R16

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 $\mathbf{Z}_{ab}$ and $\mathbf{I}_o$.
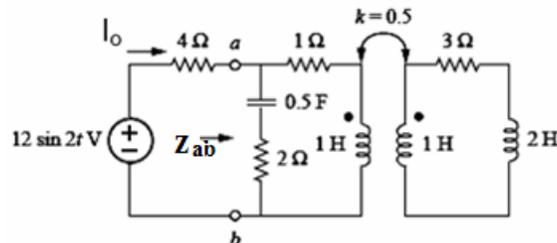
Figure: 1

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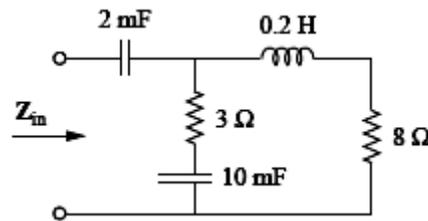

Figure: 2

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 $Z_1 = 10 + j10$ Ω 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 $\omega = \omega_0$, ω_1, ω_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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