

Code No: 133BJ

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, April/May - 2018

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)

- 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]
- Draw the impedance triangle and explain each term. [3]
- Define quality factor and band width of a series resonant circuit. [2]
- For the circuit shown in figure 1, if $v = 10e^{-4t}$ V and $i = 0.2e^{-4t}$ A, $t > 0$, find R and C. [3]

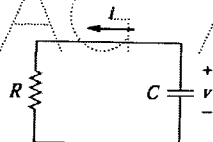


Figure 1

- Define the following terms related to periodic function (i) RMS Value (ii) Average Value. [2]
- List any three properties of Laplace transform. [3]
- Write down the set of equations of a two port network in terms of ABCD parameters. [2]
- Define image and iterative impedance. [3]
- List the properties of Low Pass filter. [2]
- Explain about composite filters. [3]

PART-B

(50 Marks)

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

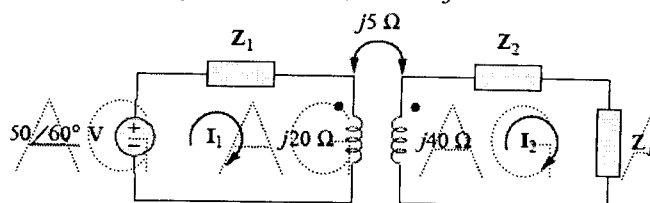


Figure 2

- b) For the network shown in figure 3 draw the oriented graph and frame the cut-set matrix. [5+5]

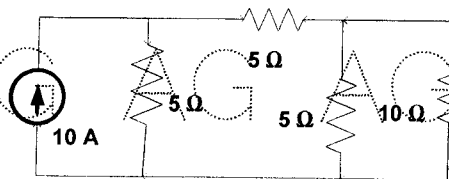


Figure 3
OR

- 3.a) Define Graph, Tree, Basic tie set matrix and cut set matrix for a planar network with an example.
b) Draw the oriented graph of a network with fundamental cut-set matrix as shown in figure 4, Also find number of cut-sets and draw them. [5+5]

Twigs				Links		
1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

Figure 4

- 4.a) Refer to the circuit shown figure 5 the switch is closed at $t = 0$. (i) determine equations for i_L and v_L . (ii) At $t = 300$ ms, open the switch and determine equations for i_L and v_L during the decay phase. (iii) Determine voltage and current at $t = 100$ ms and at $t = 350$ ms. (iv) Sketch i_L and v_L .

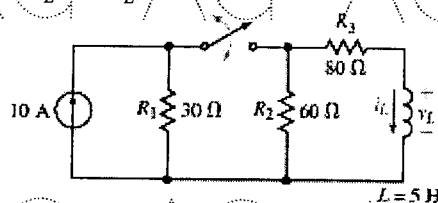


Figure 5

- b) A series resonant circuit has a bandwidth of 100 Hz and contains a 20 mH inductance and a 2 μ F capacitance. Determine (i) f_o (ii) Q (iii) Z_{in} at resonance (iv) f_2 . [5+5]

OR

- 5.a) Design a series RLC circuit that will have an impedance of 10Ω at the resonant frequency of $\omega_0 = 100 \text{ rad/s}$ and a quality factor of 80. Find the bandwidth.
b) Consider the circuit shown in figure 6. Find $i(t)$ for $t < 0$ and $t > 0$. [5+5]

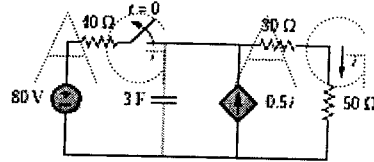


Figure 6

- 6.a) Obtain the response of R-L-C series circuit for exponential excitation. Use Laplace Transform method.
b) Determine the RMS value of the current waveform shown in figure 7. If this current waveform is passed through 2Ω resistor find the average power absorbed by the resistor? [5+5]

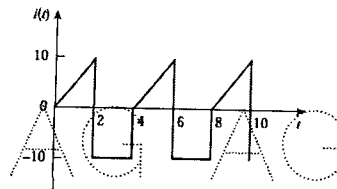


Figure 7

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 for which there will be no transient current in the circuit. Use Laplace Transform method.
b) Find the-rms value of the voltage waveform shown in figure 8. [5+5]

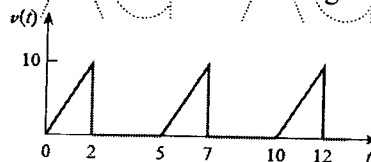


Figure 8

- 8.a) Obtain the y parameters for the circuit shown in figure 9.

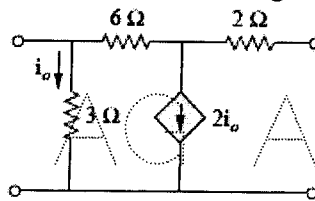


Figure 9

- b) For the network shown in figure 10 find the driving point input impedance and also plot the pole-zero patterns. [5+5]

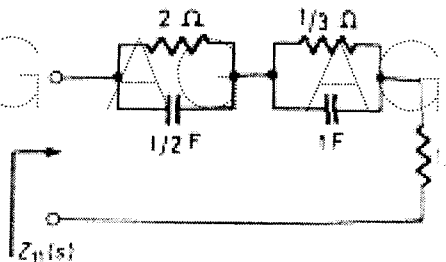


Figure 10
OR

- 9.a) Find the transfer function $G_{12}(s) = \frac{V_2(s)}{V_1(s)}$ for the network shown in figure 11.

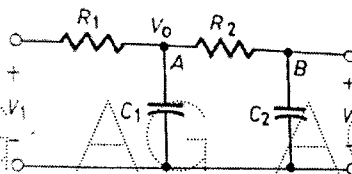


Figure 11

- b) Express hybrid parameters in terms of impedance parameters. [5+5]

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

- b) Draw the circuit diagram of a Band pass filter? Explain the design procedure of the above filter in detail. [5+5]

OR

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

- b) Classify the filters according to their
i) frequency characteristics and
ii) Depending upon the relation between series impedance and Shunt impedance. [5+5]

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