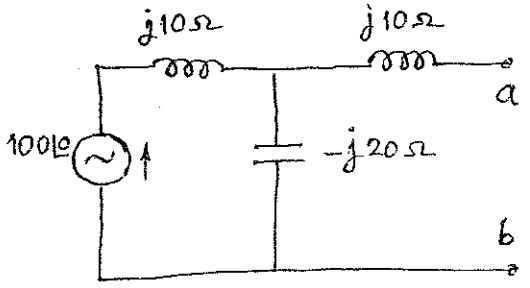

Fig 8 b

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OLD SCHEME

Third Semester B.E. Degree Examination, Dec. 06 / Jan. 07
EC / TE / ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Define the following terms with relevant examples :
i) Planar and nonplanar graph
ii) Twigs and links **(04 Marks)**

b. For network shown in Fig.1(b), branch numbers also indicate branch conductance in mho. Construct cut set schedule and obtain equilibrium equations in matrix form on node pair basis selecting 1, 2, 3 tree branches. **(08 Marks)**

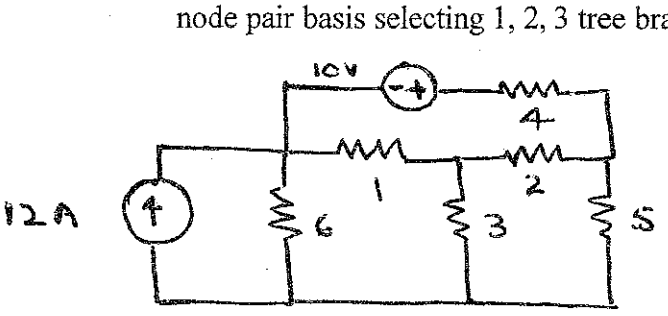

Fig.1(b)

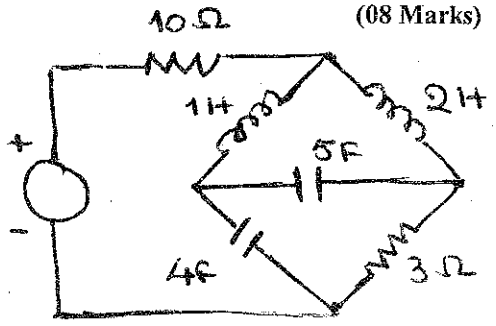

Fig.1(c)

c. For the network shown in Fig.1(c), draw its dual and write in integer differential form
i) Mesh equations for the given network
ii) Node equations for the dual.
$v(t) = 10 \sin 40t$ **(08 Marks)**

2 a. Define and distinguish the following network elements :
i) Linear and nonlinear elements
ii) Active and passive elements
iii) Lumped and distributed elements
iv) Ideal and practical current source
v) Unilateral and bilateral elements. **(10 Marks)**

b. In the circuit shown in Fig.2(b), determine the nodal voltages using nodal analysis. **(10 Marks)**

3 a. Obtain expression for a set of equivalent
i) Y connected impedances to replace a set of Δ connected impedances.
ii) Δ connected impedances to replace a set of Y connected impedances. **(10 Marks)**

b. In the circuit shown in Fig.3(b), determine the current through R_L using loop analysis method. **(06 Marks)**

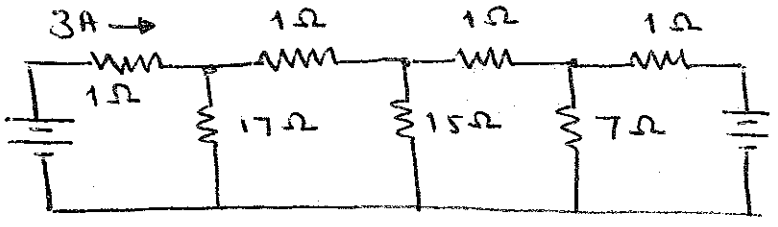

Fig.2(b)

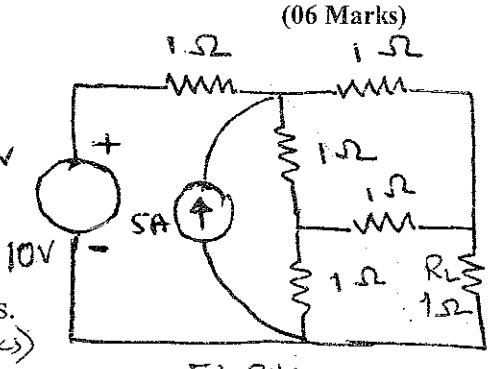

Fig 3(b)

c. State and explain Thevnin's and Tellengen's theorems. (04 Marks)

Contd...2

4 a. Find the condition for maximum power transfer in the following network : AC source, complex source impedance, complex load impedance with variable resistance. **(07 Marks)**

b. Obtain Norton's equivalence circuit for the Fig.4(b). Also calculate power delivered to $10\angle 60^0\ \Omega$ impedance. **(10 Marks)**

c. Find Milliman's equivalent for the left of terminals x-y in Fig.4(c). **(03 Marks)**

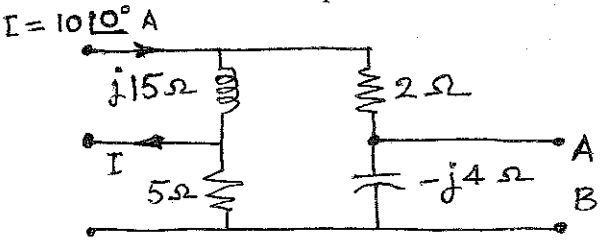

Fig.4(b)

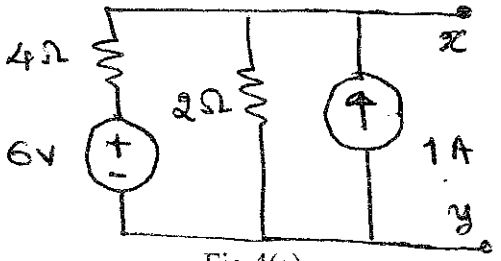

Fig.4(c)

5 a. Define quality factor, band width and establish relation between them in a series resonant circuit. **(07 Marks)**

b. Select values of R and C in the network shown in Fig.5(b) so that maximum power is delivered to R and also calculate the value of power. **(07 Marks)**

V(t)=250 sin 500t

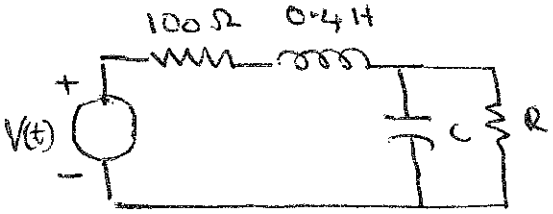

Fig.5(b)

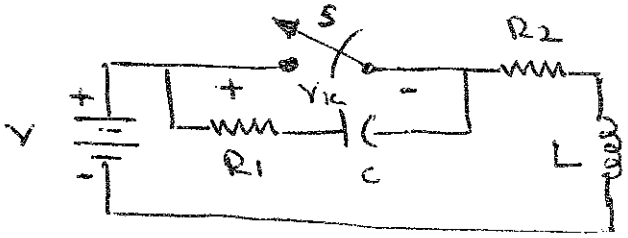

Fig.5(c)

c. In the network shown in Fig.5(c), switch 'S' is opened at t = 0 after the network has attained steady state with the switch closed. Find the expression for voltage across the switch 'S' at $t = 0^+$. If the parameters are adjusted such that $i(O^+) = 1$ and $\frac{di(O^+)}{dt} = -1$, what is the derivative of the voltage across the switch. **(06 Marks)**

6 a. Evaluate the condition in series RLC circuit for AC excitation. **(10 Marks)**

b. Switch K in the network shown in Fig.6(b) is closed at $t = 0$. With zero initial voltage across capacitor and zero current in inductor, find values of following quantities at $t = 0^+$. i) i_1 ii) i_2 iii) $\frac{di_1}{dt}$ iv) $\frac{di_2}{dt}$ **(10 Marks)**

7 a. Find the Laplace transform of the periodic waveform shown in Fig.7(a). **(07 Marks)**

b. State and prove convolution theorem. Using the same find the inverse Laplace transform of $F(S) = 3S/(S^2+1)(S^2+9)$ **(08 Marks)**

c. Using initial value and final value theorems find f(0) and f(∞) given

$$F(S) = \frac{S^3 + 7S + 5}{S(S^3 + 3S^2 + 4S + 2)}$$ **(05 Marks)**

8 a. Define h and T parameters and derive expressions for [h] in terms of [T]. **(10 Marks)**

b. Determine Z parameters for the network shown in Fig.8(b). **(10 Marks)**

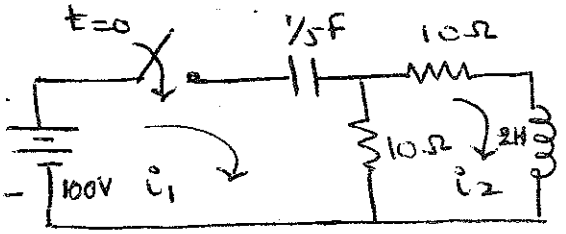

Fig 6(b)

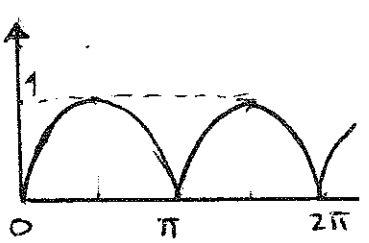

Fig 7(a)

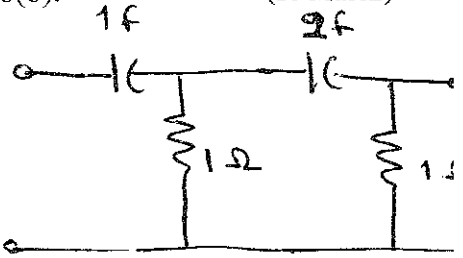

Fig 8(b)

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OLD SCHEME

Third Semester B.E. Degree Examination, July 2006
EC/TE/ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note : ***1. Answer any Five full questions.***
2. All questions carry equal marks.

1 a) Explain the following terms with reference to Network Topology, i) Tree, ii) Branch, ii) Cut-set Matrix, iv) Incident Matrix **(08 Marks)**

b) For the resistive network given below, write a cut-set schedule and obtain equilibrium equations on the voltage bias. Solve these equations and calculate values of branch currents and branch voltages.

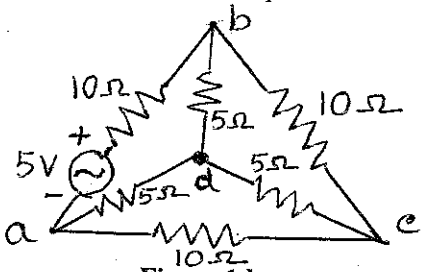


Figure 1.b **(12 Marks)**

2 a) Define the following : 1) Time invariant and Time variant sources, 2) Classification of electrical Networks, 3) Unilateral and Bilateral networks. **(06 Marks)**

b) State and explain Kirchoff's laws. **(06 Marks)**

c) It is intended that the two networks of the figure be equivalent with respect to the pair of terminals which are identified. What must be the values for C_1, L_2 and L_3?

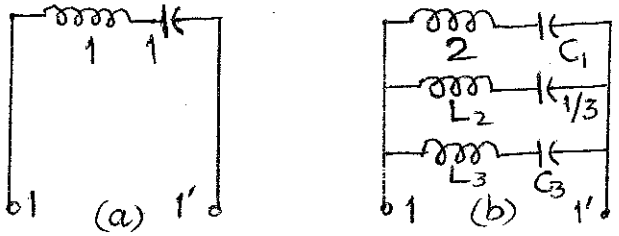
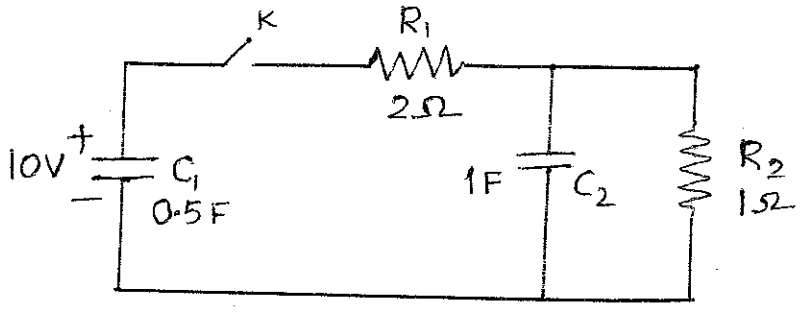


Figure 2(c) **(08 Marks)**

3 a) State and explain maximum power transfer theorem. **(06 Marks)**

b) State and prove millman's theorem with example. **(06 Marks)**

c) In the given network capacitor C_1 is charged to 10 Volts in the polarity shown. Capacitor C_2 is initially uncharged. At time t=0, switch K is closed. Using Thevenin's theorem find the current in resistor R_2.



(08 Marks)

FIG 3 C

4 a) Explain briefly the terms i) Band-width ii) quality factor iii) Selectivity curve in a series resonant circuit. **(06 Marks)**

b) A coil of Inductance 0.2 Henry and resistance 5 ohms is connected in series with a capacitor of value 0.05 μF. Find the frequency of series resonance of the circuit in Hz. **(07 Marks)**

c) An RLC series circuit consists of capacitor of value 0.05 μF. It resonates at 5 KHz. Calculate the value of Inductance. **(07 Marks)**

5 a) What is the significance of initial conditions? Write a note on initial conditions in basic circuit elements. **(06 Marks)**

b) What is time-constant? Explain time-constant in case of series RL and series RC circuit. **(06 Marks)**

c) In the network, given below the switch is closed at t=0, with the capacitor uncharged. Find values for i, di/dt, d^2i/dt^2 at t=0. The element values are V=100V, R=1000Ω and C=1 μF.

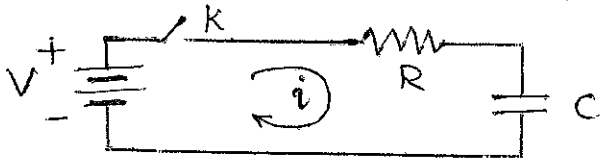


Figure 5(C)

(08 Marks)

6 a) Explain the complex translation property and shifting translation property of Laplace transform. **(08 Marks)**

b) Find the Laplace transform of i) e^{-at} cos wt, where a is constant, ii) $f(t)=1-e^{-at}$, where a is constant. **(12 Marks)**

7 a) Find the Laplace Transform of half sine pulse shown in figure 7(a)

b) Find the Laplace transform of the wave form shown in the figure 7(b)

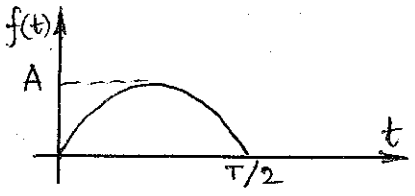


Figure 7(a)

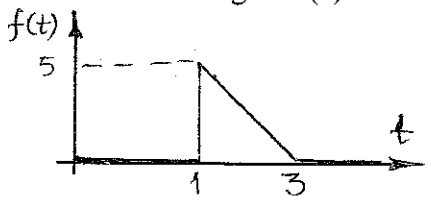


Figure 7(b) **(10 Marks)**

8 a) Obtain the relationship between 'h' and 'y' parameters of a two-port network. **(10 Marks)**

c) The network of the figure is a bridged – T RC network. For the values given, find the Y and Z parameters.

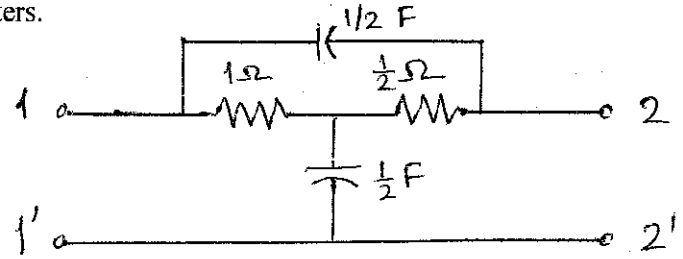


Figure 8(b) **(10 Marks)**

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NEW SCHEME

Third Semester B.E. Degree Examination, July 2006
EE / EC / IT / TC / BM / ML
Network Analysis

Time: 3 hrs.] [Max. Marks:100

Note: 1. ***Answer any FIVE full questions.***
2. ***Justify any assumptions made.***

1 a. In the circuit shown in figure Q1 (a) determine V2, which results in zero current through the 4 Ω resistor. Use mesh analysis. **(10 Marks)**

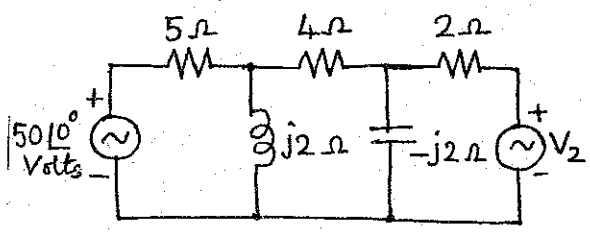


Fig. Q1 (a)

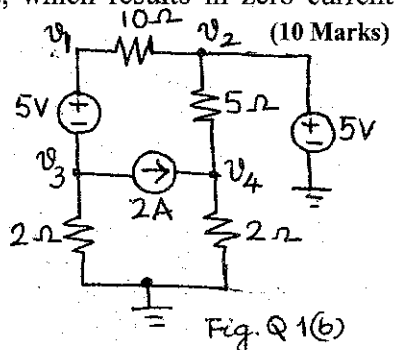


Fig. Q1 (b)

b. For the network shown in figure Q1 (b) determine the node voltages V_1, V_2, V_3 and V_4 using nodal analysis. **(10 Marks)**

2 a. In figure Q2 (a) determine the equivalent resistance Req by using star delta transformation. **(10 Marks)**

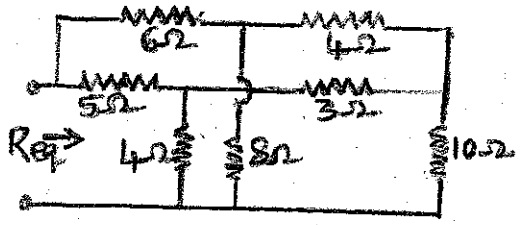


Fig. Q2 (a)

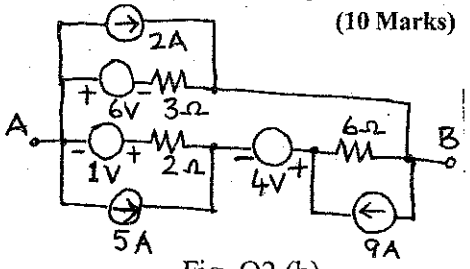


Fig. Q2 (b)

b. Obtain the Thevenin's and Norton's equivalent circuits across terminals A and B for the circuit shown in figure Q2 (b). **(10 Marks)**

3 a. State and explain Millman's theorem. **(05 Marks)**

b. For the circuit shown in figure Q3 (b) find the current *i* using superposition theorem. **(07 Marks)**

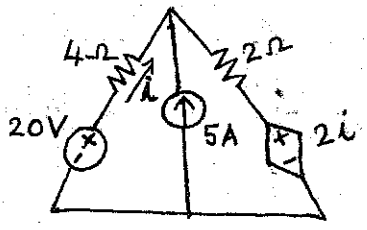


Fig. Q3 (b)

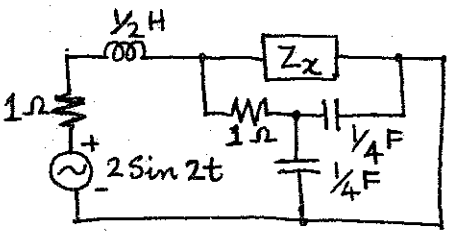


Fig. Q3 (c)

Contd....2

3 c. For the network shown in figure Q3 (c), determine the impedance Z_x such that maximum power is transferred from the source to the load of impedance Z_x. **(08 Marks)**

4 a. For the oriented graph shown in figure Q4 (a), write the complete incidence matrix. Also write the cutset and tieset matrices considering branches 4, 5 and 6 as twigs. **(10 Marks)**

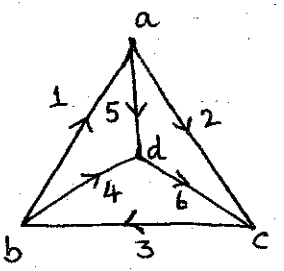


Fig. Q4 (a)

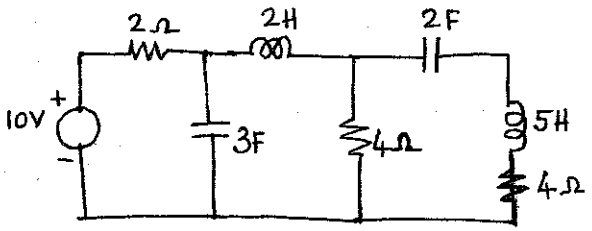


Fig. Q4 (b)

b. For the network shown in figure Q4 (b) draw its dual write in the integro-differential form
   i) Mesh equations for the given network.
   ii) Node equations for the dual. **(10 Marks)**

5 a. A constant voltage at a frequency of 1 MHz is applied to an inductor coil in series with a variable capacitor. When the capacitor is set at 500 pF, the current has its maximum value, while the current is reduced to one half when the capacitance is 600 pF. Find
   i) The resistance and inductance of the coil.
   ii) The Q factor of the inductor. **(10 Marks)**

b. Derive the expression for the resonant frequency of the circuit shown in figure Q5 (b). Also show that the circuit will resonate at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(10 Marks)**

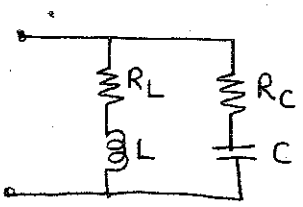


Fig Q5 (b)

6 a. In the network shown in figure 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 $V_a(0+)$. **(10 Marks)**

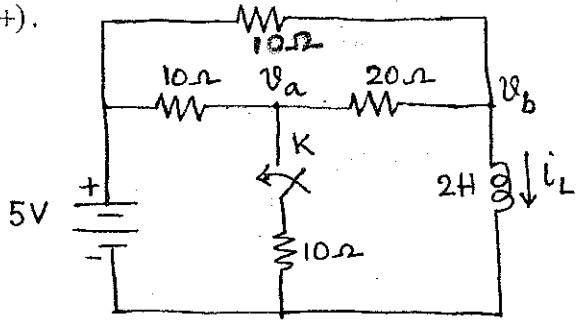
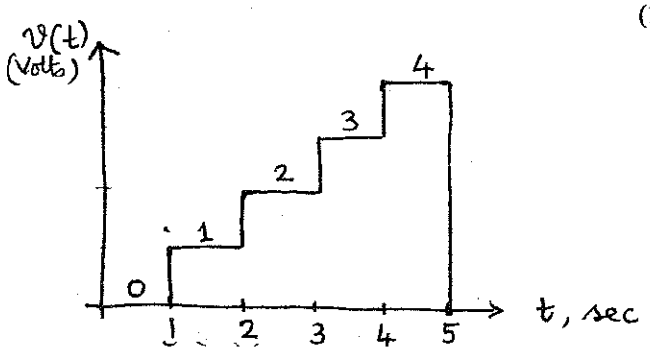


Fig Q6 (a)

Contd....3

6 b. State and prove (i) initial value theorem and (ii) final value theorem as applied to Laplace transform. What are the limitations of each theorem? **(10 Marks)**

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



b. In figure Q7 (b) the switch is initially closed. After steady state the switch is opened. Determine the nodal voltages $V_a(t)$ and $V_b(t)$ using Laplace transform method. **(10 Marks)**

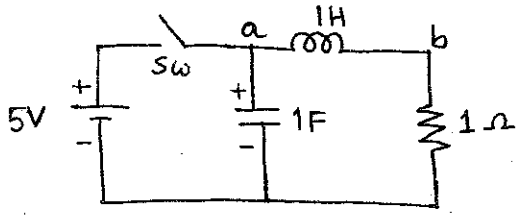


Fig Q7 (b)

8 a. Define h parameters. Show that the transmission matrix of a cascade of two-port networks is the product of transmission matrices of the individual two-port networks. **(10 Marks)**

b. Find z and y parameters for the two-port network shown in figure Q8 (b). **(10 Marks)**

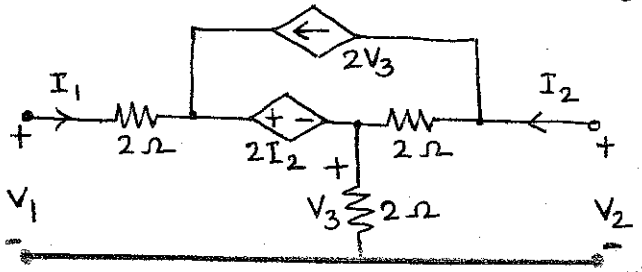


Fig Q8 (b)

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NEW SCHEME

EE34

Reg. No.

Third Semester B.E. Degree Examination, January/February 2006

EC/TE/EE/IT/ML/BM

Network Analysis

Time: 3 hrs.) (Max.Marks : 100

Note: ***Answer any FIVE full questions.***

1. (a) Three impedances are connected in delta. Obtain expressions for their star connected equivalents. **(6 Marks)**

(b) Reduce the network shown in fig Q. 1(b) to a single voltage source in series with a resistance using source shift and source transformations. **(6 Marks)**

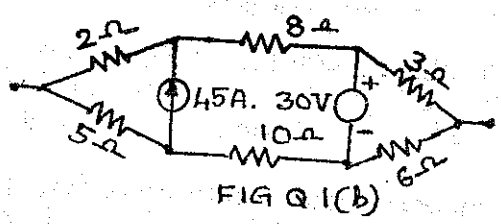

FIG Q 1(b)

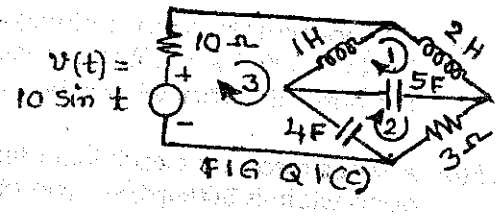

FIG Q 1(c)

(c) For the network shown in Fig Q. 1(c), write the mesh equations, for the meshes indicated, in time domain. Draw the dual network and write its node equations. **(8 Marks)**

2. (a) Find V_2 through the use of nodal analysis, of the network shown in fig Q. 2(a). Also find V_x. **(6 Marks)**

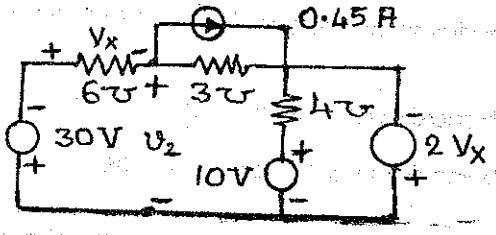

FIG Q 2(a)

(b) Use mesh analysis to determine what value of V_2 in the network shown in fig Q 2(b) causes $v = 0$. v is the voltage across 20Ω. **(6 Marks)**

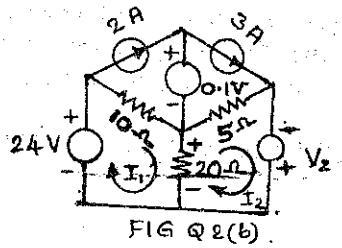

FIG Q 2(b)

Contd.... 2

(c) For the network shown in fig Q 2(c), perform source shifts, draw a graph, select tree with branches 1, 2 and 3 and obtain tie set and cut set matrices. **(8 Marks)**

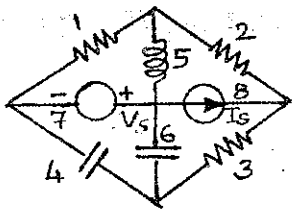

FIG Q 2(C).

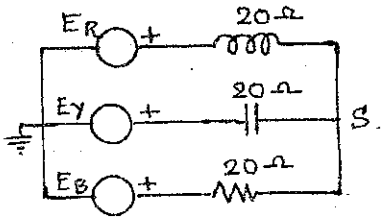

FIG Q 3(a).

3. (a) Use Millmann's theorem to determine the voltage V_s of the network shown in Fig Q 3(a) given that
$E_R = 230 \angle 0^0 V$, $E_Y = 230 \angle -120^0 V$, and $E_B = 230 \angle 120^0 V$, **(6 Marks)**

(b) Prove that an alternating voltage source transfers maximum power to a load when the load impedance is the conjugate of the source impedance. **(6 Marks)**

(c) A linear time invariant network when terminated with i) $R = 1\Omega$, the current is $5 \angle -45^0 A$ ii) $X_c = 1\Omega$, the current is $10 \angle -45^0 A$. Find the Thevinins equivalent of the network. What will be the current if it is terminated with $X_L = 1\Omega$? **(8 Marks)**

4. (a) A series resonant circuit includes $1\mu F$ capacitor and a resistance of 16Ω. If the band width is $500 rad/sec$, determine i) ω_r ii) Q and iii) L. **(6 Marks)**

(b) A two branch antiresonant circuit contains $L = 0.4\,H$ and $C = 40\,\mu F$. Resonance is to be achieved by variation of R_L and R_C. Calculate the resonance frequency for the following cases :

i) $R_L = 120\Omega,\ R_C = 80\Omega$

ii) $R_L = 80\Omega,\ R_C = 0$

iii) $R_L = R_C = 100\Omega$ **(6 Marks)**

(c) In the case of a series resonant circuit with frequency variation, obtain expressions for

i) ω_C at which maximum voltage occurs across C

ii) ω_L at which maximum voltage occurs across L and show that $\omega_L > \omega_C$ **(8 Marks)**

5. (a) Why do we need to study initial conditions ? Write the equivalent form of the elements in terms of the initial condition of the element. **(6 Marks)**

(b) A parallel R - L circuit is energised by a current source of 1 A. The switch across the source is opened at $t = 0$. Solve for v, Dv and D^2v all at $t = 0+$ if $R = 100\Omega$ and $L = 1H$. **(6 Marks)**

(c) A series R - C branch with $R = 20\Omega$ and $C = 1\mu F$ is shunted by an inductor of resistance 20Ω and inductance $1H$. This is supplied by a D.C. source of $100V$ through a series resistance of 10Ω. There is a switch across 10Ω which is closed at $t = 0$. Solve for the currents in L and C and their derivatives at $t = 0+$. **(8 Marks)**

6. (a) State and prove i) initial value theorem and ii) final value theorem as applied to L transformation. **(6 Marks)**

Contd.... 3

(b) Determine the Thevinin's equivalent $V_{ab}(s)$ and $Z_{ab}(s)$ for the network shown in Fig Q. 6 (b) for zero initial conditions. **(6 Marks)**

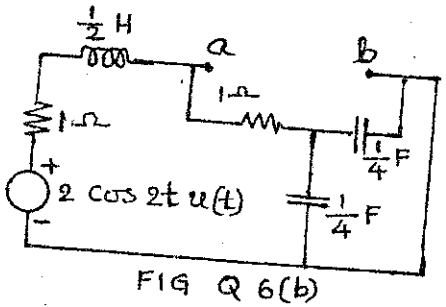

FIG Q 6(b)

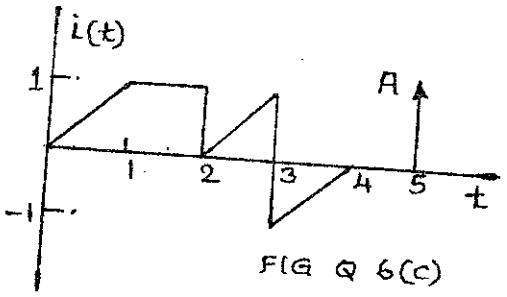

FIG Q 6(c)

(c) The current $i(t)$ shown in fig. Q 6(c) is impressed upon a capacitor C. What should be the value of A of the impulse so that the voltage across the C becomes zero for $t > 5\ sec$? **(8 Marks)**

7. (a) Explain the application of convolution integral in the analysis of linear systems. **(6 Marks)**

(b) A network has a transfer function $H_1(s)$ and the impulse response of the system is a gate function of height 1 and spanning from 0 to 1 sec. Three of these networks are connected such that the overall transfer function is $H_3(s) = [H_1(s)]^3$. Using convolution or otherwise find the impulse response of the new system $h_3(t)$. **(6 Marks)**

(c) For the circuit shown in fig Q. 7(c) the switch is opened at $t = 0$. If $L = \frac{1}{2}H$, $G = 1\ mho$, $C = 1F$ and $V = 1V$, find the node voltages $v_1(t)$ and $v_2(t)$

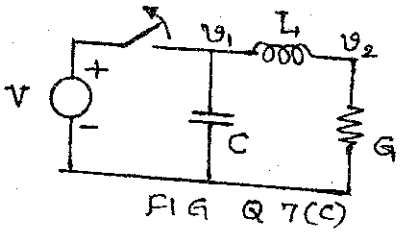

FIG Q 7(C)

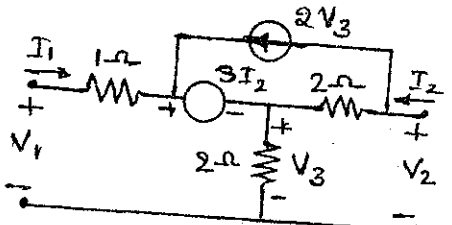

FIG Q 8(C)

8. (a) A two port network, in terms of z parameters is said to be symmetric if $z_{11} = z_{22}$ and reciprocal if $z_{12} = z_{21}$. Obtain the corresponding conditions in terms of **(8 Marks)**

i) h parameters

ii) T parameters,

using the relationship between different two port parameters. **(6 Marks)**

(b) Two 2 port networks are connected in cascade. Obtain T parameters of the interconnected network in terms of the T parameters of the individual networks. **(6 Marks)**

(c) For the two port network shown in fig Q. 8(c). obtain z parameters. **(8 Marks)**

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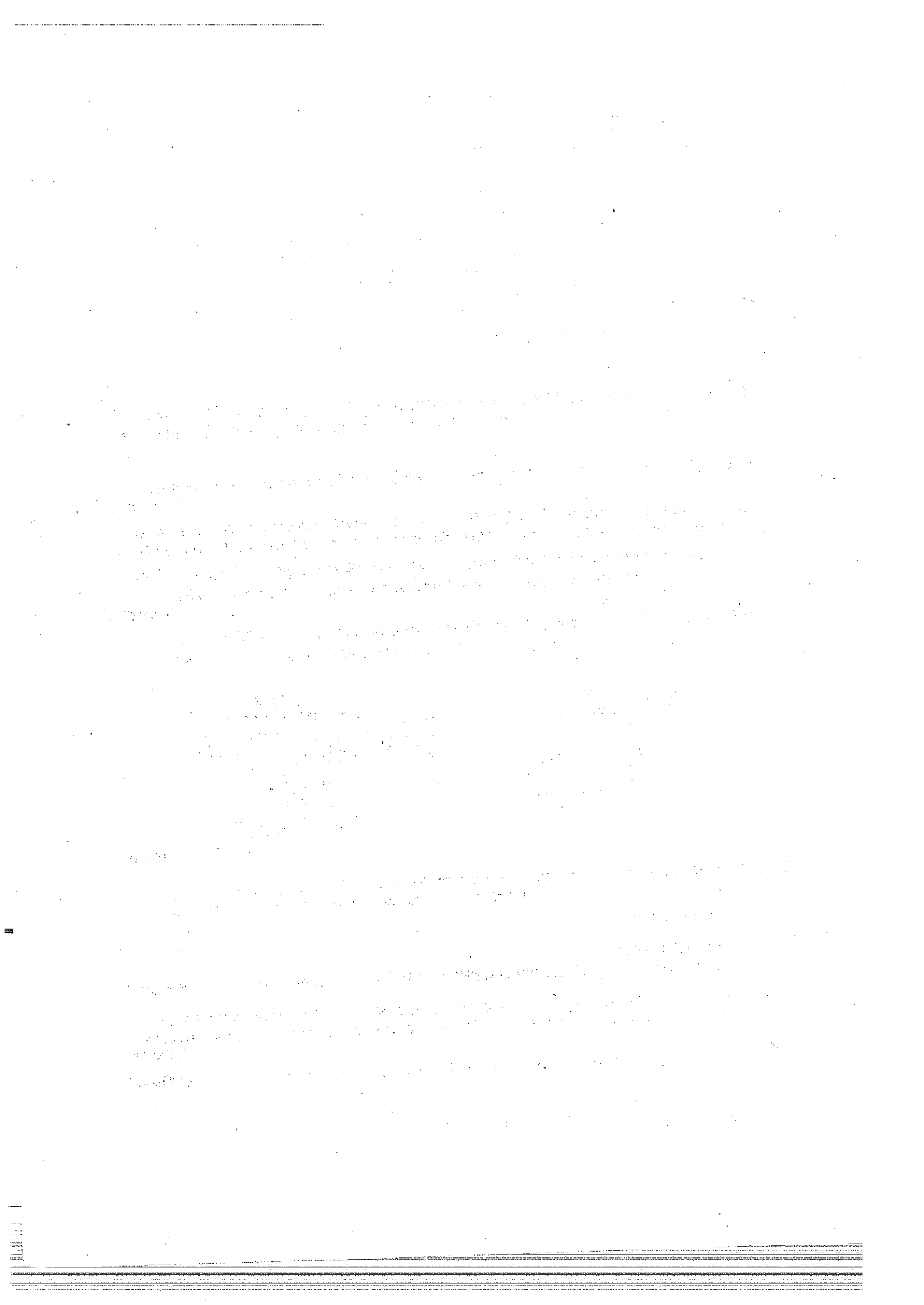

EC/TE/ML302

Reg. No. | | | | | | | | | | |

Third Semester B.E. Degree Examination, January/February 2006

EC/TE/ML

(Old Scheme)

Network Analysis

Time: 3 hrs.) (Max.Marks : 100

Note: ***Answer any FIVE full questions.***

1. **(a)** Define the following pairs of terms bringing out their salient features

   i) Node & branch ii) Planar and nonplanar network
   iii) Path and loop iv) Tree and co-tree

(12 Marks)

(b) For the net work shown in Fig. Q 1(b), draw the graph. Select branches 2 and 4 as tree branches. Write down the equilibrium equations with loop currents as variable. Solve these equations and find various branch currents and voltages. The integers indicate branch numbers **(8 Marks)**

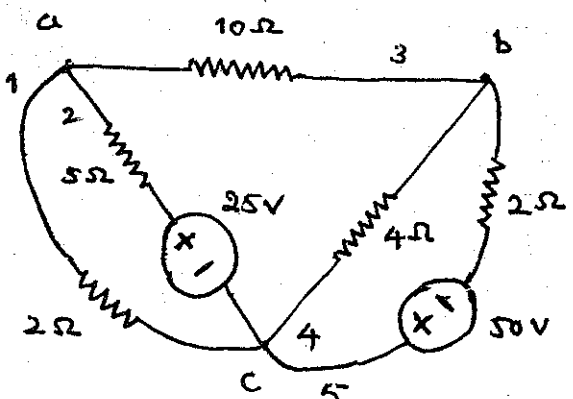

Fig Q1(b)

2. **(a)** Explain the following :

   i) Time invariant and time variant sources

   ii) Unilateral and bilateral networks

   iii) Kirchott's laws **(9 Marks)**

(b) Give Star to Delta and Delta to Star conversion relations. **(6 Marks)**

(c) Compute the resistance across the terminals A and B of the network shown in Fig Q 2(c) using star delta conversions: **(5 Marks)**

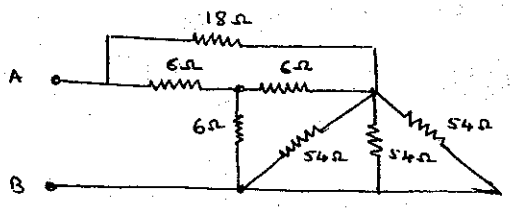

Fig Q2(c)

Contd.... 2

3. **(a)** State and explain superposition theorem. **(6 Marks)**

(b) State and explain reciprocity theorem. **(6 Marks)**

(c) Find Norton's equivalent circuit with respect to the circuit shown in Fig. Q 3(c) and hence determine the power dissipation in 20Ω resistor across terminals A & B. **(8 Marks)**

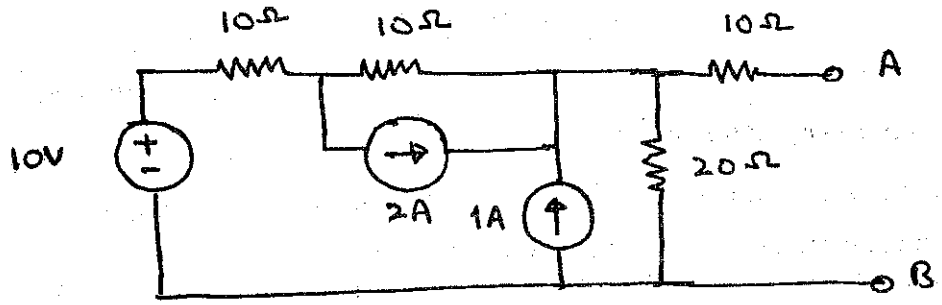

fig Q 3 (c)

4. **(a)** With respect to resonant circuits define the following terms:

i) Band width ii) Quality factor **(6 Marks)**

(b) For a series resonance circuit, determine the values of half power frequencies ω_1 and ω_2 in terms of resonance frequency and circuit parameters. **(6 Marks)**

(c) For the circuit shown in fig.Q r(c), determine the antiresonance frequency in terms of the circuit parameters. **(8 Marks)**

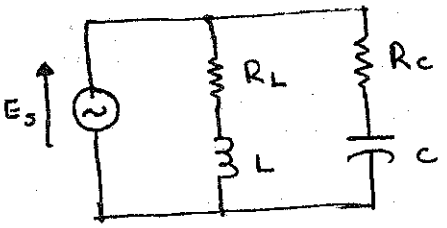

fig Q 4 (c)

5. **(a)** Explain the initial and final conditions in electric circuit for the elements inductance and capacitance. **(10 Marks)**

(b) In the network shown in fig. Q 5(b), the switch K is closed at t =0. Find the values of $i_1, i_2, \frac{di_1}{dt}$ and $\frac{d^2i_2}{dt^2}$ at $t = 0^+$. **(10 Marks)**

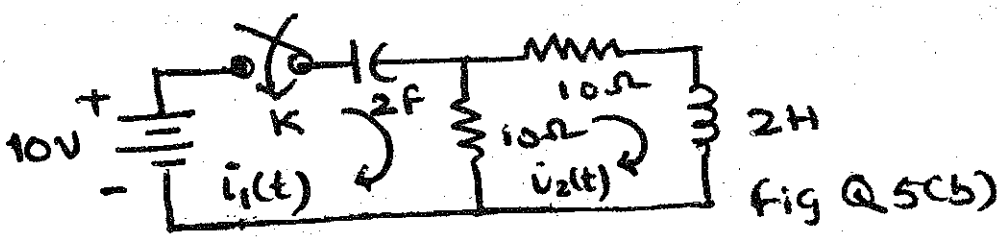

fig Q 5(b)

Contd.... 3

6. **(a)** Define Laplace transform of function f(t) and prove various properties of Laplace transform. **(10 Marks)**

(b) Find the Laplace transform of the wave form shown in fig. Q 6(b) **(10 Marks)**

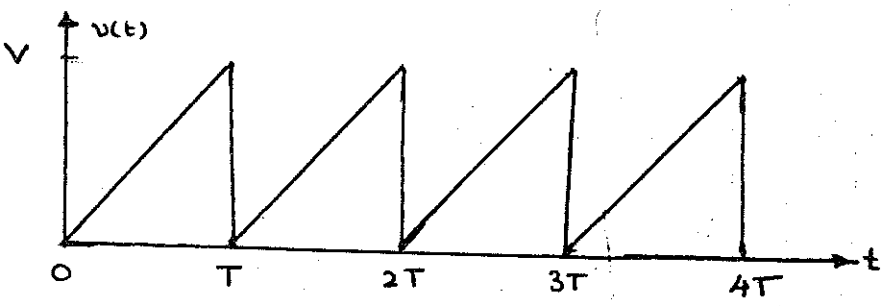

Fig Q 6(b)

7. **(a)** List the properties of driving point and transfer function of a network. **(5+5 Marks)**

(b) Determine the driving point impedance of the network shown in fig. Q 7(b) and plot the pole - zero diagram. **(10 Marks)**

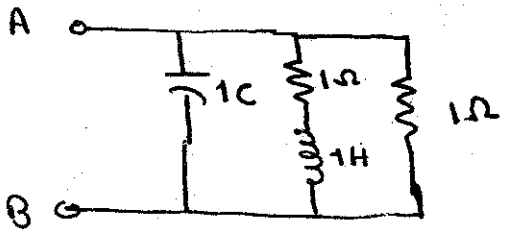

fig Q 7(b)

8. **(a)** List out the different sets of network parameters. **(8 Marks)**

(b) Derive relation between z and y parameters. **(12 Marks)**

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EC/TE/ML302

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

Third Semester B.E. Degree Examination, July/August 2005

EC/TE/ML

(Old Scheme)

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. All questions carry equal marks.
3. Justify any assumptions made.

1. (a) With the help of an example explain the following for a network graph.

i) Complete incidence matrix and reduced incidence matrix.

ii) Tie-set and Tie-set schedule.

iii) Cut-set and cut-set schedule. **(12 Marks)**

(b) For the network shown in fig 1(b) write the fundamental cut-set matrix and determine the nodal voltages. Consider branches (1) and (3) as tree branches. **(8 Marks)**

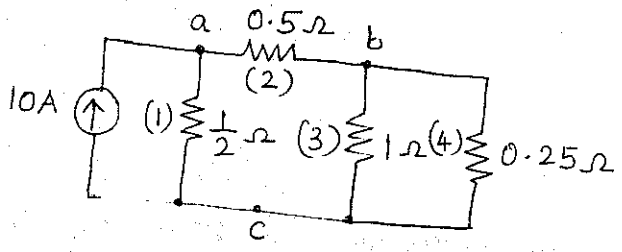


Fig 1(b)

2. (a) For the network shown in fig 2(a) find the mesh currents i_1, i_2 and i_3. **(8 Marks)**

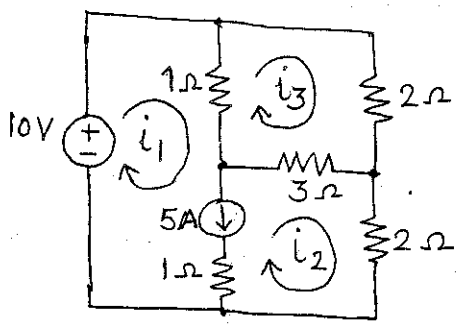


Fig 2(a)

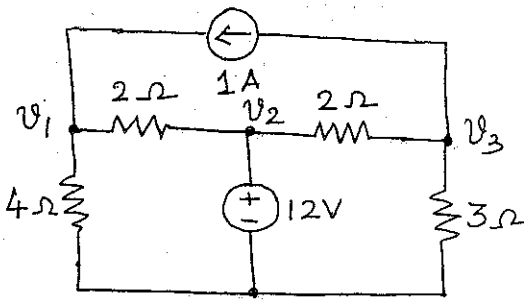


fig 2(b)

(b) In the circuit of fig 2(b), find the current through the 3Ω resistor using nodal analysis and also calculate the power dissipated in it. **(7 Marks)**

Contd.... 2

(c) Find the resistance between terminals A and B of the network shown in fig 2(c). **(5 Marks)**

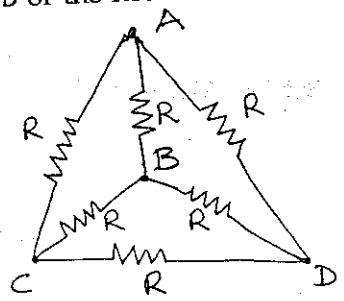


Fig 2(c)

3. (a) A 200V, 50Hz source is connected to a series circuit consisting of an inductance of 0.1H and a resistance that varies between 10Ω and 50Ω. Draw the current locus and indicate thereon the circle diameter, maximum and minimum currents and their phase angles. **(7 Marks)**

(b) Determine the current through the branch AB of the network shown in fig 3(b) using superposition theorem. **(7 Marks)**

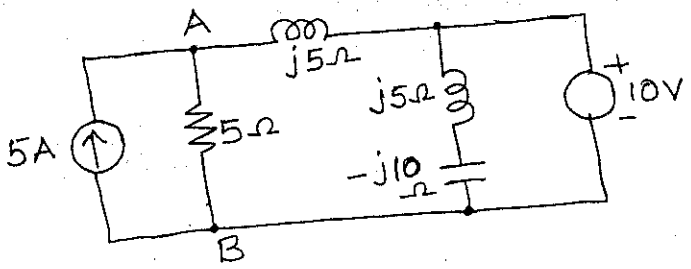


Fig 3(b)

(c) Two coils having 1000 turns and 1600 turns respectively are placed close to each other such that 60% of the flux produced by one coil links the other. If a current of 10A flowing in the first coil produces a flux of 0.5 mwb, find the inductance of the second coil. **(6 Marks)**

4. (a) Find the Thevenin's equivalent circuit across the terminals *a* and *b* for the circuit shown in fig. 4(a). **(8 Marks)**

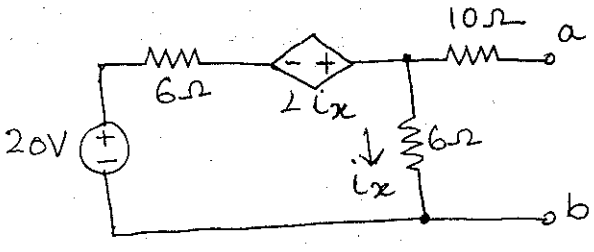


Fig 4(a)

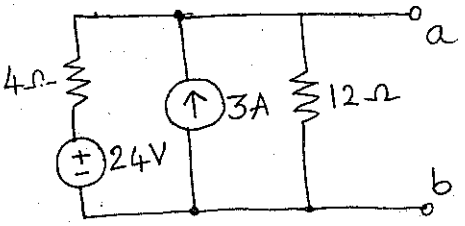


Fig 4(b)

(b) Find the Norton's euqivalent circuit across terminals a,b of the network shown in fig 4(b). **(4 Marks)**

Contd.... 3

(c) Find the maximum power delivered to the load R_L in the circuit of fig 4(c). (8 Marks)

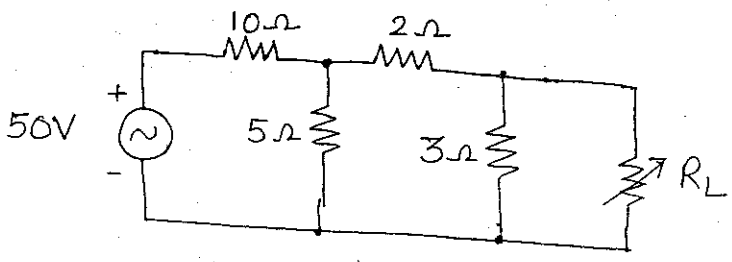


Fig. 4(c)

5. (a) Using Millman's theorem find the current through 10Ω resistor in the circuit of fig 5(a). (6 Marks)

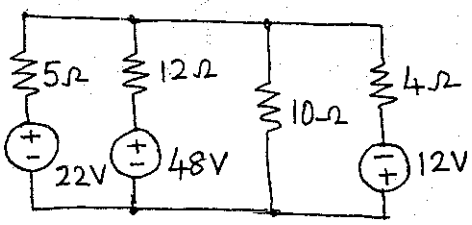


Fig 5(a)

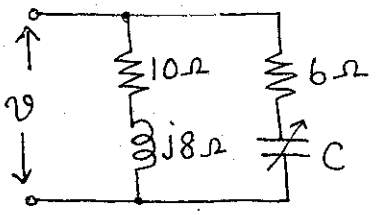


Fig 5(c)

b) What is series resonance? Define half power frequencies in a series resonant circuit and show that $f_r = \sqrt{f_1 f_2}$ where f_r is the resonant frequency and f_1 and f_2 are half-power frequencies. (7 Marks)

(c) Find the values of C for which the circuit of fig 5(c) resonates at 750Hz. (7 Marks)

6. (a) What are the uses of knowing initial conditions in a circuit? Explain the initial conditions in i) resistor ii) inductor and iii) capacitor. (10 Marks)

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

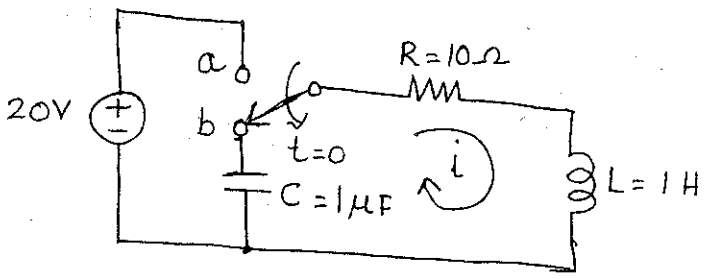


Fig 6(b)

7. (a) Define Laplace transform and explain any three of its properties. (7 Marks)

Contd.... 4

(b) For the circuit shown in fig 7(b) find i(O) and $i(\infty)$ using initial and final value theorems. **(6 Marks)**

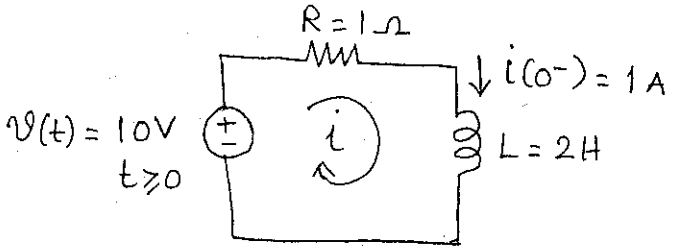


Fig 7(b)

(c) Determine the Laplace transform of the periodic function shown in fig 7(c). **(7 Marks)**

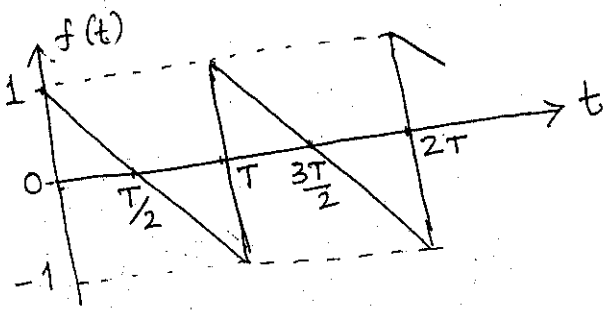


Fig 7(c)

8 (a) List the restrictions on the locations of poles and zeros for driving point functions. **(6 Marks)**

(b) Define Z and Y parameters for a two port network. Express Z parameters in terms of Y-parameters. **(7 Marks)**

(c) Determine the h parameters for the circuit shown in fig 8(c). **(7 Marks)**

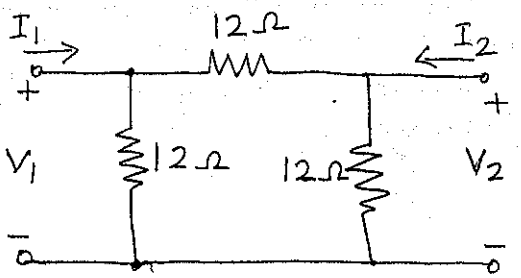


Fig 8(c)

** * **

NEW SCHEME

EE34

USN

Third Semester B.E. Degree Examination, July/August 2005

Common to EC/TE/EE/IT/ML/BM

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Distinguish between the following network elements citing examples :

i) Unilateral and bilateral

ii) Independent and dependent sources. (6 Marks)

(b) Obtain the delta connected equivalent of the network shown in fig.Q1(b). (6 Marks)

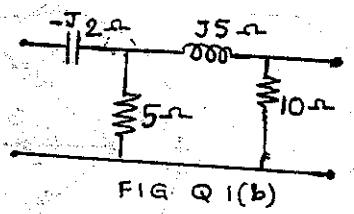


FIG Q 1(b)

(c) Find the voltage across the capacitor of 20Ω reactance of the network shown in Fig.Q1(c), by reducing the network to contain one source only, by source transformation techniques. (8 Marks)

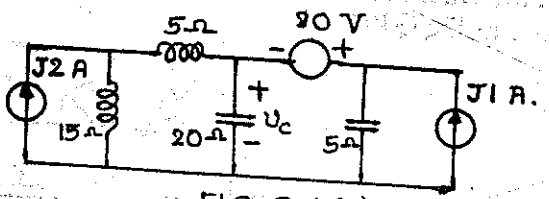


FIG Q 1(c)

2. (a) Explain the procedure of writing node equations for a network, that contains ideal voltage sources in addition to current sources, without source transformation techniques. (6 Marks)

(b) Set up node equations for the circuit shown in Fig.Q2(b) to determine the voltage ϑ_a. (6 Marks)

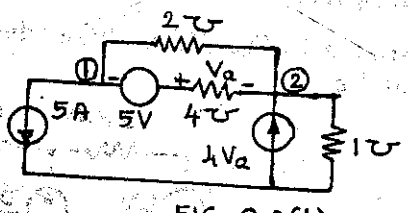


FIG Q 2(b)

Contd.... 2

(c) Use 3 mesh equations for the network shown in Fig.Q2(c) to determine R and C such that the current in $3 + J4\Omega$ is zero. Take $\omega = 50 rad/sec.$ (8 Marks)

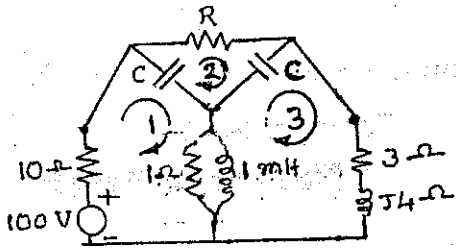


FIG Q 2(c)

3. (a) With usual notations, derive from topological considerations, the matrix relationship for node equations.

$$[Q]\,[Y_b]\,[Vs] - [Q]\,[I_s] = [Q]\,[Y_b]\,[Q]^T[V]$$ (6 Marks)

(b) Construct a tree for the network shown in Fig.Q3(b) so that all loop currents pass through 7Ω. Write the corresponding tie set matrix. (8 Marks)

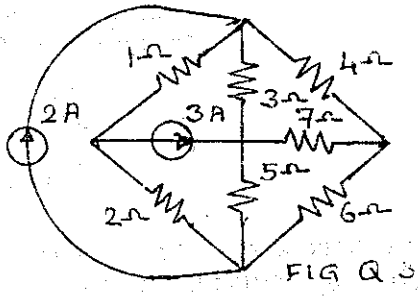


FIG Q 3(b)

(c) What are dual networks? What is their significance? Draw the dual of the circuit shown in Fig.Q3(c). (6 Marks)

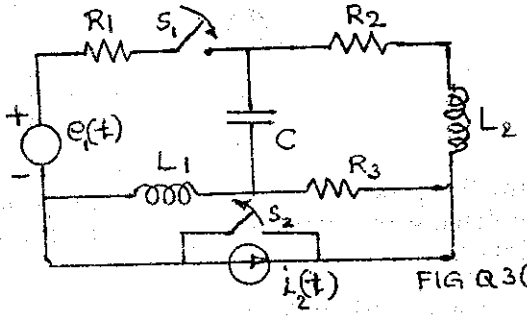


FIG Q3(c).

4. (a) State and explain reciprocity theorem. What is transfer impedance? (6 Marks)

(b) For the network shown in Fig.Q4(b), obtain the Thevinin's equivalent as seen from terminals p and q. (8 Marks)

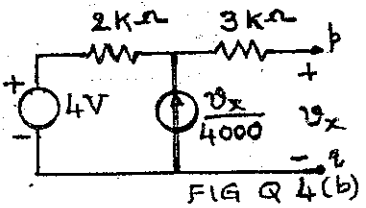


FIG Q 4(b)

Contd.... 3

(c) Select values of R and C in the network shown in Fig Q4(c) so that a maximum power is delivered to R and calculate the value of that power $\vartheta(t) = 250\ sin\ 500t$ volts. **(6 Marks)**

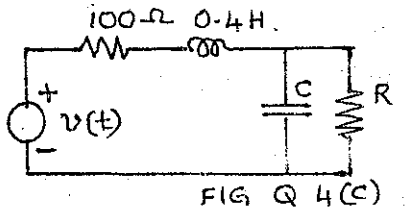


FIG Q 4(C)

5. (a) Using superposition theorem, obtain the response I for the network shown in Fig.Q5(a). **(8 Marks)**

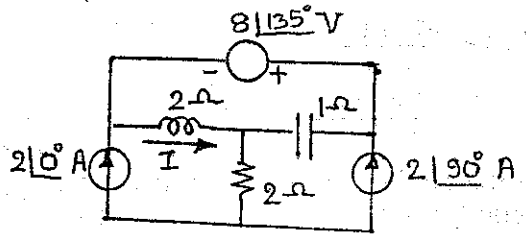


FIG 5(a)

(b) Determine the R-L-C parallel circuit parameters whose response curve is as shown in Fig.Q5(b). What are the new values of w_r and band width if c is increased 4 times ? **(6 Marks)**

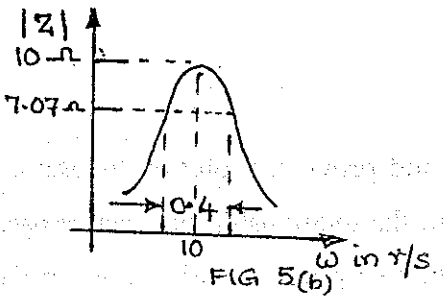


FIG 5(b)

(c) A coil of $R = 10\Omega$ and $L = 0.5H$ is connected in series with a capacitor. The current is maximum when $f = 50Hz$. A second capacitor is connected in parallel with this circuit. What capacitance must it have so that the combination acts like a non inductive resistor at 100 Hz. Calculate the total current supplied in each case if the applied voltage is 220V. **(6 Marks)**

6. (a) Show that :

i) the voltage of a capacitor cannot change instantaneously.

ii) the current in an inductor cannot change instantaneously. **(6 Marks)**

(b) A coil of $R = 1000\Omega$ and $L = 1H$ is connected to a d.c. voltage of 100V through a changeover switch. At $t = 0$, the switch connects a capacitor of $C = 01.\mu F$ in series with the coil, excluding the voltage. Solve for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ in the coil all at $t = 0t$. **(7 Marks)**

Contd.... 4

(c) If $f(t) = 2t$, sketch the following :

i) $f(t-2)u(t)$

ii) $f(t)u(t-2)$

iii) $f(t-2)\ u(t-2)$

iv) $f(t+2)u(t+2) + f(t)u(t)$

v) $f(t)\delta(t)$

vi) $f(t)\delta(t-2)$ (7 Marks)

7. (a) use initial and final value theorems, where they apply, to find $f(0)$ and $f(\infty)$ for the following :

i) $F(s) = \frac{s^3+7s^2+5}{s(s^3+3s^2+4s+2)}$

ii) $F(s) = \frac{e^{2s}(s+2)}{s^2+5}$

iii) $F(s) = \frac{s(s+4)(s+8)}{(s+1)(s+6)}$ (6 Marks)

(b) Obtain the Laplace transform of a full wave rectified sine wave of amplitude 1 and period π secs. (6 Marks)

(c) The switch in the network of Fig.Q7(c) opens at $t = 0$. use Laplace transformation analysis to determine the voltage across the capacitor for $t \geq 0$. (8 Marks)

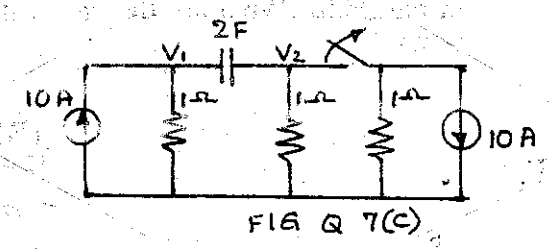


FIG Q 7(c)

8. (a) State and prove convolution theorem. (6 Marks)

(b) Obtain the relationship between y parameters and h parameters. (6 Marks)

(c) For the two port network shown in Fig.Q8(c), find the z parameters. (8 Marks)

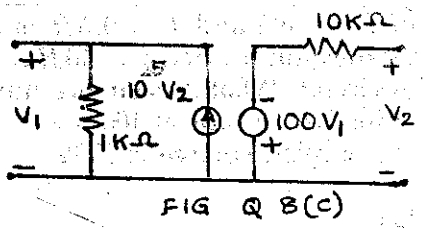


FIG Q 8(c)

** * **

NEW SCHEME

EE34

USN

Third Semester B.E. Degree Examination, January/February 2005

Electrical & Electronics Engineering

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Obtain expressions for a set of equivalent
   i) Y connected impedances to replace a set of Δ connected impedances
   ii) Δ connected admittances to replace a set of Y connected admittances. (10 Marks)

   (b) For the network shown in Fig.1, determine the voltage V using source shift and / or source transformation techniques only. Then verify by node equations. (10 Marks)

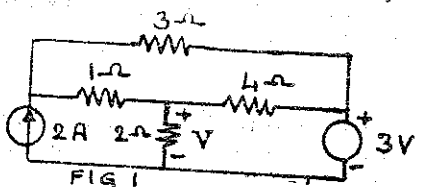


FIG 1

2. (a) Under what conditions do you consider topology for network analysis? For the graph shown in Fig.2, for a co-tree (4, 5, 7, 8), write tie set and cut set matrices. (10 Marks)

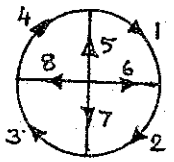


FIG 2.

   (b) For the network shown in Fig. 3, draw its dual. Write in integro differential form i) mesh equations for the given network ii) node equations for the dual. $V(t) = 10sin40t$. (10 Marks)

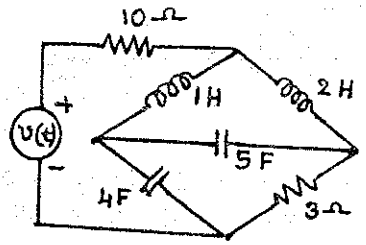


FIG 3

3. (a) Use mesh current method to determine the current in the capacitor of 6Ω of the bridge network shown in Fig.4 (10 Marks)

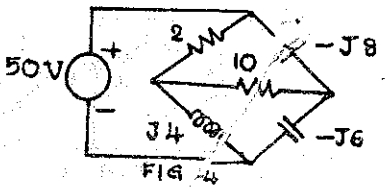


FIG 4

Contd.... 2

(b) Use node equations to determine what value of 'E' will cause V_x to be zero, for the network shown in fig. 5. (10 Marks)

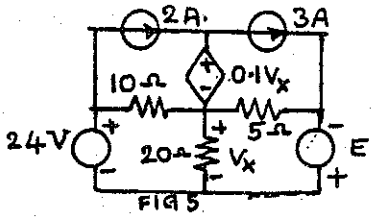


FIG 5

4. (a) State and explain i) Reciprocity theorem ii) Millmann's theorem. (10 Marks)

(b) When two networks A and B are connected as shown in fig. 6, $I_{ab} = 1A$ and $V_{aa'} = \sqrt{2} \angle -45^0 \ V$. When the same networks are connected as in Fig. 7, $I_{ab'} = 3A$ and $V_{aa'} = \sqrt{2} \angle 45^0 \ V$. Find the Thevinin's equivalents of each of these networks. (10 Marks)

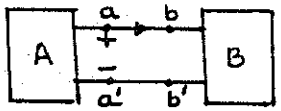


FIG 6

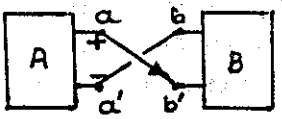


FIG 7. EE 34

5. (a) Define Q of a series resonant circuit. Obtain half power frequencies in terms of Q and show that the resonant frequency is the geometric mean of half power frequencies. (10 Marks)

(b) In a parallel resonant circuit R, L and C are all in parallel. Half power frequencies are 103 and 118 r/s respectively. The magnitude of impedance at 105 r/s is 10Ω. Find R, L and C. (10 Marks)

6. (a) $R = 1\Omega$, $L = 1H$ and $C = \frac{1}{2}F$ are in series with a switch across C 2V is applied to the circuit. At $t = 0-$ the switch is in closed position. At $t = 0$ the switch is opened. Find at t = 0+, the voltage across the switch, its first and second derivatives. (10 Marks)

(b) State and prove (i) initial value theorem and (ii) final value theorem as applied to L transform. What are the limitations of each theorem? (10 Marks)

7. (a) The current function i(t) shown in fig 8 is impressed on a capacitor C. What should be the strength A of the impulse so that the voltage across the C becomes zero for $t > 5secs$ (10 Marks)

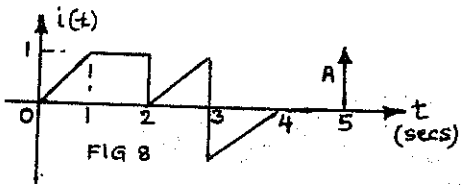


FIG 8

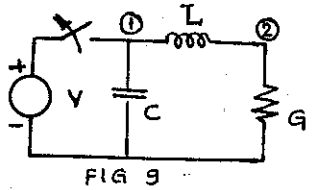


FIG 9

(b) In the circuit shown in fig. 9, the switch is opened at $t = 0$, with $V = 1V$, $C = 1F$, $L = \frac{1}{2}\ H$, $G = 1\mho$ find the node voltages $V_1(t)$ and $V_2(t)$ by L transform method. (10 Marks)

8. (a) Define h and T parameters and derive expressions for [h] in terms of [T]. (10 Marks)

(b) Find [z] and [y] for the two port network shown in fig.10. (10 Marks)

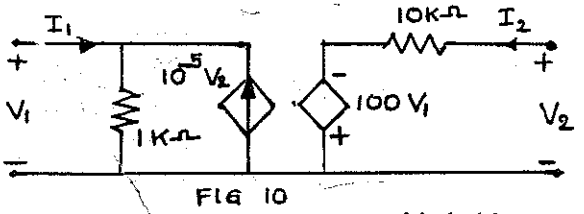


FIG 10

** * **

EC/TE/ML302

USN

Third Semester B.E. Degree Examination, July/August 2004

EC/TE/ML

Network Analysis

(Old Scheme)

Time: 3 hrs.] [Max.Marks : 100

Note: *1.Answer any FIVE full questions.*
2.All questions carry equal marks.

1. (a) Explain the following terms with examples
   i) Tree and links
   ii) Planar and non planar graph. (6 Marks)

   (b) Define the basic loop set matrix. The basic loop-set matrix B of a graph is as given below. Draw the oriented graph. Substantiate each step.

2	3	5	6	1	4	7	8
1	1	0	0	1	0	0	0
-1	0	1	0	0	1	0	0
0	-1	0	1	0	0	1	0
0	0	-1	-1	0	0	0	1

(8 Marks)

   (c) Write short notes on
   i) Duality as applied to network topology
   ii) Cut - set matrix. (6 Marks)

2. (a) Establish relationship between star and delta networks. (4 Marks)

   (b) Determine the voltage V_{23} of Fig. 2(b) by nodal analysis. (8 Marks)

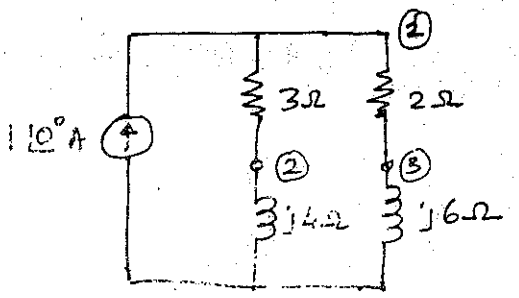


Fig. 2(b)

Contd.... 2

(c) Determine the current flowing through the load impedance 3+j4 using mesh current method for the network shown in Fig. 2(c)

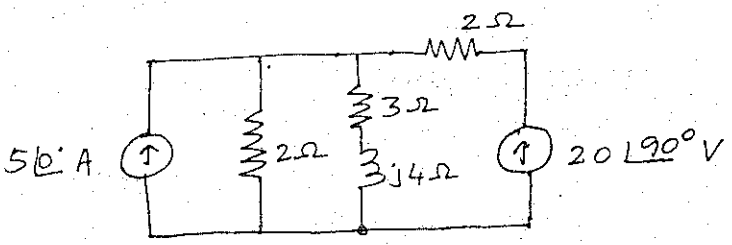


Fig 2 (c)

(08 Marks)

3. (a) Prove that $M = \sqrt{L_1 L_2}$ in a coupled circuit

where M = Mutual inductance
L_1 = Self inductance of coil 1
L_2 = Self inducatnace of coil 2
K = Co-efficient of coupling

(6 Marks)

(b) Explain dot conversions suitably as applied to coupled circuit. (6 Marks)

(c) A simple series circuit shown in Fig 3(c) consisting of fixed capacitive reactance of 200Ω and a variable resistance R is connected across 240V 50 Hz supply. If R varies from 0 to ∞ draw the locus of current. From the locus diagram find the current and the power factor for maximum power in the circuit. Also find the corresponding value of R. (8 Marks)

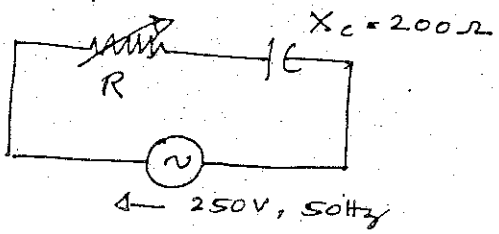


Fig 3 (c)

4. (a) State and prove Thevenin's Theorem. Also prove that Thevenin's equivalent is the dual of the Norton's equivalent. (7 Marks)

(b) In the single source network shown in Fig 4(b). find V_x and interchange current source and verify reciprocity theorem. (5 Marks)

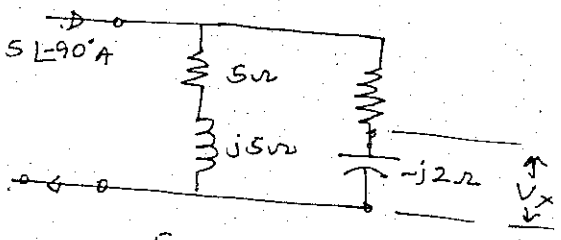
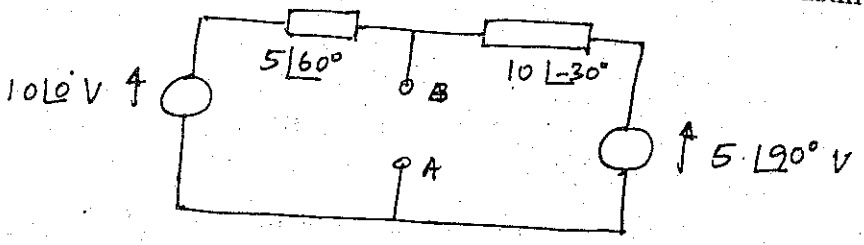


Fig 4 (b)

Contd.... 3

(c) If the load connected across AB is variable both in resistance and reactance in the circuit shown in Fig 4(c), find the value of load impedance when maximum power is transferred to the load. Also find the value of maximum power.



5. (a) Explain series resonance phenomenon in electric network. (8 Marks)

(b) Describe the effect of Q on Band width and selectivity. (4 Marks)

(c) Establish the relation between f_0 and f_1, f_2 in a series resonant circuit. (3 Marks)

(d) Determine the value of R_c in the network shown in Fig 5(d) to yield resonance. (5 Marks)

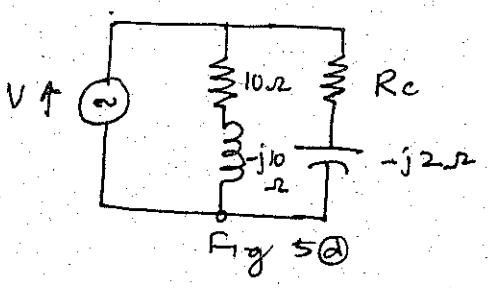


Fig 5(d)

6. (a) State and prove the superposition theorem, also mention the importance of the same in the network analysis. (8 Marks)

(b) Explain the behaviour of the circuit elements under switching conditions. (6 Marks)

(c) In the given network the capacitor C_1 is charged to voltage V_0 and switch K is closed at t=0. When $R = 2M\Omega, V_0 = 100V, R_2 = 1M\Omega, C = 10\mu F$ and $C_2 = 20\mu F$, solve for $\frac{d^2i_2}{dt^2}$ at $t = 0+$ (4 Marks)

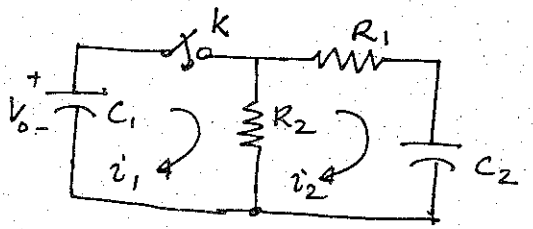


Fig 6(c)

7. (a) State and prove initial and final value theorem. Also find initial and final value of the following (10 Marks)

$$I(s) = \frac{s+6}{s(s+3)}$$

(8 Marks)

Contd.... 4

(b) Determine the Laplace transform of a train of pulses of width 'a' shown in fig 7(b)

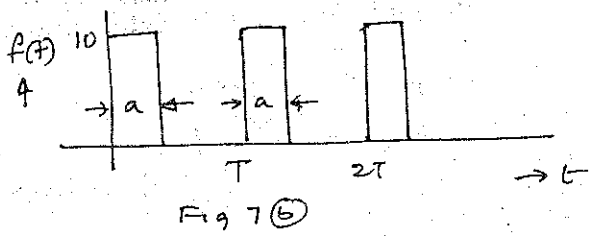


Fig 7 (b) (5 Marks)

(c) State and prove convolution theorem. Using the same find f(t) of the following $F(s) = \frac{1}{s(s+a)}$. (7 Marks)

8. (a) Define Z - parameters and h- parameters. Express Z-parameters in terms of h-parameters and also h-parameters in terms of z- parameters. (10 Marks)

(b) Determine Y-parameters of a two port network shown in fig. 8(b). Aslo give the equivalent circuit. (10 Marks)

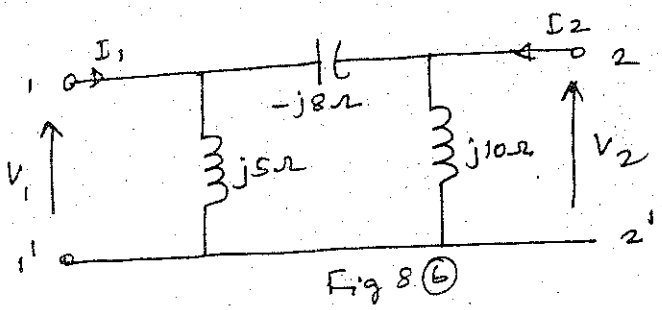
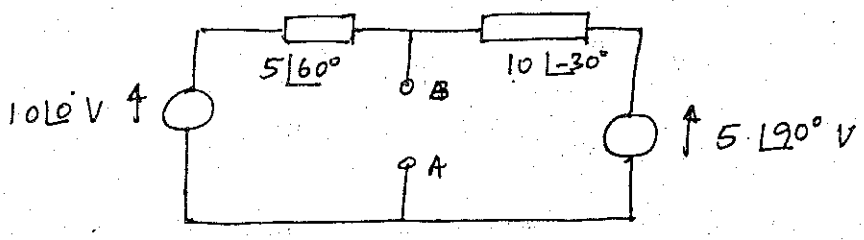


Fig 8 (b)

** * **

(c) If the load connected across AB is variable both in resistance and reactance in the circuit shown in Fig 4(c), find the value of load impedance when maximum power is transferred to the load. Also find the value of maximum power.



(8 Marks)

5. (a) Explain series resonance phenomenon in electric network. (4 Marks)

(b) Describe the effect of Q on Band width and selectivity. (3 Marks)

(c) Establish the relation between f_0 and f_1, f_2 in a series resonant circuit. (5 Marks)

(d) Determine the value of R_c in the network shown in Fig 5(d) to yield resonance.

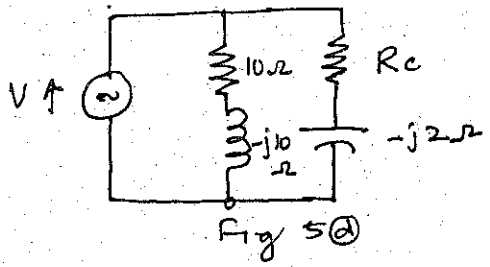


Fig 5(d)

(8 Marks)

6. (a) State and prove the superposition theorem, also mention the importance of the same in the network analysis. (6 Marks)

(b) Explain the behaviour of the circuit elements under switching conditions. (4 Marks)

(c) In the given network the capacitor C_1 is charged to voltage V_0 and switch K is closed at t=0. When $R = 2M\Omega, V_0 = 100V, R_2 = 1M\Omega, C = 10\mu F$ and $C_2 = 20\mu F$, solve for $\frac{d^2i_2}{dt^2}$ at $t = 0^+$

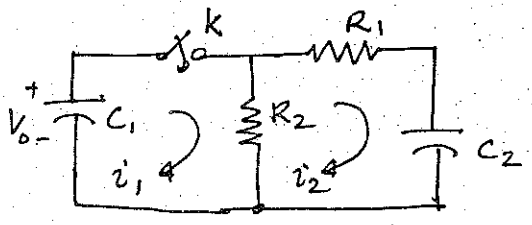


Fig 6 (c)

(10 Marks)

7. (a) State and prove initial and final value theorem. Also find initial and final value of the following

$I(s) = \frac{s+6}{s(s+3)}$ (8 Marks)

Contd.... 4

EC/TE/ML302

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

Third Semester B.E. Degree Examination, January/February 2004

EC/TE/ML

Network Analysis

(Old Scheme)

Time: 3 hrs.] [Max.Marks : 100

Note: *1.Answer any FIVE full questions.*
2.All questions carry equal marks.

1. (a) Using star/delta transformations, reduce the given network shown in fig.1 and determine the total current supplied by the source. (6 Marks)

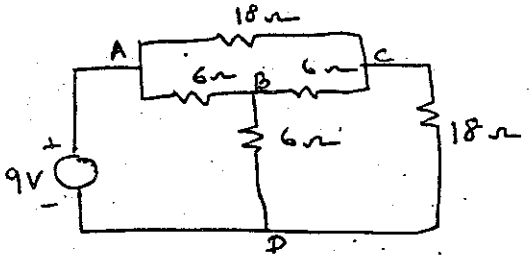


fig (1)
(Q1a.)

(b) Determine V_2 in the network shown in fig 2. Which results in zero current through the 4Ω resistor. Use loop current analysis. (6 Marks)

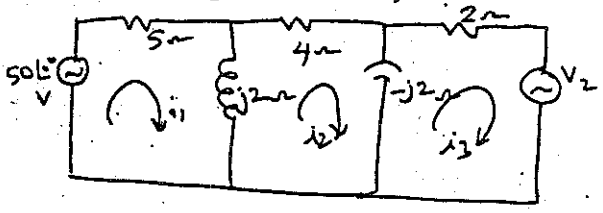


fig 2
Q1b

(c) Using node voltage analysis, determine node voltage V_A in the circuit shown in fig.3 (8 Marks)

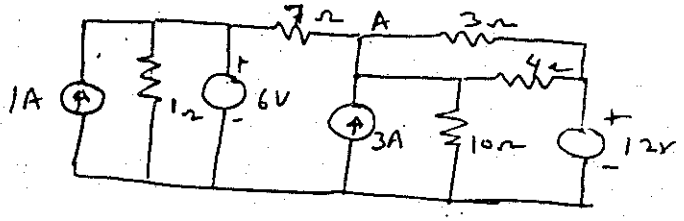


fig 3
Q1c.

2. (a) Using Thevinins' theorem find the current through $Z_l = (10 - j\,7.5)\Omega$ if connected across AB in the circuit shown in fig 4. (6 Marks)

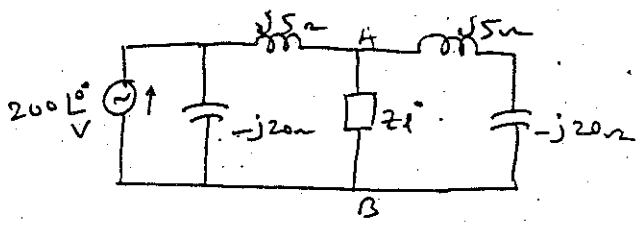


Fig 4
Q2

Contd.... 2

(b) Using Maximum power transfer theorem determine Z_l, in the circuit shown in fig 5 for maximum power transfer from the source. Also determine the maximum power. **(8 Marks)**

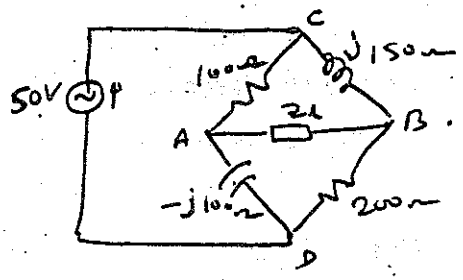


fig 5. (Q. 2b.)

(c) State and explain with a suitable example Millman's theorem. **(6 Marks)**

3. (a) Show that the resonant frequency of an RLC series circuit is equal to the geometric mean of two half power frequencies. **(6 Marks)**

(b) For the circuit shown in fig.6 find the condition for resonant at all frequencies. Also find R_l *and* R_c. Mention the area of application of such circuits. **(6 Marks)**

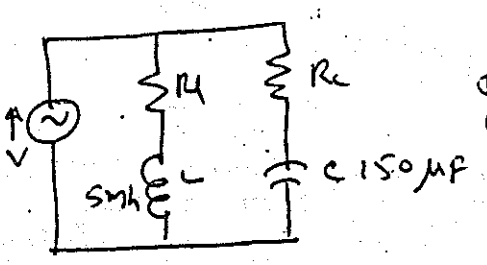


fig 6 (Q 3b)

(c) Plot the reactance curve for the circuit shown in fig.7. Indicate all resonant and antiresonant points. **(8 Marks)**

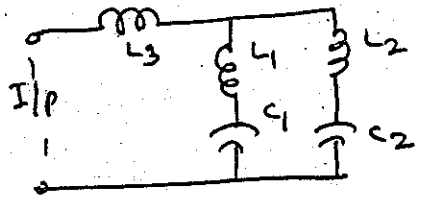


fig 7. (Q 3c)

4. (a) What are locus diagrams? Show that the current level of series RLC circuit with variable frequency supply is a circle. **(6 Marks)**

(b) Determine all circuit parameters from the diagram of current locus is shown in fig.8 Assume ω=4000 rad/sec. **(8 Marks)**

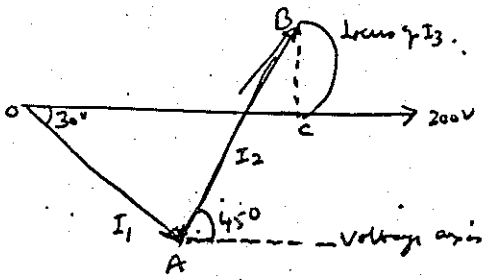


fig 8. (Q. 4b).

(c) Draw the current locus for the circuit shown n fig.9 and thereby determine

i) Minimum current and p.f.

ii) Maximum current and p.f

iii) Two values of u.p.f currents. (6 Marks)

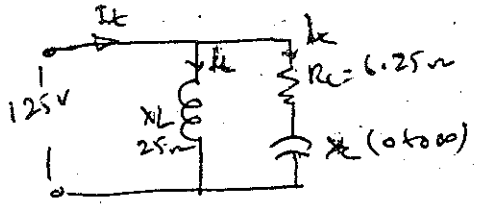


fig.9 (Q 4c)

5. (a) Define coefficient of coupling K and show that $M = K\sqrt{L_1,\ L_2}$ for a mutually coupled circuit. (5 Marks)

(b) Determine V_2/V_1 when i) $i_1 = 0$ ii) $i_2 = 0$ and I_2/I_1 when i) $v_1 = 0$ ii) $v_2 = 0$ For the circuit shown in fig 10. (10 Marks)

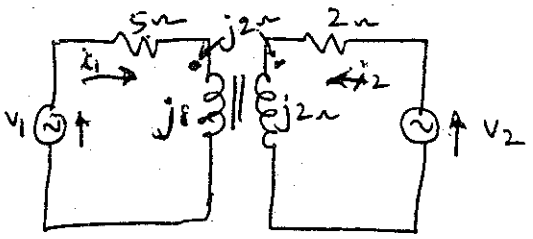


fig 10 (Q 5b)

(c) Determine the elements of a conductively coupled circuit for the mutually coupled circuit shown in fig.11. (5 Marks)

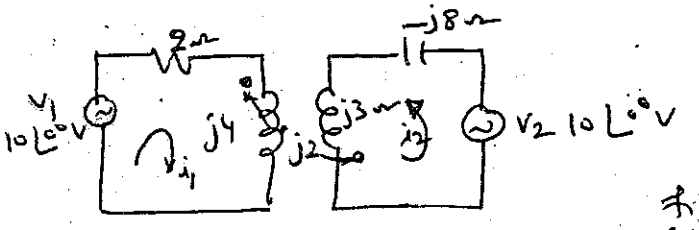


fig 11 (Q 5c)

6. (a) Explain the principle of duality as applied to a network. Give examples. (5 Marks)

(b) For the network shown in fig.12, draw the oriented graph. Select a tree with branches 1 and 3. Obtain equilibrium equations with tree branch voltages as variables. Find all the branch currents and branch voltages. The resistance values indicate the branch numbers. (10 Marks)

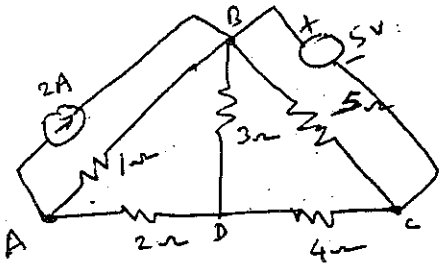


fig 12 Q6b)

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(c) Draw the oriented graph of the network shown in fig.13. Select a tree and write the tie set schedule. Also obtain equilibrium equations. (5 Marks)

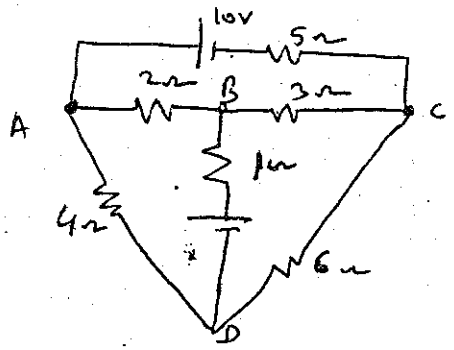

Fig 13
Q 6(c)

7. (a) In the circuit shown in fig.14, the relay is adjusted to operate with a current of 7mA. Switch 'k' is closed at t=0. It is found that the relay operates at t=0.2 sec. Find the inductance L of the relay coil. Also find the equation for the relay current i(t). (8 Marks)

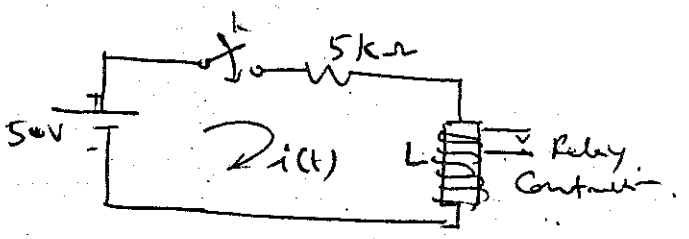

Fig 14
(Q 7a)

(b) In the network shown in fig.15, the steady state has been reached with switch k on position A. the switch is moved to position B at t=0. Determine at t=o+, the values of i, di/dt and d^2i/dt^2 (6 Marks)

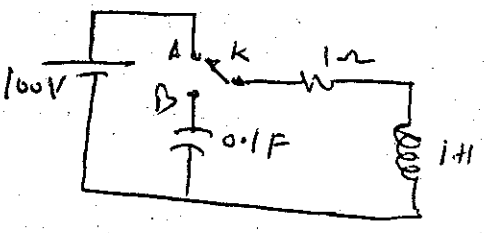

Fig 15
(Q 7b)

(c) Obtain the inverse laplace transform of the function $P(s) = \frac{s}{(s^2+25)^2}$ using convolution theorem. (6 Marks)

8. (a) Find the laplace transform of the periodic waveform shown in fig.16. (8 Marks)

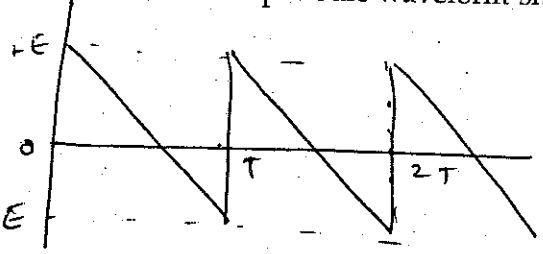

Fig 16
Q 8a

Contd.... 5

(b) Bring out the necessary conditions of poles and zeros to define the driving point functions. (6 Marks)

(c) For the network shown in fig.17, obtain the transformed network and thereby determine

i) Transfer function $(E_2(s)/E(s))$

ii) Driving point impedence Z_{11}

iii) Driving point admittance Y_{11} (6 Marks)

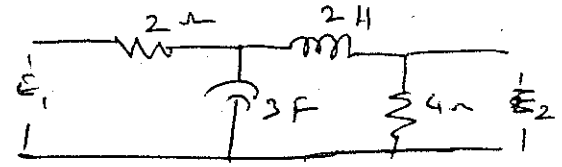

Fig 17 (6 Marks)

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NEW SCHEME

EE34

USN

Third Semester B.E. Degree Examination, January/February 2004

Electrical & Electronics Engineering

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Distinguish the following with suitable examples.

i) Linear and non-linear elements

ii) Unilateral and trilateral elements

iii) Independent and dependent sources. (6 Marks)

(b) Write the mesh equation for the circuit shown in Fig 1(b) and determine mesh currents using mesh analysis.

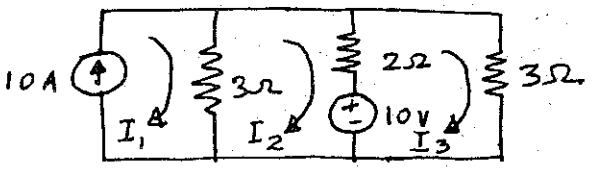

Fig 1(b)

(6 Marks)

(c) Develop a model equation for a general network in the form [Y] [V] = [I]

Where [Y] = Admittance matrix

[V] = Node voltage matrix

[I] = Source current matrix. (8 Marks)

2 (a) Establish star - delta relationship suitably. (3 Marks)

(b) Explain incidence matrix of a network graph? Give suitable example. (4 Marks)

(c) Define the following with suitable examples

i) Planar and non-planar graph

ii) Twigs and links. (5 Marks)

(d) For the network shown in Fig 2(d) write the graph of the network and obtain the tie-set schedule considering J_1, J_2, J_5 as tree branches. Calculate all branch

Contd.... 2

currents.

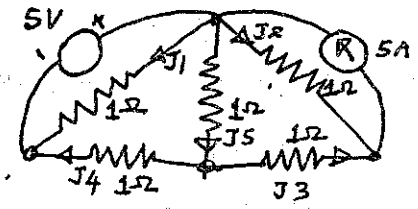

Fig 2(a)

(8 Marks)

3. (a) Find the condition for maximum power transfer in the following network type AC source, complex source impedance and complex load impedance but only load resistance varying. (7 Marks)

(b) In the circuit shown in fig 3(b) find the load connected at AB for which the power transferred will be maximum. Also find maximum power.

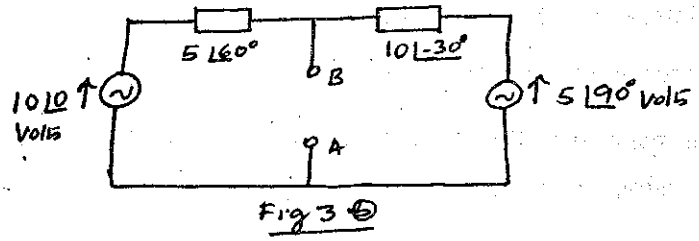

Fig 3(b)

(8 Marks)

(c) In the circuit shown in fig 3(c) Find V_x and prove reciprocity theorem.

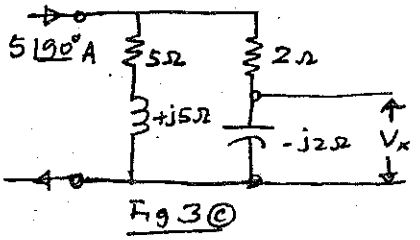

Fig 3(c)

(5 Marks)

4. (a) "Thevenin's equivalent is the dual of Norton's equivalent". Comment on the above statement and substantiate the same. (4 Marks)

(b) Determine the current through 2Ω resistor of the network shown in Fig. 4(b) using superposition principle.

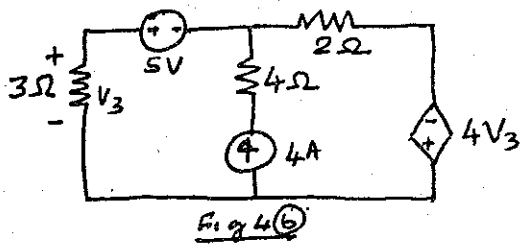

Fig 4(b)

(8 Marks)

Contd.... 3

(c) State Millman's theorem, using the same calculate current through the load in the circuit shown in fig. 4(c)

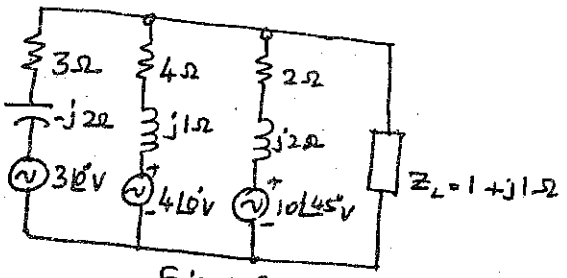

Fig 4©

5. (a) Define quality factor and bandwidth. Also establish the relationship between them in a series resonance circuit. (8 Marks)

(b A series resonance circuit with $R = 10\Omega, L = 0.1H$ and $C = 50\mu F$ has an applied voltage $V = 50\angle 0^0$ with a variable frequency. Find the resonant frequency, the value of frequency at which maximum voltage occurs across inductor and the value of frequency at which maximum voltage occurs across capacitor. (7 Marks)

(c) Explain parallel resonance? Derive the condition for parallel resonace when RL connected parallel to RC. (6 Marks)

6. (a) Establish the procedure for evaluating initial conditions with suitable examples. (7 Marks)

(b) In the circuit shown in Fig 6(b) $V = 10V$, $R = 10\Omega$, $L = 1H$, $C = 10\mu f$, and $V_c(0) = 0$. Find (8 Marks)

$i(o+)$, $\frac{di}{dt}(0+)$ and $\frac{d^2i}{dt^2}(o+)$ if switch K is closed at t =0

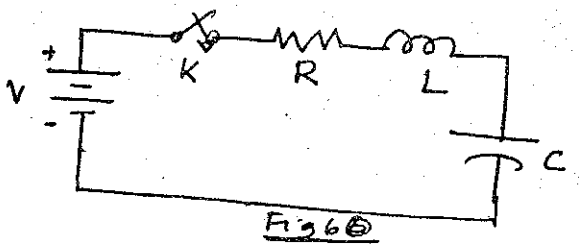

Fig 6©

(c) Find i(t) for the following network shown in Fig.6 (c) if the switch 'K' is opened at t=0, before that the circuit has attained steady state condition (6 Marks)

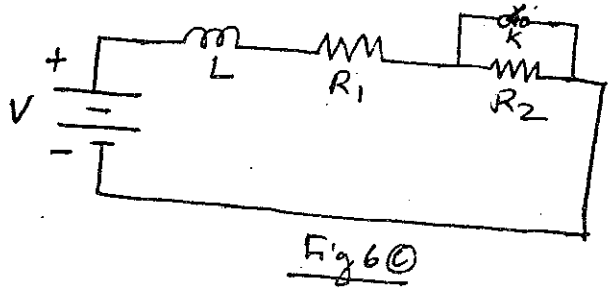

Fig 6©

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7. (a) Obtain the Laplace Transform of a periodic function with a suitable example wave form. Also find the Laplace transform of the following wave form shown in Fig 7(a) (7 Marks)

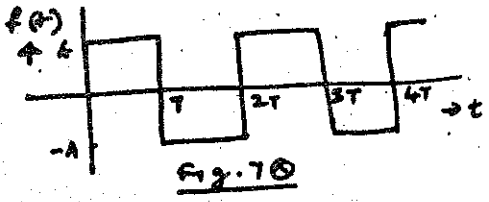


Fig. 7(a)

(b) State and prove convolution theorem. Using the same find f(t) when $F(s) = \frac{1}{s^2(s+1)}$. (8 Marks)

(c) Using Laplace transform determine the current in the circuit shown in Fig 7(c) when the switch S is closed at t=0. Assume zero initial condition.

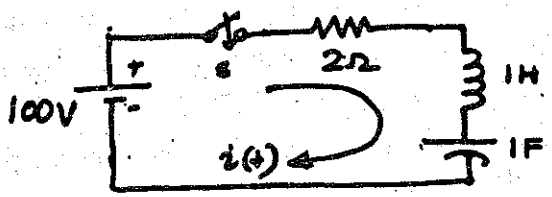


Fig. 7(c) (5 Marks)

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

(b) Find the h-parameters of the network shown in Fig 8(b) Give its equivalent circuit.

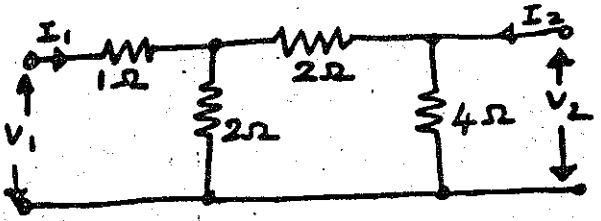


Fig 8(b) (10 Marks)

EC/TE/ML302

Reg. No. | | | | | | | | | | |

Third Semester B.E. Degree Examination, January/February 2003

EC/TE/ML

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

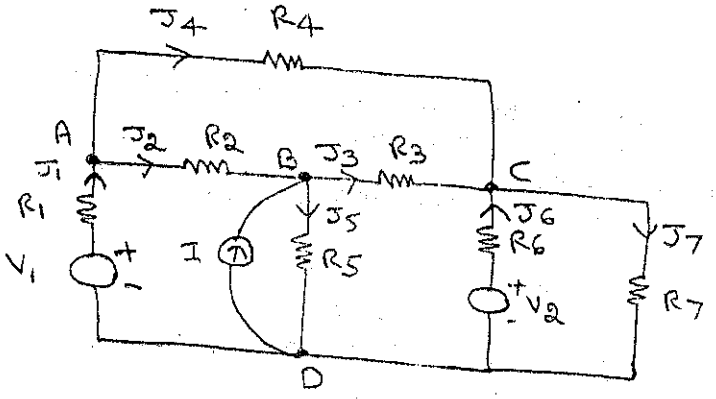
Note: *Answer any FIVE full questions.*

1. (a) Explain the following terms

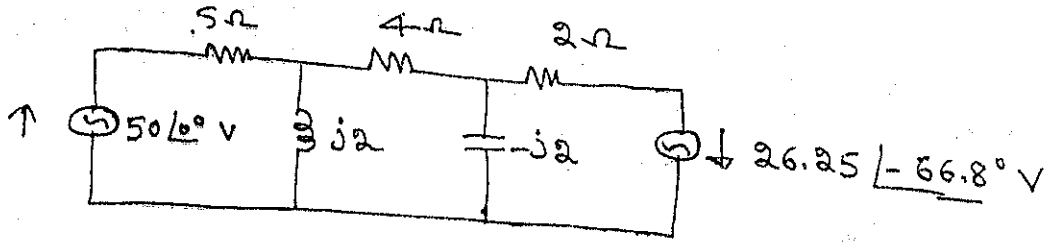
i) Network ii) Graph iii) Incident Matrix

iv) Tie - Set Schedule Oriented Graph

(b) Write incidence matrix for the following network. (6 Marks)



(c) Find current through 4Ω resistor by using loop current method. (6 Marks)



2. (a) i) Derive expressions for resistances of a star network interms of known delta values. (8 Marks)

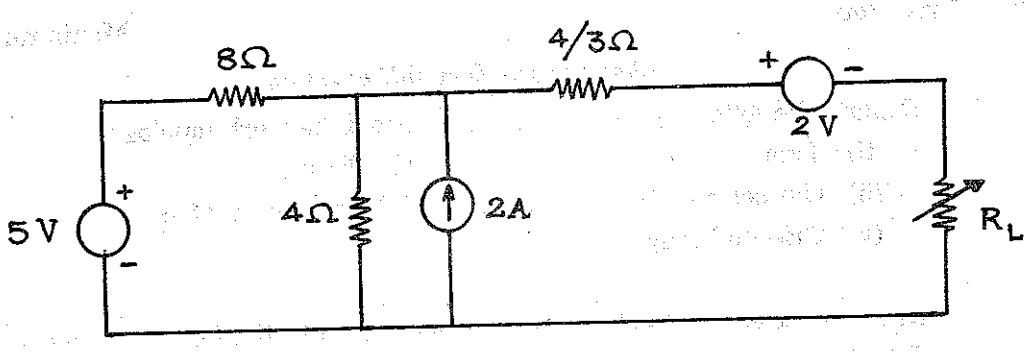
ii) Derive expressions for resistances of a delta network interms of known star values. (4 Marks)

(b) By using cut - set schedule on the basis of node to datum voltage as independent variables, determine all the branch currents & branch voltages for the following network. (4 Marks)

Contd.... 2

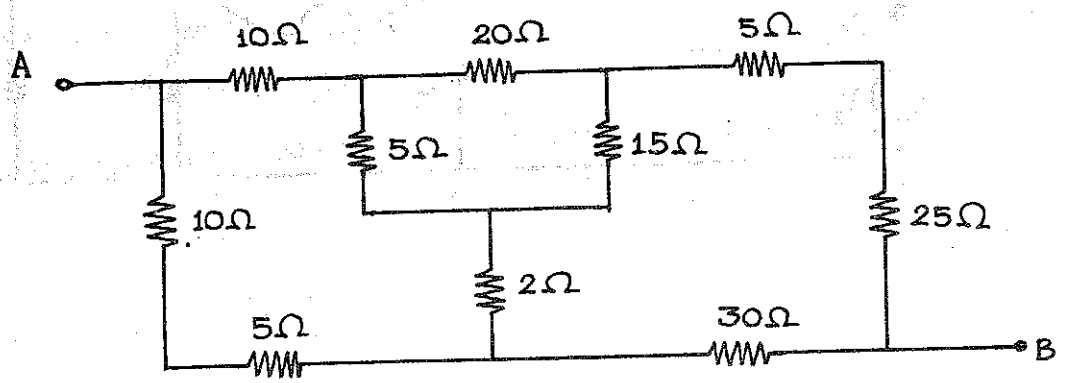
(b) State and explain Millman's theorem. (6 marks)

(c) Find the value of load resistance when maximum power is transferred across it and also find the maximum power transferred.



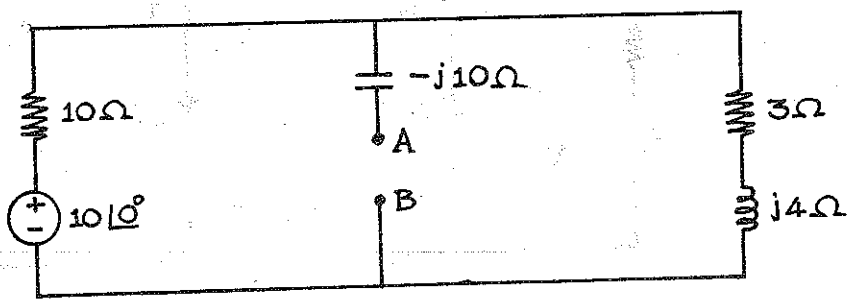
(8 marks)

3. (a) Find the resistance between the terminals A and B.



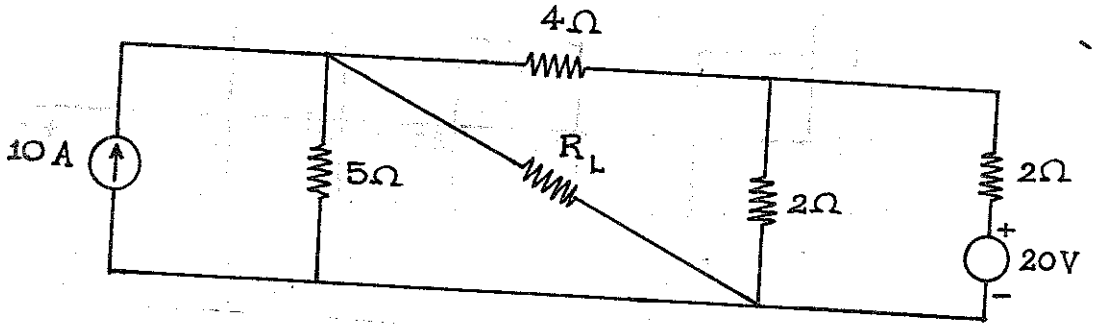
(5 marks)

(b) Replace the network at terminals AB with Norton's and Thevenin's equivalent circuit.



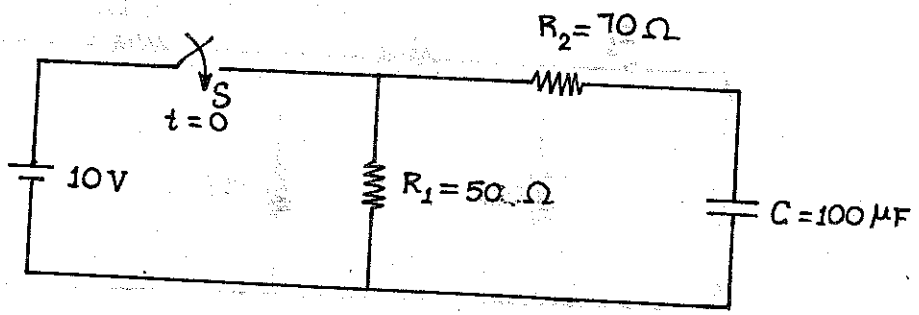
(8 marks)

(c) Find the current flowing through R_L = 7.5 Ω resistance, using superposition theorem in the network shown.



4. (a) Obtain an expression to find transient response in RC series circuit having DC excitation and plot the voltage across R and C. (7 marks)

(b) In figure, the switch S is closed. Find the time when the current from the battery reached to 500 mA : (6 marks)



(c) A 20 Ω resistor is connected in series with an inductor, a capacitor and an ammeter across a 25 V variable frequency supply. When the frequency is 400 Hz the current is at its maximum value of 0.5 A and the potential difference across the capacitor is 150 V. Calculate (6 marks)

(i) the capacitance of the capacitor.

(ii) the resistance and inductance of the inductor.

5. (a) Find the Laplace transform of : (8 marks)

(i) $\delta(t)$.

(ii) $u(t)$.

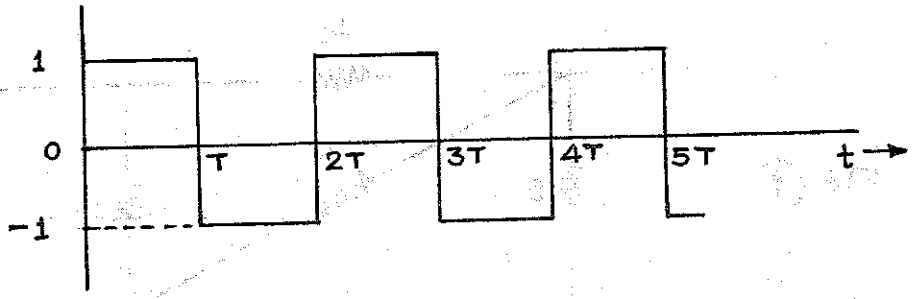
(iii) t.

(iv) $\sin wt$.

(v) e^{-at}

(10 marks)

(b) Obtain the Laplace transform of the square wave train shown in figure :



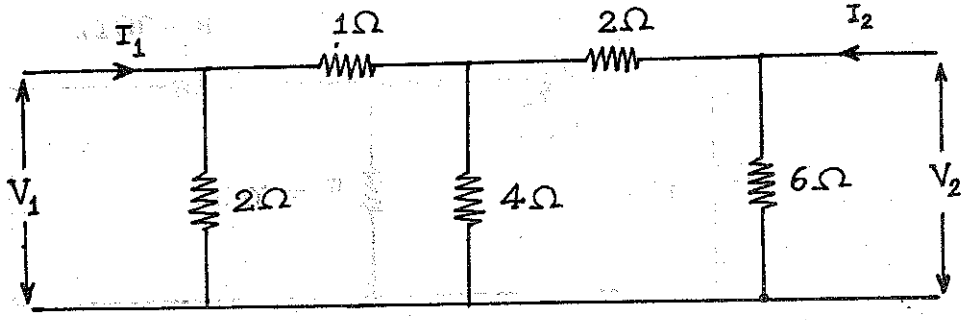
(5 marks)

(c) A function in Laplace domain is given by $V(s) = \frac{s+1}{s^3 + 4s^2 + 4s}$ obtain its inverse form.

(5 marks)

6. (a) State and prove initial and final value theorem. (10 marks)

(b) Find z and h parameters for the network shown in figure and check for symmetry and reciprocity in both the cases.

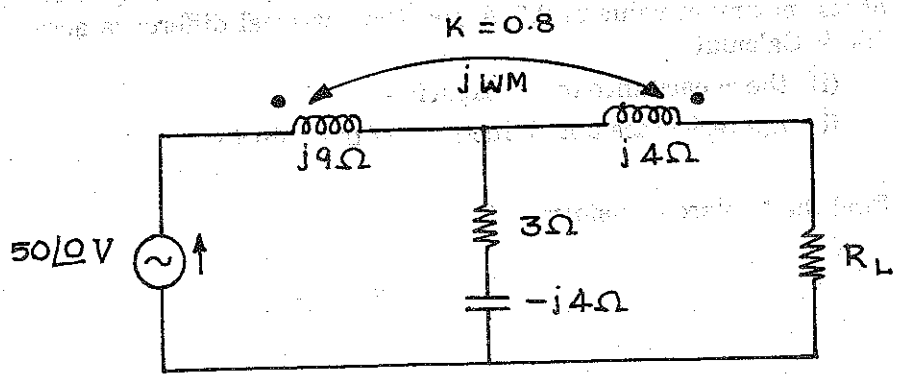


(10 marks

7. (a) Obtain the relationship between h and y parameters of a two-port network.

(10 marks

(b) In the circuit shown in figure, find the voltage across R_L = 5 ohm.



(10 marks

8. (a) Find the equivalent inductance of parallel connected coupled coils in
   (i) Opposing mode.
   (ii) Aiding mode.

(10 marks)

(b) In a series circuit consisting of R = 60 Ω, L = 0.4 H and C = 17.6 μF is connected to a variable frequency supply of 120 V. If the frequency is varied through 40 Hz to 80 Hz, draw the locus current. Determine the current and power factor at 40 Hz and 80 Hz.

(10 marks)