Code No: **R201209** **R20** **SET - 1**

I B. Tech II Semester Regular/Supplementary Examinations, July/August - 2023

ELECTRICAL CIRCUIT ANALYSIS –I

(Only for Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

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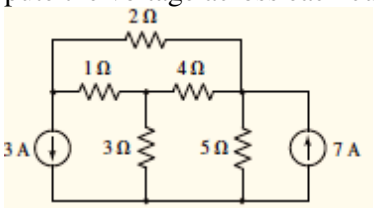
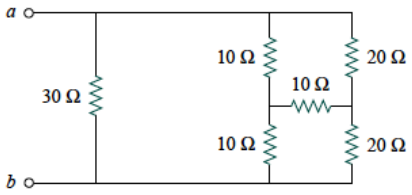
UNIT-I

1. a) For the circuit shown, compute the voltage across each current source. [7M]

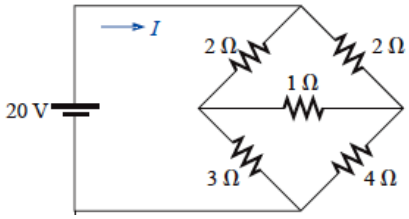


b) Obtain the equivalent resistance at the terminals a-b [7M]



(OR)

2. a) Using a Δ-Y or Y- Δ conversion, find the current *I* in the network [7M]



b) State and explain Kirchoff's Laws? [7M]

UNIT-II

3. a) Two identical coupled coils have an equivalent inductance of 80 mH when connected series aiding and 35 mH in series opposing. Find L_1, L_2, M and K. [7M]

b) A closed magnetic circuit of cast steel contains a 6 cm long path of cross-sectional area 1 cm^2 and a 2 cm path of cross-sectional area 0.5 cm^2. A coil of 200 turns is wound around the 6 cm length of the circuit and a current of 0.4A flows. Determine the flux density in the 2 cm path if the relative permeability of the cast steel is 750. [7M]

(OR)

4. a) Explain the analogy between electric and magnetic circuits? [7M]

b) A magnetic circuit of cross-sectional area 0.4 cm^2 consists of one part 3 cm long, of material having relative permeability 1200, and a second part 2 cm long of material having relative permeability750.With a 100-turn coil carrying 2A, find the value of flux existing in the circuit. [7M]
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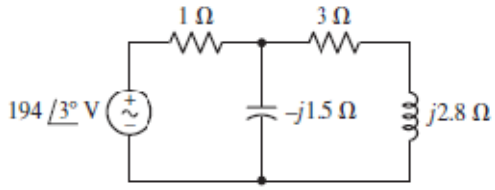
UNIT-III

5. a) Calculate the average power absorbed by each passive element in the circuit shown, and verify that it equals the average power supplied by the source? [7M]

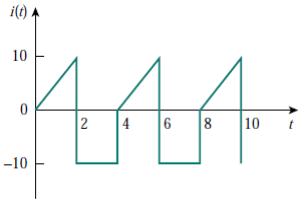


b) A coil of inductance 159.2mH and resistance 20 Ω is connected in series with a 60resistor to a 240V, 50 Hz supply. Determine (i) the impedance of the circuit, (ii) the current in the circuit, (iii) the circuit phase angle, (iv) the p.d.across the 60 Ω resistor and (v) the p.d. across the coil. (vi) Draw the circuit phasor diagram showing all voltages. [7M]

(OR)

6. a) The voltage of a circuit is v = 200 sin ($\omega t + 30^0$) and the current is i = 50 sin($\omega t + 60^o$). Calculate i. The average power, reactive volt-amperes, and apparent power ii. Find the circuit elements if $\omega=100\pi$ rad /sec. [7M]

b) Determine the RMS value of the current waveform shown below? If this current waveform is passed through 2 Ω resistorfind the average power absorbed by the resistor? [7M]



UNIT-IV

7. a) A coil of resistance 25Ω and inductance100mH is connected in series with a capacitance of 0.12 μF across a 200V, variable frequency supply. Calculate (i) the resonant frequency, (ii) the current at resonance and(iii) the factor by which the voltage across the reactance is greater than the supply voltage. [7M]

b) A series RLC Circuit has a quality factor of 5 at 50 rad/s. The current flowing through the circuit at resonance is 10 A and the supply voltage is 100 V. Find the Circuit constants? [7M]

(OR)

8. a) A coil of 10 Ω resistance and 0.2 H inductance is connected in parallel with a variable capacitance across a 220 V, 50 Hz supply. Calculate (i) the capacitance of the capacitor for resonance (ii) the dynamic impedance of the circuit and the supply current. [7M]

b) With a neat sketch explain series Locus diagram [7M]

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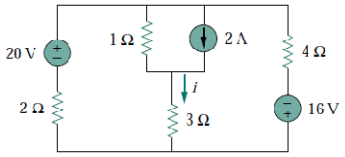
UNIT-V

9. a) State and explain Milliman's theorem with an example? [7M]

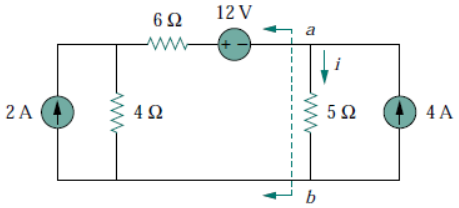
b) Apply the superposition principle to find i and power delivered to the 3 Ω resistor in the circuit shown below? [7M]



(OR)

10. a) State and explain maximum power transfer theorem with an example for DC excitation? [7M]

b) Obtain the Norton equivalent of the circuit in Fig. shown to the left of terminals a-b. Use the result to find current i. [7M]



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