Code No: R201213 **R20** SET - 1

I B. Tech II Semester Regular Examinations, September- 2021

NETWORK ANALYSIS

(Comm. to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

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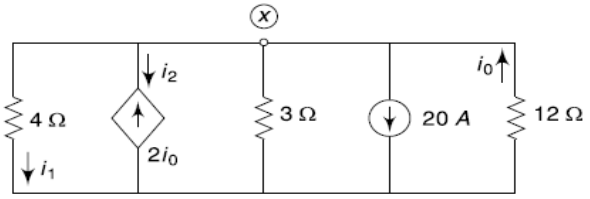
UNIT-I

1 a) Distinguish between Ideal sources and practical sources (3M)

b) Two resistors $2R$ and $3R$ are connected in parallel across a 5A DC current source. The voltage that appears across the current source is 30V. Find R and the power dissipated in each resistor. (4M)

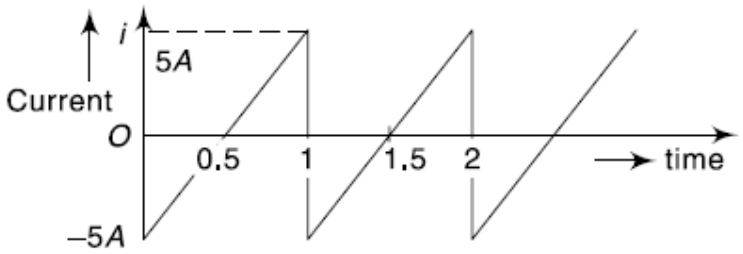
c) Find i_0, i_2 and the value of the dependent source for the following network: (7M)



OR

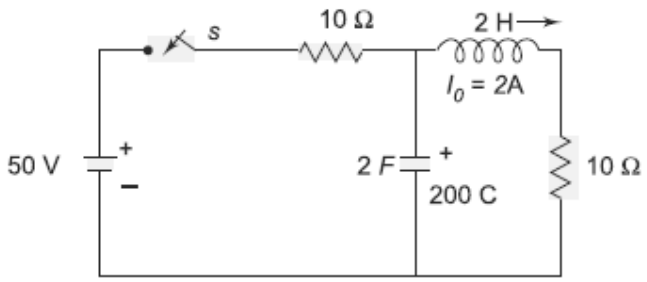
2 a) Explain about incidence matrix and its properties and also analyze the relationship between KCL and incidence matrix. (7M)

b) Find the average and rms value for the following waveform: (7M)



UNIT-II

3 For the circuit shown below, the initial current in the inductance is 2 A and its direction is as shown in the figure. The initial charge on the capacitor is 200 C with polarity as shown when the switch is closed. Determine the current expression for the inductance. (14M)



OR

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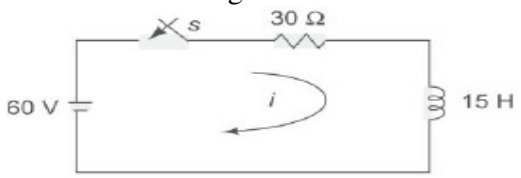
4 a) Analyze the dc response for a series R – L – C circuit. (7M)

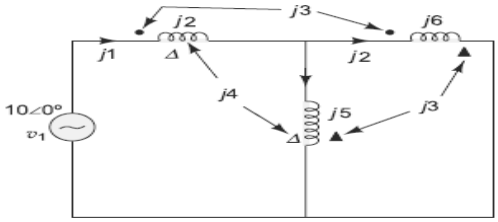
b) A series RL circuit with R = 30 Ω and L = 15 H has a constant voltage V = 60 V applied at t = 0 as shown in figure below. Determine the current i, the voltage across resistor and the voltage across the inductor. (7M)



UNIT-III

5 a) Explain the concept of Dot convention in magnetically coupled circuits and derive the expression for coefficient of coupling in terms of mutual and self-inductances of the coils. (7M)

b) Find the current passing through all the elements using mesh analysis for the following circuit. (7M)



OR

6 a) Explain step by step procedure of phasor analysis for a Series RLC circuit. (7M)

b) A series ac circuit has a resistance of 15 Ω and an inductive reactance of 10 Ω. Calculate the value of a capacitor which is connected across this series combination so that the system has unity power factor. The frequency of ac supply is 50 Hz. (7M)

UNIT-IV

7 a) What is resonance in an ac circuit and discuss the effects of resonance in electrical systems (3M)

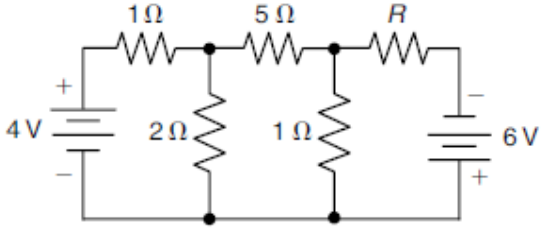
b) Define the terms 'Q factor' and 'band width' w.r.t ac circuits. (4M)

c) Voltages across resistance, inductance and capacitance connected in series are 3 V, 4 V and 5 V respectively. If supply voltage has 50-Hz frequency, what is the magnitude of supply voltage? Find the resonant frequency of this series RLC circuit. (7M)

OR

8 a) State and explain maximum power transfer theorem. (4M)

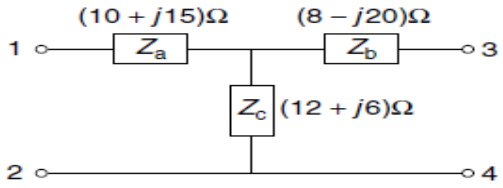
b) Find the value of R in the following circuit, such that maximum power transfer takes place. What is the amount of this power? (10M)



UNIT-V

9 a) Derive the h – parameters of a two-port network. (7M)

b) Find Z – parameters for the following network: (7M)

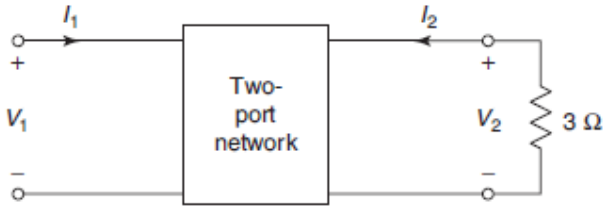


OR

10 a) Deduce the relationship between impedance and admittance matrix. (7M)

b) The following equations give the voltages V_1 and V_2 at the two ports of a two – port network as shown in the following figure: (7M)

$$V_1 = 5I_1 + 2\,I_2$$
$$V_2 = 2I_1 + I_2$$



A load resistor of 3 Ω is connected across port 2. Calculate the input impedance.