NEW SCHEME

EE34

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

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

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

Network Analysis

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

Note: *Answer any FIVE full questions.*

1. (a) Define and distinguish the following network elements i) linear and non linear ii) active and passive iii) lumped and distributed iv) ideal and practical current sources. (8 Marks)

   (b) Using source transformation, find the power delivered by the 50 V voltage source in the circuit shown in figure 1.1. (6 Marks)

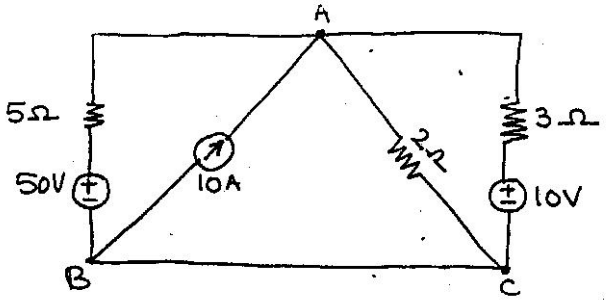

fig 1.1

   (c) Find the power delivered by the 5A current source in the circuit shown in figure by using the nodel method. (6 Marks)

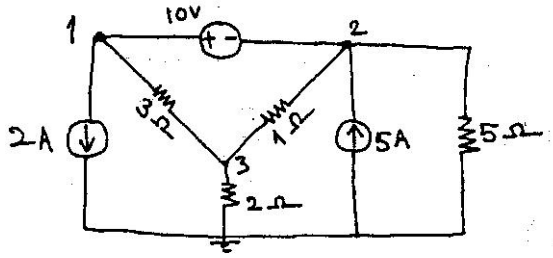

fig 1.2

2. (a) Explain briefly trees, cotrees and loops in a graph of network with suitable example. (5 Marks)

   (b) Explain incidence of a graph with a suitable example. (5 Marks)

   (c) Obtain the star connected equivalent for the delta connected circuit shown in figure 2.1. (5 Marks)

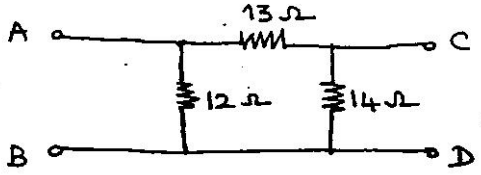

figure 2.1

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(d) **Obtain the delta connected equivalent for the star connected circuit shown in figure 2.2.** **(5 Marks)**

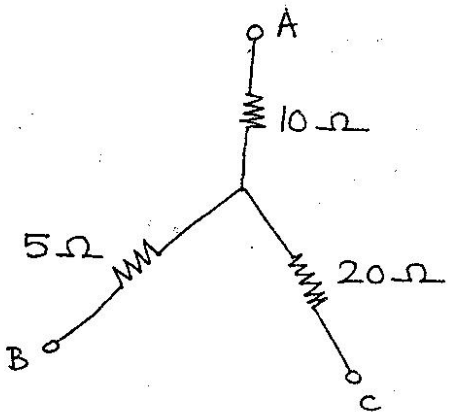

figure · 2.2

3. (a) Explain with examples the principles of duality. **(10 Marks)**

(b) Draw the oriented graph of the network shown in figure 3.1 Select a tree, write the set schedule and obtain equilibrium equations. **(10 Marks)**

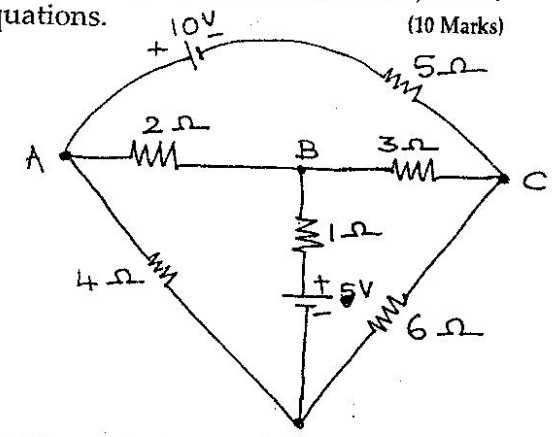

figure 3.1

4. (a) State and explain superposition theorem and Norton's theorem. **(10 Marks)**

(b) Obtain the Thevenin's equivalent of network shown in figure 4.1 between terminals X and Y. **(5 Marks)**

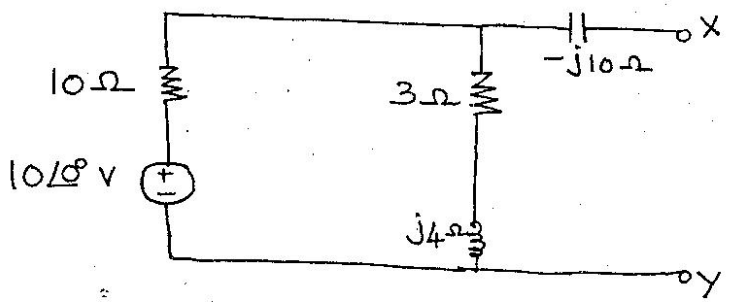

figure 4.1

(c) Calculate the current I shown in figure 4.2 using Millman's theorem. **(5 Marks)**

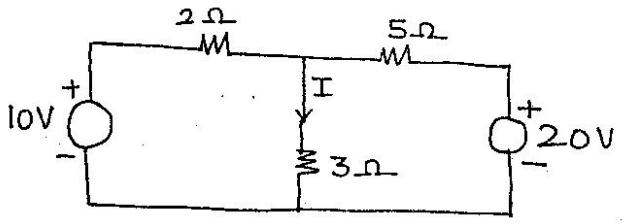

figure 4.2

Contd.... 3

5. (a) Show that resonant frequency of series resonance circuit is equal to the geometric mean of two half power frequencies. (6 Marks)

   (b) In the circuit given below in figure 5.1 , an inductance of 0.1 H having a Q of 5 is in parallel with a capacitor. Determine the value of capacitance and coil resistance at resonant frequency of 500 rad / sec. (6 Marks)

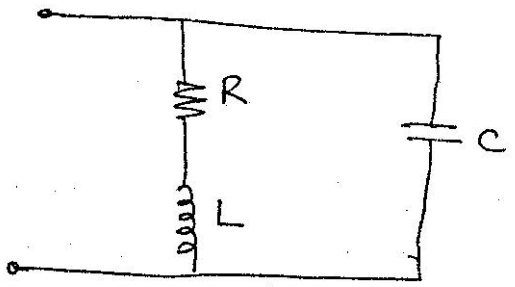

figure 5.1

   (c) A series RLC circuit consists of a 50Ω resistance, 0.2 H inductance and $10\mu F$ capacitor with an applied voltage of 20 V. Determine the resonant frequency. Find the Q factor of the circuit. Compute the lower and upper frequency limits and also find the bandwidth of the circuit. (8 Marks)

6. (a) In the circuit shown in figure 6.1, determine the complete solution for the current when the switch S is closed at $t = 0$. Applied voltage is $V(t) = 400cos(500t + \frac{\pi}{4})$. Resistance $R = 15\Omega$, inductance $L = 0.2H$ and capacitance $C = 3\mu F$. (10 Marks)

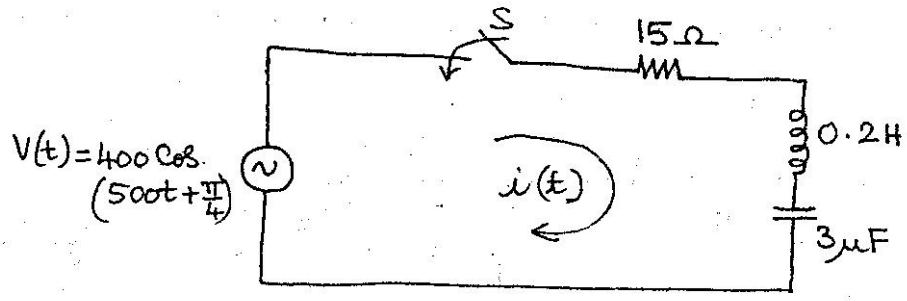

figure 6.1

   (b) In the circuit shown in figure 6.2 the switch S is moved from a to b at $t = 0$ Find values of i, $\frac{di}{dt}$, $\frac{di^2}{dt^2}$ at $t = 0^+$ if $R = 1\Omega$, $L = 1H$, $C = 0.1\mu F$ and $V = 100V$. Assume steady state is achieved when K is at 'a'. (10 Marks)

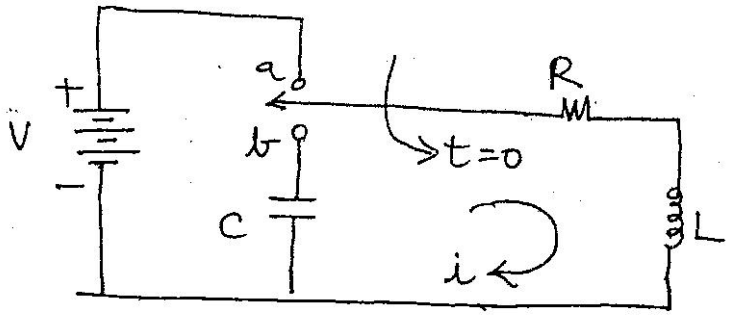

figure 6.2

7. (a) Find the Laplace transform of :

i) $\delta(t)$ ii) t iii) e^{-at} iv) $sin\omega t$ v) $u(t)$ (2×5=10 Marks)

(b) Obtain the Laplace transform of sawtooth wave form shown in the figure 7.1. (5 Marks)

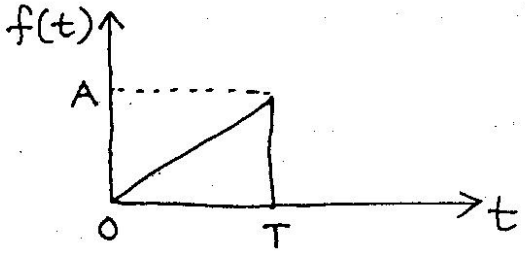

figure 7.1

(c) Find the Laplace inverse of $\frac{1}{s(s+4)}$ using convolution integral. (5 Marks)

8. (a) Find Y parameters for the network shown in figure 8.1.

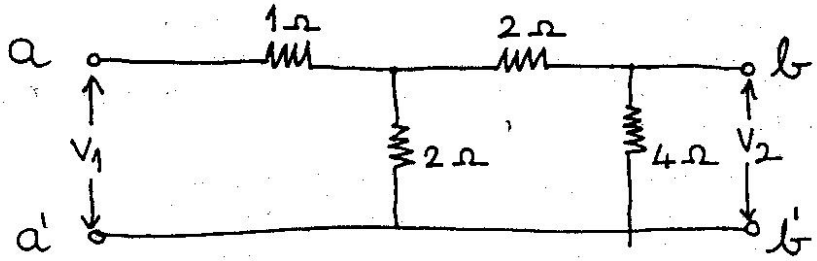

fig 8.1

(5 Marks)

(b) Find the transmission or general parameters for the circuit shown in figure 8.2. (5 Marks)

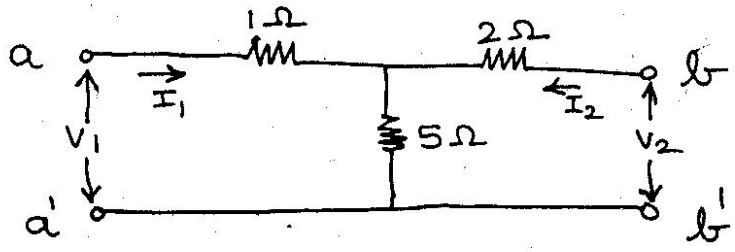

figure 8.2

(c) Define Y and Z parameters. Derive relationship such that Y parameters expressed in terms of Z parameters and Z parameters expressed in terms of Y parameters. (2+4+4=10 Marks)

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