Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Second Semester

Electrical and Electronics Engineering

EE3251 / UEET24201 - Electric Circuit Analysis

Regulations – 2021 & 2024

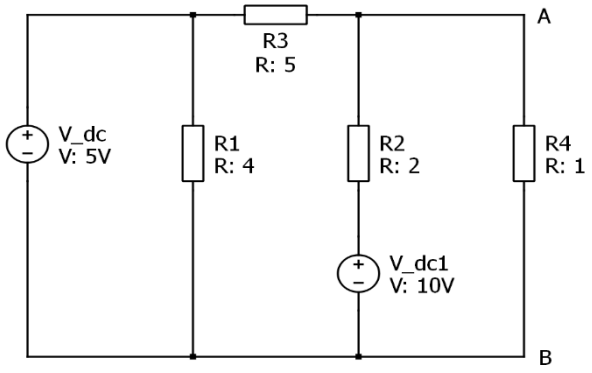
Duration: 3 Hrs *Maximum : 100 Marks*

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

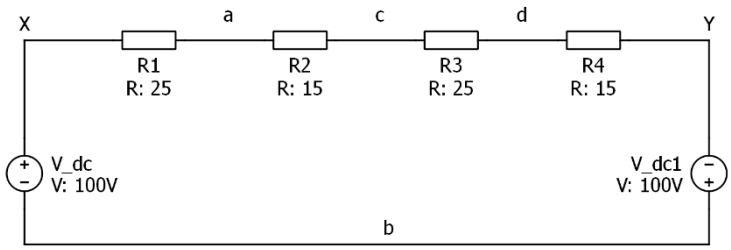
Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	State Ohm's Law and its significance in DC circuits.	L1	1	2
2.	Define real and reactive power in AC circuits.	L2	1	2
3.	Explain the concept of source transformation.	L2	2	2
4.	Define Thevenin's theorem.	L1	2	2
5.	Determine the Laplace transform of a unit step input.	L2	3	2
6.	Define the quality factor of an RLC circuit.	L2	3	2
7.	Compare between series and parallel resonance.	L2	4	2
8.	Contrast between self and mutual inductance.	L2	4	2
9.	Explain balanced and unbalanced loads in three-phase circuits.	L2	5	2
10.	Discuss the coefficient of coupling in magnetically coupled circuits.	L2	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a i	Determine the voltage across 1Ω resistor in the given circuit.	L3	1	8

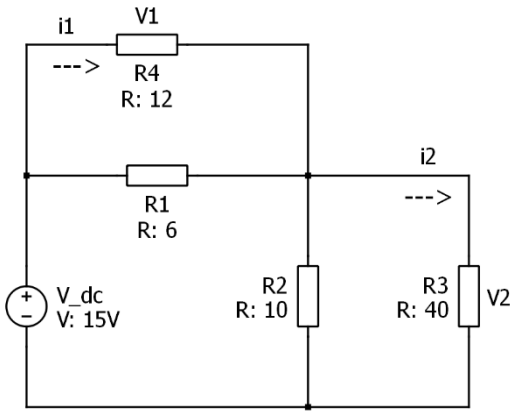


	ii	From the given circuit, find the voltage across ab, cb, and db:	L3	1	8

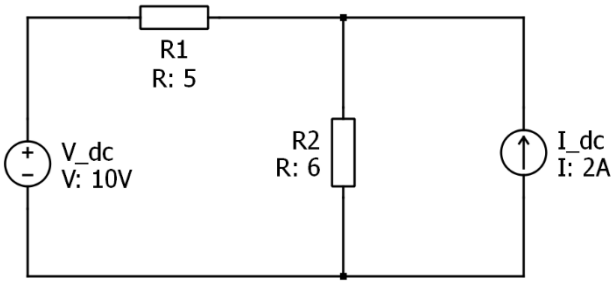


Or

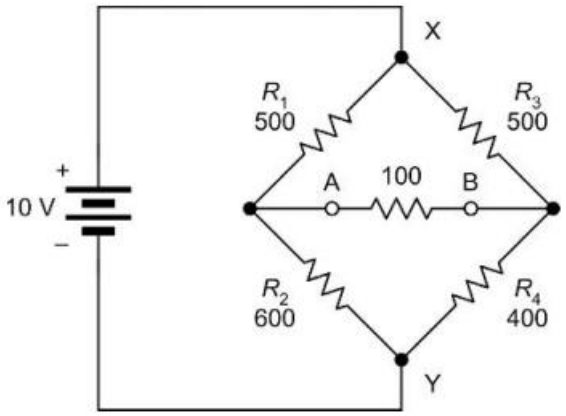
b	i	Find V1, V2, V3, and power dissipated in 12Ω and 40Ω:	L3	1	8



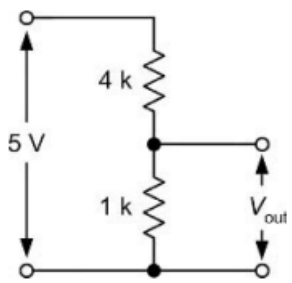
	ii	Determine the number of branches and nodes in the circuit shown. Identify which elements are in series and which are in parallel.	L3	1	8



12.	a	i	Determine the current that will flow in a 100Ω load connected between terminals A and B.	L3	2	8

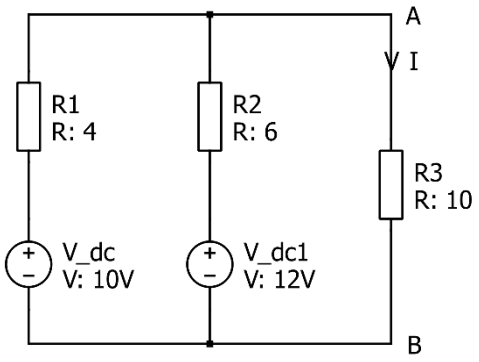


	ii	Determine the output voltage produced by the circuit: (a) when the output terminals are left open-circuit (i.e., when no load is connected). (b) when the output is loaded by a resistance of 10 kΩ.	L3	2	8

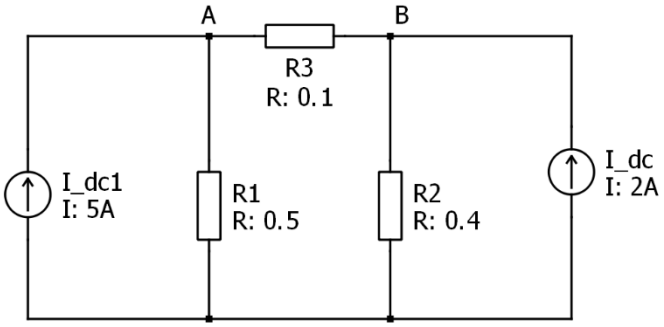


Or

	b	i	Determine the current I in the network by using Thevenin's theorem,	L3	2	8



		ii	Solve and find the current through the 0.1Ω resistor in the figure, using Thevenin's method.	L3	2	8



13.	a	i	Determine the capacitive reactance of a capacitor of 10 μF when connected to a circuit of frequency (a) 50 Hz (b) 20 kHz.	L3	3	8
		ii	Explain the importance of inverse Laplace transforms in circuit analysis with an illustrative example.	L2	3	8
			Or			
	b	i	Solve (a) Calculate the reactance of a coil of inductance 0.32 H when it is connected to a 50 Hz supply. (b) A coil has a reactance of 124Ω in a circuit with a supply of frequency 5 kHz. Determine the inductance of the coil.	L3	3	8
		ii	Describe the role of standard test signals in analyzing the system response.	L2	3	8
14.	a	i	An R–L–C series circuit is comprised of a coil of inductance 10 mH and resistance 8Ω and a variable capacitor C. The supply frequency is 1 kHz. Determine the value of capacitor C for series resonance.	L3	4	8
		ii	Calculate the resonant frequency and impedance at resonance for a series RLC circuit with R = 10 Ω, L = 0.1 H, and C = 100 μF.	L3	4	8
			Or			
	b	i	Determine the resonant frequency and quality factor for a parallel RLC circuit consisting of a resistor of 20 Ω, an inductor of 0.05 H, and a capacitor of 220 μF.	L3	4	8
		ii	Calculate the coefficient of coupling for two coils with self-inductance values of L1 = 0.2 H and L2 = 0.1 H, and a mutual inductance of M = 0.05 H, and discuss its significance in coupled circuits.	L3	4	8

15.	a	Construct a balanced three-phase circuit with a star-connected load where each phase has a resistance of 15 Ω and an inductance of 0.1 H. Calculate the total power consumed if the line voltage is 400 V.	L3	5	16
		Or			
	b	Determine the line and phase currents for a three-phase delta-connected load with each impedance of 20 + j30 Ω, when the line voltage is 440 V. Sketch the corresponding phasor diagram for this circuit.	L3	5	16