Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Second Semester

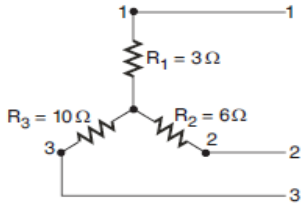
Electronics and Communication Engineering

EC3251 / UECT24201 - Circuit Analysis

Regulations – 2021/2024

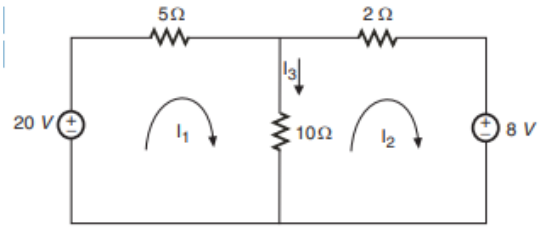
Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

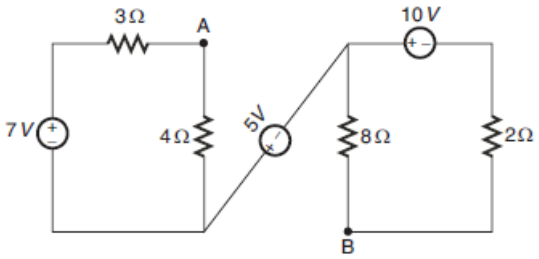
Q.No	Questions	BLT	CO	Marks
1.	Define Kirchhoff's Voltage Law.	L1	1	2
2.	The equivalent resistance of two wires is 25 Ω when connected in series and 6Ω when connected in parallel. Calculate the resistance of each wire.	L4	1	2
3.	What are the limitations of Super position theorem?	L1	2	2
4.	A star-connected network consists of three resistances 3Ω, 6Ω and 10Ω. Convert the star-connected network into an equivalent delta-connected network. 	L3	2	2
5.	A sinusoidal voltage is represented by the equation, 100 sin(503t + 30^o) volts. What is the frequency and time period?	L2	3	2
6.	Write the expression for admittance of an RLC parallel circuit at half-power frequencies.	L1	3	2
7.	Determine the quality factor of an RLC series circuit with R = 5Ω, L = 0.01H and C = 100μF.	L2	4	2
8.	What is the time constant of an RL circuit with R = 10Ω and L = 20mH?	L1	4	2
9.	An ideal transformer has a turns ratio of 1:5. If the secondary voltage is 100 V, find the primary voltage.	L2	5	2
10.	State dot rule for coupled coils.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			Questions	BLT	CO	Marks
11.	a	i	Obtain the current in each branch of the network shown in Fig. using Kirchhoff's Current Law.	L3	1	8

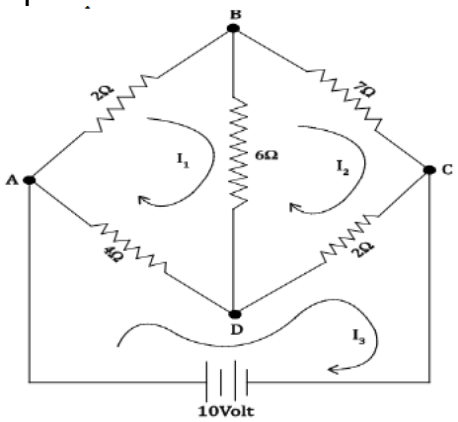


ii What is the voltage across A and B in the circuit shown in figure? L3 1 8

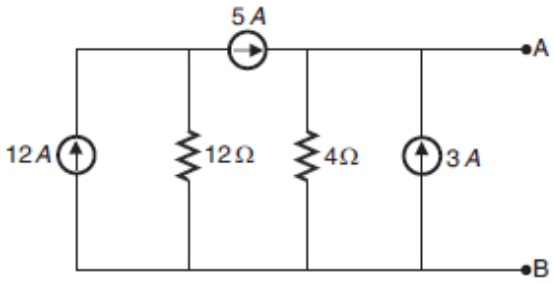


Or

b The Wheat Stone Bridge Circuit as shown in Fig. Find Loop currents I1, I2, I3 and also (i) Voltage across 6 Ohm Resistor (ii) Power Developed to 6 Ohm Resistor L3 1 16

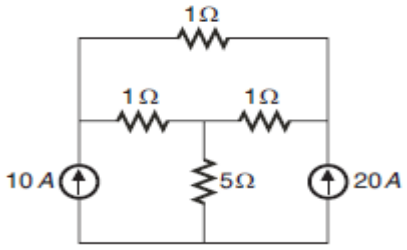


12. a Determine Thevenin's and Norton's equivalents of the circuit shown in Fig. L3 2 16

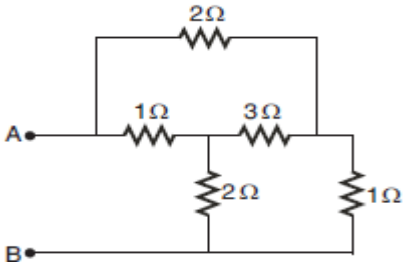


Or

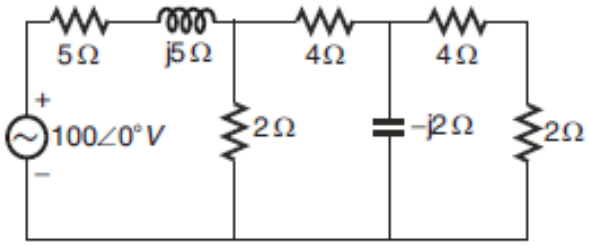
b i Find the current through the 5 Ω resistor in the circuit shown in Figure using the superposition theorem. L3 2 8



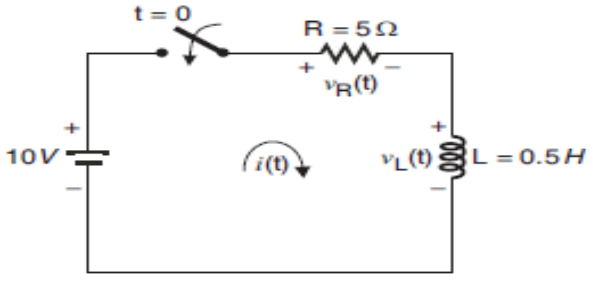
	ii	Find the equivalent input resistance across terminals A and B of the bridged-T network shown in figure.	L3	2	8



13.	a	i	A series combination of 12 Ω resistance and 600 μF capacitance is connected to a 220 V, 50 Hz supply. Estimate the current, active power, reactive power and apparent power. Also estimate the voltage across Rand C and draw the phasor diagram.	L2	3	8
		ii	Derive the phasor voltage-current relationships for resistor (R), inductor (L), and capacitor (C).	L2	3	8
			Or			
	b		Solve the currents in various branches of the circuit shown in Fig. by mesh analysis.	L2	3	16

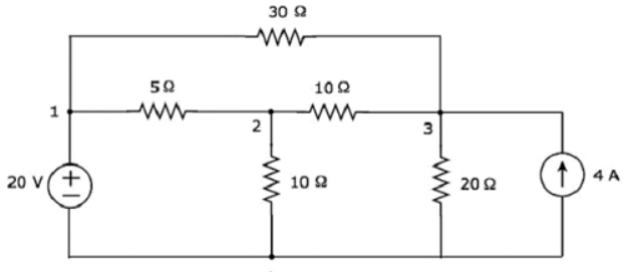


14.	a	i	In the RL circuit of Fig. the switch is closed at t = 0. Find the current i (t) and the voltage across resistance and inductance.	L2	4	10



		ii	Derive the condition for resonance and the expression for resonant frequency in a series RLC circuit.	L2	4	6
			Or			

	b	i	Examine the transient response of RC circuit for unit step function.	L2	4	8
		ii	Derive the admittance (Y) expression for a parallel RLC circuit and the resonant frequency (ignoring coil resistance).	L2	4	8
15.	a	i	An ideal transformer has a turns ratio of 1:5. If the secondary is connected to a 100 Ω load and the primary to a 10 V source, calculate: (i) Secondary voltage and current. (ii) Power delivered to the load. (iii) Reflected impedance at the primary	L4	5	8
		ii	Derive the relationship l = b - n + 1 (where l=loops, b=branches, n=nodes) For a given circuit, calculate: i. Number of links ii. Number of independent loops	L4	5	8



Or

	b	i	A coil having an inductance of 100mH is magnetically coupled to another coil having an inductance of 900mH. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance if the two coils are connected in a) series aiding, b) series opposing, c) parallel aiding and d) parallel opposing.	L4	5	8
		ii	Determine the cut-set matrix and the current balance equation of the following graph.	L4	5	8