Printed Pages : 8

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EC404(MTU)

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 130404

Roll No. | | | | | | | | | | |

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

NETWORK ANALYSIS AND SYNTHESIS

Time : **3** Hours] [Total Marks : **100**

Note: (1) Attempt all questions.
(2) All questions carry equal marks.

1 Attempt **any four** parts of the following: **5x4=20**

(a) Show that f-cutset and f-loop matrix are orthogonal to each other.

(b) Draw the oriented graph of network given in fig1. & write the incidence & reduced incidence matrix

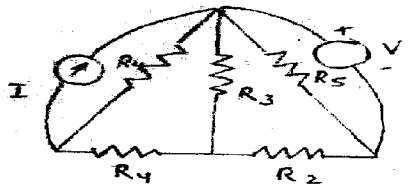

Fig-1

(c) Define with suitable example: (i) Tree (ii) Planar graph (iii) Incidence matrix (iv) Twigs (v) Chord.

(d) Write the principle of duality & draw the dual of the network given in fig2.

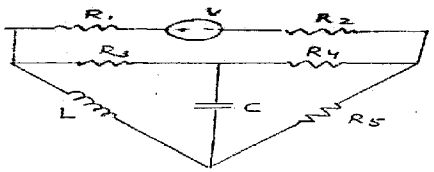

Fig-2

(e) For the network shown in fig3. draw the oriented graph , select a suitable tree and obtain the fundamental cut-set matrix. Determine the node equations and find v.

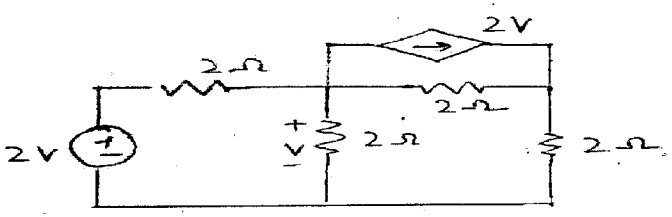

Fig-3

(f) The fundamental cut-set matrix is given below. Draw the oriented graph of the network.

2 Attempt **any two** parts of the following: **10x2=20**

(a) In the network given in fig4. two voltage sources act on the load impedance connected to the terminals a and b. If the load is variable in both reactance and resistance what load Z_L will receive the maximum power? Use maximum power trarsfer theoran.

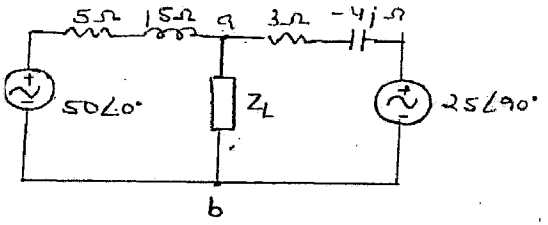

Fig-4

(b) In the network given in Fig.5. find current through inductor connected across a and b using Thevenin theorem.

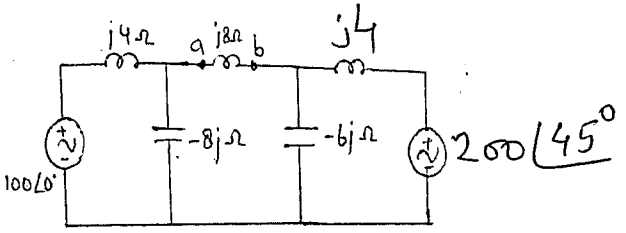

Fig-5

(c) Find the value of source E_2 using Tellegen's theorem if the power absorbed by E_2 is 120 W in fig.6.

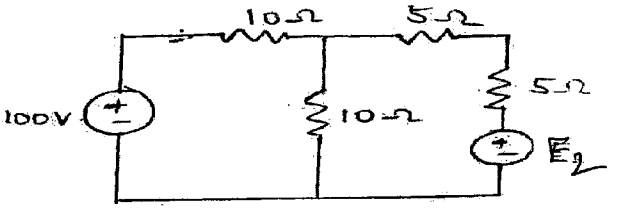

Fig-6

3 Attempt **any two** parts of the following: **10x2=20**

(a) Obtain the expression for the current in a series RL circuit connected to a dc voltage V for t>0. Assume initial current through inductor as zero. Also draw the response graph for the current through inductor and from the graph define time constant of the circuit.

(b) In the network shown in fig7. the switch K is opened at t=0. Solve for V, dv/dt and d^2v/dt at $t=0^+$.

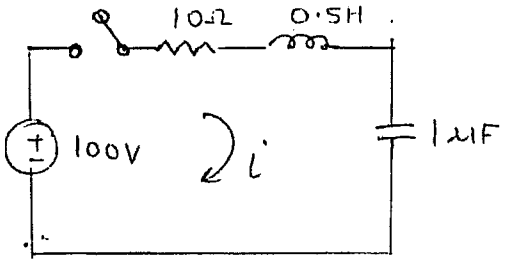

Fig-7

(c) Obtain current i(t) for $t \geq 0$ using time domain approach for the network given in fig.8. The switch is closed at t=0.

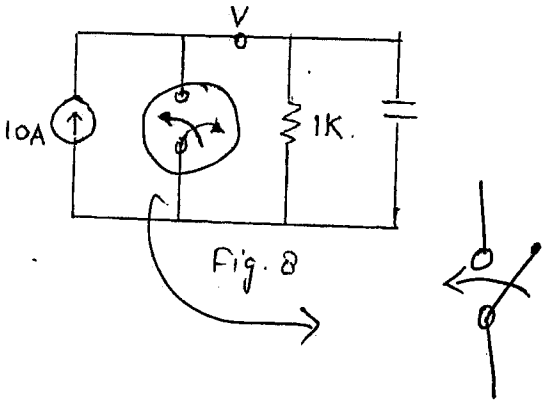

Fig-8

4 Attempt **any two** parts of the following : **10x2=20**

(a) The ABCD parameters of a two port n/w are A=2, B=5, C=1/3, D=4/3, Determine z, y & h-Parameters.

(b) Find the transmission parameters for the network shown in fig9. considering two networks connected in cascade.

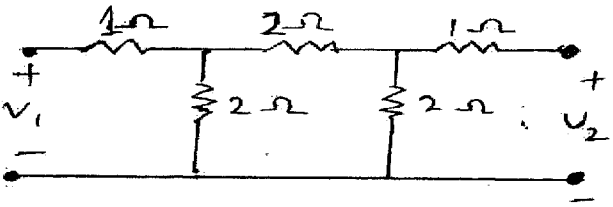

Fig-9

(c) (i) Find the number of closed loop poles in the left half s-plane for a system whose characteristic equation is $S^4 + 2S^3 + 3S^2 + 4S + 5 = 0$

Comment on stability of the system.

(ii) What are poles and zeroes? How does the location of poles in the s-plane affect the system stability? Explain.

5 Attempt **any two** parts of the following: **10x2=20**

(a) What is the difference between active and passive filters? Design a constant K type bandpass filter section to be terminated in 600 Ω resistance having cut-off frequencies of 2kHz and 5kHz.

(b) Synthesize (i) $Z(s)=(s+1)(s+3)/[(s+6)s]$ in cauer - I form. (ii) $Z(s)=(s+5)/[(s+1)(s+6)]$ in Foster's - II form.

(c) Test whether given polynomial is positive real function or not. $Z(S)=\frac{S^2+2S+25}{S+4}$.