R16

Code No: 133BJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November/December - 2017

NETWORK ANALYSIS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Define Graph, Tree, Basic Cut set and Basic Tie set. Illustrate with an example. [2]

b) Explain Active elements in detail. [3]

c) Derive the relation between voltage and current in a series connected RL Circuits. [2]

d) Draw a power triangle in series connected RLC networks. [3]

e) Derive the relation between RMS and maximum value. [2]

f) Define form factor and peak factor. [3]

g) Define characteristic impedance. [2]

h) Define image and iterative impedance. [3]

i) Draw and explain T section network. [2]

j) Explain about LC Filters. [3]

PART-B

(50 Marks)

2.a) What is an electric circuit? What is a magnetic circuit? Make a comparison between electric circuit and magnetic circuit.

b) Coil 1 of a pair of coupled coils has a continuous current of 5A, and the corresponding fluxes ϕ_{11} and ϕ_{12} are 0.2 and 0.4 mWb respectively. If the turns are $N_1 = 500$ and $N_2 = 1500$, find L_1, L_2, M and k. [5+5]

OR

3.a) For the network shown in below Figure 1 find Z_{ab} and I_0.

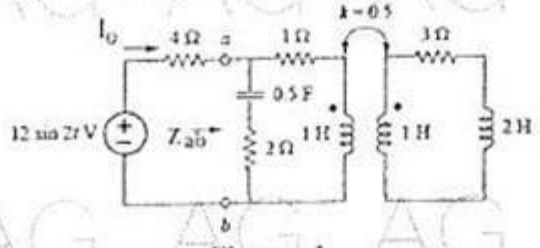

Figure: 1

b) Find the input impedance of the circuit shown in Figure 2. Assume that the circuit operates at $\omega = 50$ rad/s. [5+5]

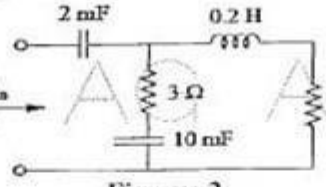

Figure: 2

4.a) Obtain the current locus of a fixed resistance and a variable capacitance.

b) Given a series RLC circuit with R = 10 ohms, L = 1 mH and C = 1 μF is connected across a sinusoidal source of 20 V with variable frequency. Find: i) The resonant frequency ii) Q factor of the circuit at resonant frequency iii) Half power frequencies [5+5]

OR

5.a) Derive and draw the response of a series RLC circuit for step input.

b) An impedance $Z_1 = 10 + j10\ \Omega$ is connected in parallel with another impedance of resistance 8.5 Ω and a variable capacitance connected in series. Find C such that the circuit is in resonance at 5 KHz. [5+5]

6. A series-connected RLC circuit has R = 4 and L = 25 mH:
a) Calculate the value of C that will produce a quality factor of 50.
b) Find ω_1, ω_2, and B.
c) Determine the average power dissipated at $\omega = \omega_0, \omega_1, \omega_2$. Take $V_m = 100$ V. [3+3+4]

OR

7.a) Obtain the current locus of a series circuit having a fixed resistance and a variable inductance.

b) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 μF, Calculate the resonant, lower and upper half – power frequencies. [5+5]

8. Explain clearly the terms:
a) Characteristic Impedance and
b) Image Transfer Constant. [5+5]

OR

9.a) Define Hybrid parameters of a Two Port network. Establish the relation between Hybrid Parameters and ABCD Parameters.

b) A symmetrical T-section has an inductance of 0.47H in each series arm and a 300 μF capacitor in the shunt arm.
i) Find the characteristic impedance at frequencies of 50 Hz and 100 Hz.
ii) If the T-section is terminated in the characteristic impedance, find the ratio of load current to input current at both the frequencies. [5+5]

10.a) What is a high pass filter? In what respects it is different from a low pass filter?

b) Derive the equations to find the inductances and capacitances of a constant K high pass filter. [5+5]

OR

11.a) What is an LC immittance function? State the properties of such functions.

b) Design a constant 'K' T-section low pass filter having cutoff frequency of 2 kHz and nominal characteristic impedance of 600 ohms. [5+5]

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Code No: 123BW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) State Ohm's law and mention its limitations. [2]
b) Explain how voltage source with a source resistance can be converted into an equivalent current source. [3]
c) Mention the disadvantages of low power factor. [2]
d) In a series R-C circuit, R=10Ω and C=25nF. A sinusoidal voltage of 50 mHz is applied and the maximum voltage across the capacitance is 2.5 V. Find the maximum voltage across the series combination. [3]
e) Define mutual inductance and self inductance. [2]
f) Find the total inductance of the three series connected coupled coils shown in the figure 1. [3]

figure 1.

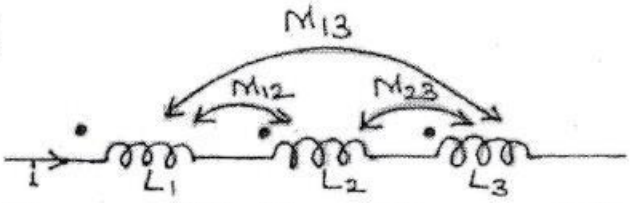

Figure: 1

g) Mention the properties of a tree in a graph. [2]
h) Explain graphical method to draw dual network. [3]
i) State superposition theorem and Reciprocity theorem. [2]
j) Give the proof of Tellegen's theorem. [3]

PART-B

(50 Marks)

2.a) State Kirchoff's voltage and current laws.
b) Find 'i' in the circuit given in figure 2. Check the power balance condition. [3+7]

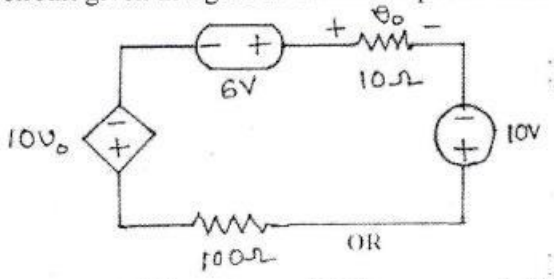

Figure: 2

OR

figure 1.

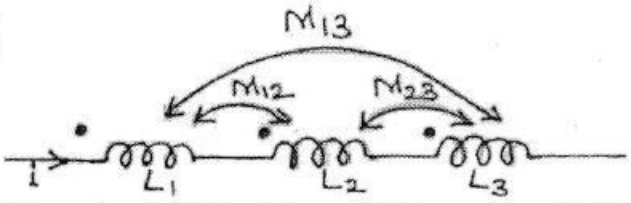

Figure: 1

g) Mention the properties of a tree in a graph. [2]

h) Explain graphical method to draw dual network. [3]

i) State superposition theorem and Reciprocity theorem. [2]

j) Give the proof of Tellegen's theorem. [3]

3.a) Determine the node voltages and the current through the resistors using mesh method for the network given in figure 3.

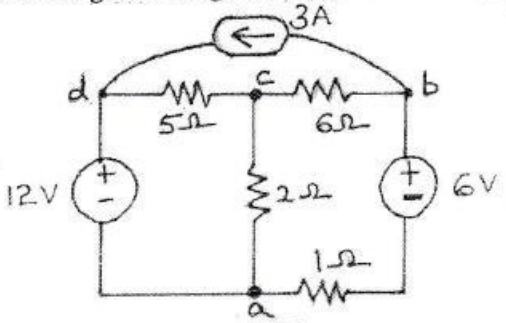

Figure: 3

b) Mention the difference between nodal analysis and mesh analysis. [7+3]

4.a) A series R-L circuit, has resistance of 20Ω and inductance of 0.02H. If the net impedance of the given circuit is $40\angle\Phi^0\Omega$, find Φ and the frequency of the circuit.

b) Define RMS value, Average value and Form factor. [4+6]

OR

5. A voltage $\upsilon(t) = 200\sin\omega t$ is applied to a series RLC circuit where R=60Ω, L=0.18mH and C=20μF. Find:

a) The power supplied by the source

b) The reactive power supplied by the source

c) The reactive power of the capacitor

d) The reactive power of the inductor and

e) The power factor of the circuit. [10]

6. Derive the equation for quality factor of series resonating circuit and parallel resonating circuit. [10]

OR

7.a) Define quality factor and Bandwidth.

b) In the coupled circuit given in figure 4, find the input impedance as well as the net inductance when L_1=0.2H, L_2=0.5H coefficient of coupling (K) being 0.5. [5+5]

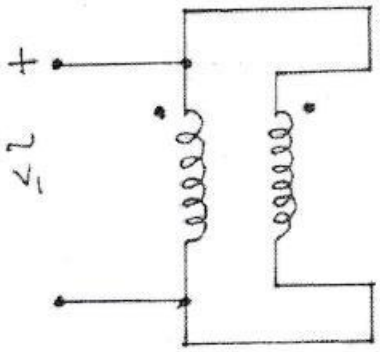

Figure: 4

8.a) Explain the concept of duality.

b) Define a fundamental Tie set and Cut set matrix. Give the procedure for obtaining the same with suitable examples. [3+7]

OR

9.a) The figure 5 represents a graph of a network. Show the tree, twigs and links.

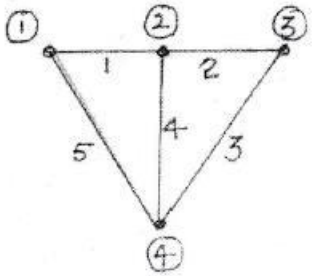

Figure: 5

b) Convert the given current source to voltage source shown in figure 6. [5+5]

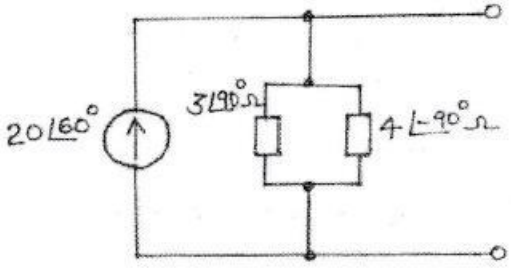

Figure: 6

10.a) State and explain Thevenin's and Norton's theorems.

b) Using Milliman's theorem find the current through R_L and voltage drop in the circuit given in figure 7. [5+5]

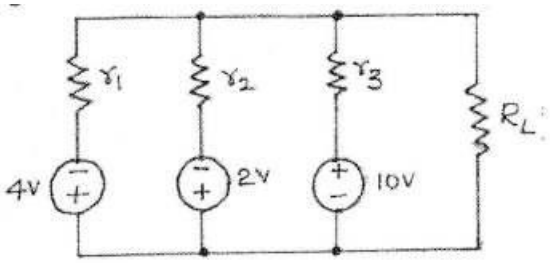

Figure: 7

OR

11.a) State and explain Maximum power transfer theorem and compensation theorem.

b) Find the Norton's equivalent circuit across a-b for the network shown in figure 8. [5+5]

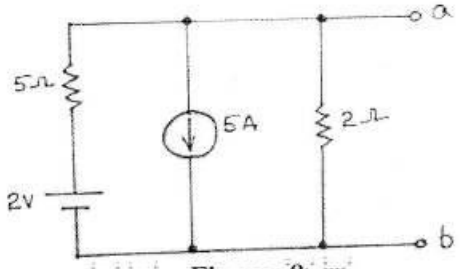

Figure: 8

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Network Analysis and Transmission Lines - Jun 18

Electronics And Communication Engineering (Semester 3)

Total marks: 80

Total time: 3 Hours

INSTRUCTIONS
(1) Question 1 is compulsory.
(2) Attempt any **three** from the remaining questions.
(3) Draw neat diagrams wherever necessary.

PART-A

1.a. Define Coefficient of Coupling and find the coefficient of coupling for two coils having $L_1 = 2$ H, $L_2 = 8$ H and $M = 3$H? (2 marks)

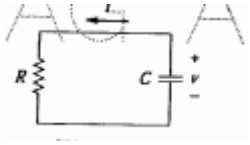
1.b. Draw the impedance triangle and explain each term.

(3 marks)

1.c. Define quality factor and band width of a series resonant circuit.

(2 marks)

1.d. For the circuit shown in the figure, if $v = 10e^{-4t}$V and $i = 0.2e^{-4t}$A, $t>0$, find R and C.



(3 marks)

1.e. Define the following terms related to periodic function

1. RMS Value
2. Average Value

(2 marks)

1.f. List any three properties of Laplace transform.

(3 marks)

1.g. Write down the set of equations of a two port network in terms of ABCD parameters.

(2 marks)

1.h. Define image and iterative impedance

(3 marks)

1.i. List the properties of Low Pass filter.

(2 marks)

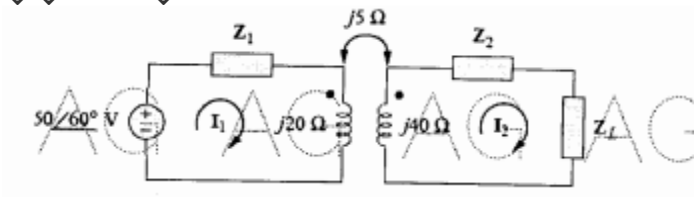
1.j. Explain about composite filters.

(3 marks)

PART-B

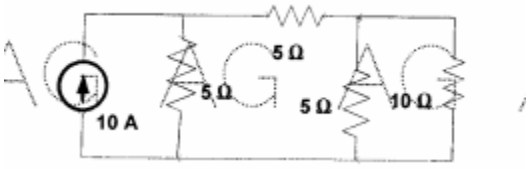
Unit-I

2.a. In the circuit shown in the figure, calculate the input impedance and current I_1. Take $Z_1=60+j100\Omega$ $Z_2=30+j40\Omega$ $Z_L=80+j60\Omega$



(5 marks)

2.b. For the network shown in the figure draw the oriented graph and frame the cut-set matrix.



(5 marks)

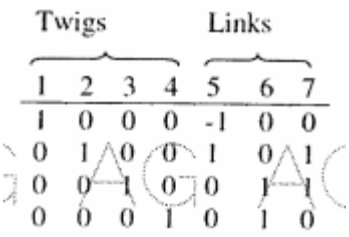
OR

3.a. Define Graph, Tree, Basic the set matrix and cut set matrix for a planar network with example.

(5 marks)

3.b. Draw the oriented graph of a network with fundamental cut-set matrix as shown in the figure.

Also find number of cut-sets and draw them.

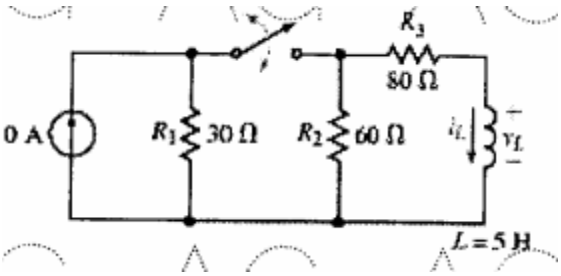


(5 marks)

Unit-II

4.a. Refer the circuits shown in the figure the switch is closed at t = 0.
1, Determine equations for i_L, and v_L.

1. At t = 300 ms, open the switch and determine equations for i_L, and v_L during the decay phase.
2. Determine voltage and current at t = 100 ms and at t = 350 ms
3. Sketch i_L, and v_L.



(5 marks)

4.b. A series resonant circuit has a bandwidth of 100 Hz and contains a 20 mH indutance and a 2 /mu/��F capacitance, Determine

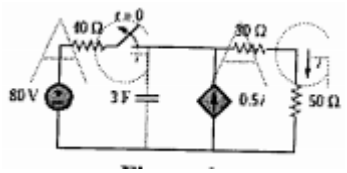
1. f_o
2. Q
3. Z_{in} at resonance
4. f_2

(5 marks)

OR

5.a. Design a series RLC circuit that will have an impedance of 10 ΩΩ at the resonant frequency ωo�� = 100 rad/s and a quality factor of 80. Find the bandwidth.
(5 marks)

5.b. Consider the circuit diagram shown in the figure. Find i(t) for t < 0 and t > 0.



(5 marks)

Unit-III

6.a. Obtain the response of R-L-C series circuit for exponential excitation. Use Laplace Transform

method

(5 marks)

6.b. Determine the RMS value of the current waveform shown in the figure. If this current waveform is passed through 2 ΩΩ resistor find the average power absorbed by the resistor?

(5 marks)

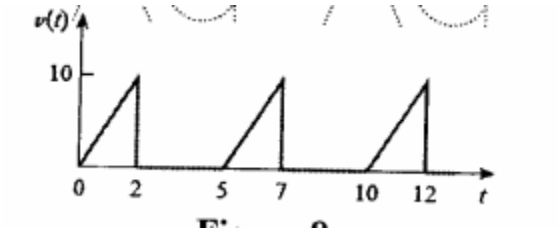
OR

7.a. A voltage $V_m Sin(\omega t+\phi)$ ����(��+�) is applied to an initially relaxed RL series circuit. Find the value of φ$\hat{}$ for which there will be no transient current in the circuit. Use Laplace Transform method.

(5 marks)

7.b.

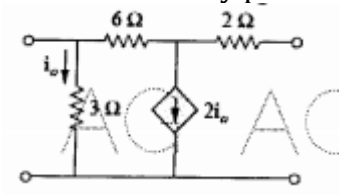
Find the rms values of the voltage waveform shown in the figure.



(5 marks)

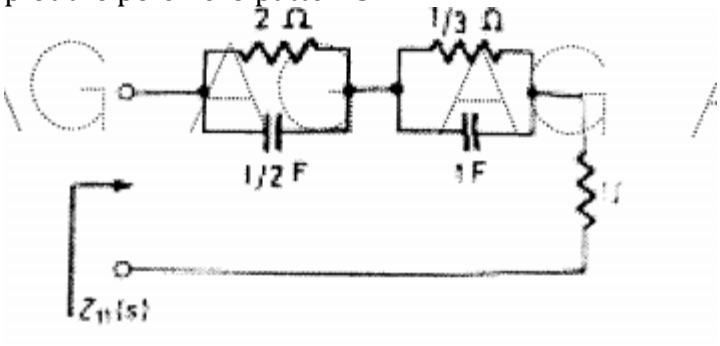
Unit-IV

8.a.a Obtain the y parameters for the circuit shown in the figure



(5 marks)

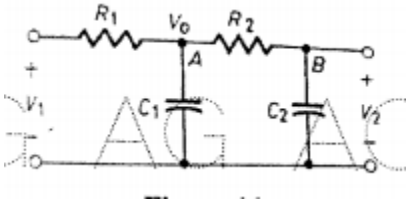
8.b. For the network shown in figure find the driving point input impedance and also plot the pole-zero patterns.



(5 marks)

OR

9.a. Find the transfer function $G_{12}(S)=V_2(s)V_1(s)$ for the network shown in the figure



(5 marks)

Unit-V

10.a. An attenuator is composed of symmetrical T-section having series arm each of 175 ΩΩ and shunt arm of 350 ΩΩ. Derive expression for and calculate the characteristic impedance of this network and attenuation per section.

(5 marks)

10.b. Draw the circuit diagram of a Band pass filter? Explain the design procedure of the above filter in detail.
(5 marks)

OR

11.a. Design an asymmetrical T-attenuator to produce attenuation of 20 DB and to work between source impedance of 400 ΩΩ and load impedance of 900 ΩΩ

(5 marks)

11.b. Classify the filters according to their

1. Frequency characteristics
2. Depending upon the relation between series impedance and Shunt impedance.

(5 marks)