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

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

ELECTRICAL CIRCUIT ANALYSIS –I

(Only for EEE)

Time: 3 hours Max. Marks: 70

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

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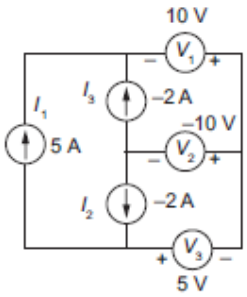
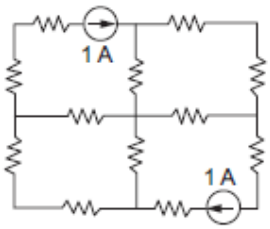
UNIT-I

1. a) Explain the following dependent sources: (7M)
   i) Voltage controlled voltage source ii) Voltage controlled current source
   iii) Current controlled current source iv) Current controlled voltage source
   b) Find the power delivered by all the sources in the following circuit: (7M)



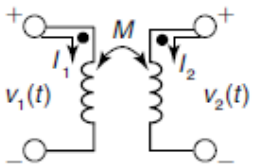
Or

2. a) Three equal resistors are connected across a voltage source in series first and in parallel later. Find the ratio of power delivered by the source in the two cases. (7M)
   b) All resistors in the circuit are of 4Ω. Find currents in all resistors and voltage across current sources by mesh analysis. (7M)



UNIT-II

3. a) Explain the following terms with respect to magnetic circuits: (7M)
   i) Self-inductance ii) Mutual inductance
   ii) Series and parallel magnetic circuits
   b) For the circuit shown below, if L_1 =0.4 H, L_2= 2.5 H, k =0.6, and $i_1 = 4i_2$= 20cos (500t -20^0) mA. (7M)



Evaluate the following quantities at t = 0:
(i) i_2,
(ii) V_1, and
(iii) the total energy stored in the system.
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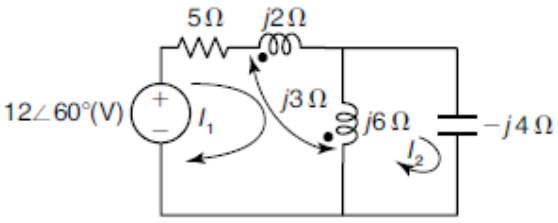
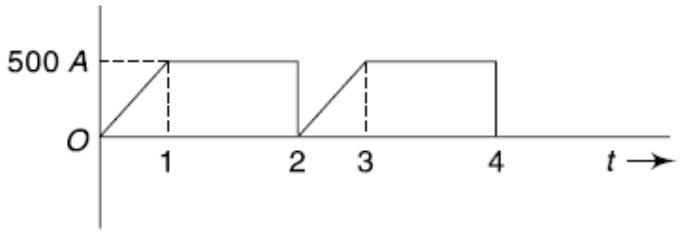
Or

4. a) Prove that when two coils of self-inductances L_1 and L_2 are connected in series aiding connection with a mutual inductance M then the total inductance is equal to $L_{eqv} = (L_1 + L_2 + 2M)$. (7M)
   b) For the circuit shown below, determine the phasor currents I_1 and I_2 (7M)



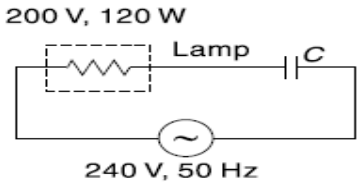
UNIT-III

5. a) A 200 V, 50 Hz. inductive circuit takes a current of 15 A, lagging the voltage by 45°. Calculate the resistance and inductance of the circuit. (7M)
   b) Find the average and rms value for the following waveform: (7M)



Or

6. a) Prove that the active power over a complete cycle of current in a purely capacitive circuit is zero. (7M)
   b) A 200 V, 120 W lamp is to be operated on 240 V, 50 Hz. supply. Calculate the value of the capacitor that would be placed in series with the lamp in order that it may be used at its rated voltage. (7M)

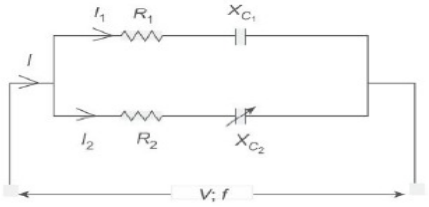


UNIT-IV

7. a) Explain the effect of band width and selectivity in series resonance circuit. (7M)
   b) A circuit consists of a coil of resistance 100 Ω and inductance 1 H in series with a capacitor of capacitance 1 μF. Calculate (i) the resonant frequency, (ii) current at resonant frequency and (iii) voltage across each element when the supply voltage is 50 V. (7M)

Or

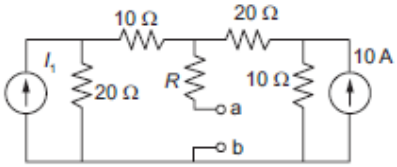
8. a) Draw the locus of I_2 and I for the parallel circuit shown below with neat step by step explanation: (7M)



b) A coil of resistance 5 Ω and inductance 0.1 H is connected in parallel with a circuit containing a coil of resistance 4 Ω and inductance 0.05 H in series with a capacitor C and a pure resistor R. Calculate the values of C and R so that currents in either branch are equal but differ in phase by 90°. (7M)

UNIT-V

9. A resistor of 20 Ω connected across a – b for the circuit shown below, draws maximum power from the circuit and the power drawn is 100W. i) Find the value of R and I_1. ii) With 20 Ω across a- b find the value of I_1 such that power transferred to it is 0 W. (14M)



Or

10. a) State and explain Thevenin's theorem. (7M)

b) Find the power dissipated in the resistor R_2 for the circuit shown below by applying superposition theorem (7M)