Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Second Semester

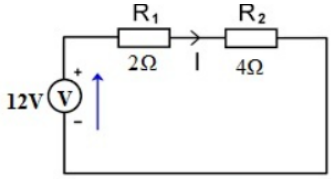
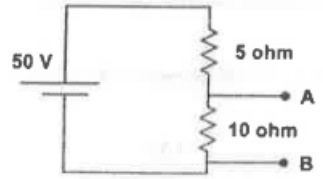
Electrical and Electronics Engineering

EE3251- Electric Circuit Analysis

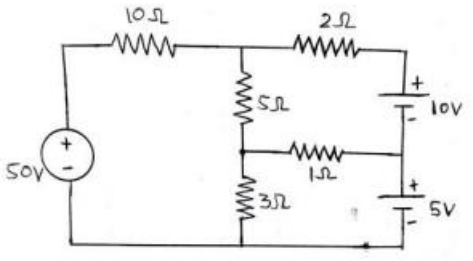
Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

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

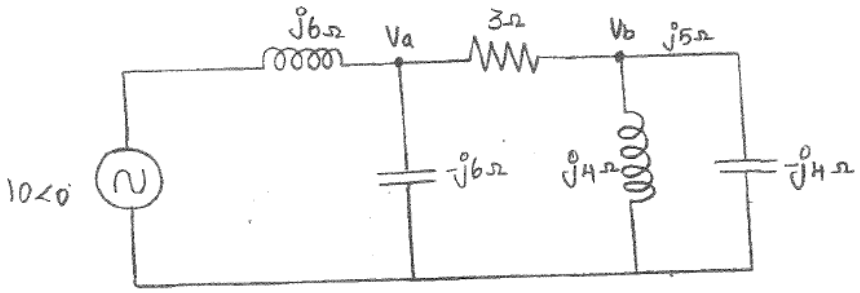
Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	State Kirchhoff 's laws.	RE	1	2
2.	The circuit as shown in the figure is designed with a 12V power source & two resistors R1 = 2 Ω & R2 = 4 Ω in series, then Calculate the voltage drop across every resistor. 	UN	1	2
3.	Using voltage division rule, determine the voltage across the 10Ω resistor. 	UN	2	2
4.	State maximum power transfer theorem.	RE	2	2
5.	List the standard input signals used for analyzing the transient response of a system.	RE	3	2
6.	A series RC circuit consists of 10 Ω resistor and 0.1μF capacitor. A constant voltage of 10V to 20 V is applied to the circuit at time t =0. Obtain the current equation.	UN	3	2
7.	A series RLC circuit has R = 50 Ω L = 0.5H c = 20 μF. Evaluate the resonant frequency f_r.	UN	4	2
8.	Define mutual inductance.	RE	4	2
9.	Mention the advantages of three phase power system.	UN	5	2
10.	What is meant by power factor leading and power factor lagging?	RE	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

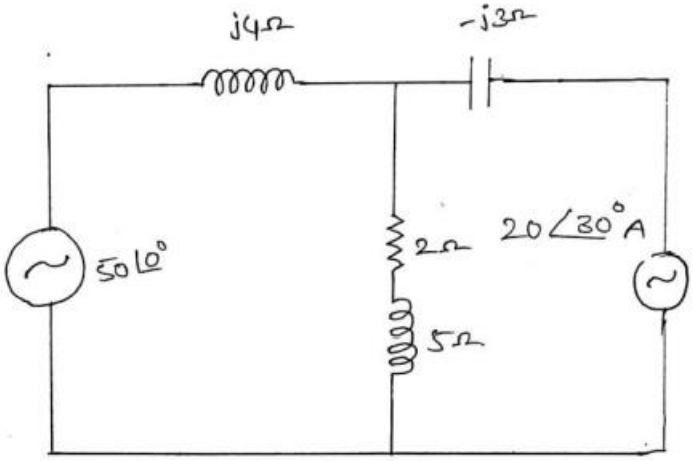
Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Determine i) the mesh currents ii) Current flowing through individual resistor iii) Voltage drop across the individual resistors for the below circuit using mesh analysis. 	AP	1	13

Or

	b	For the given AC network determine V_a and V_b by nodal analysis method.	AP	1	13

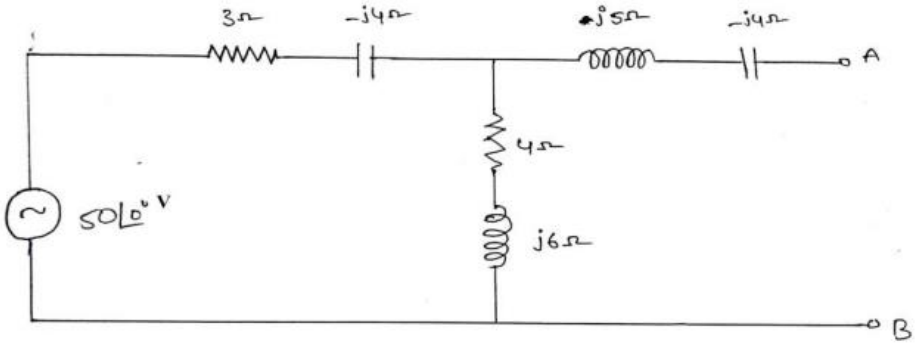


12.	a	Determine the voltage across (2+j5) Ω impedance as shown in figure by using super position theorem.	AP	2	13

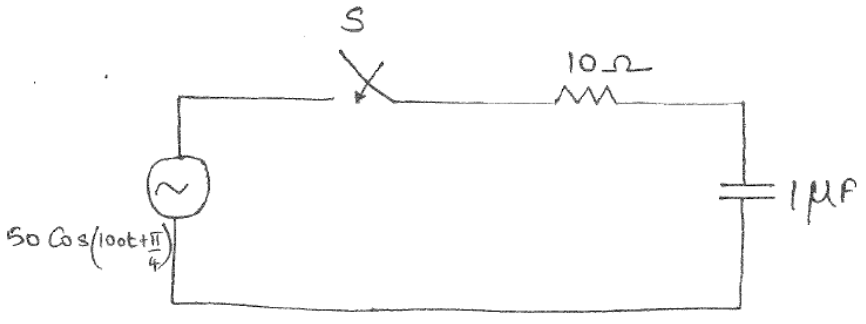


Or

	b	Determine the Thevenin's equivalent circuit for the circuit shown in figure.	AP	2	13

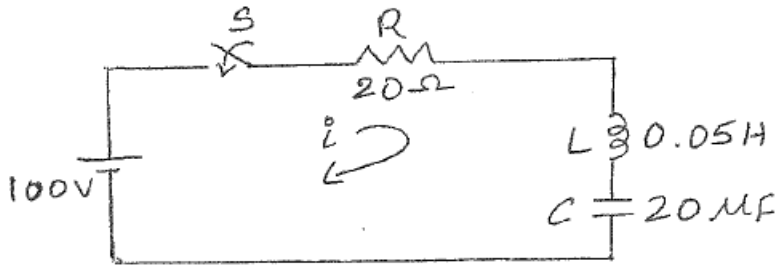


13.	a	For the circuit shown solve the complete solution of current when switch is closed at t=0. Applied voltage e = 50cos (100t+$\frac{\pi}{4}$).	AP	3	13

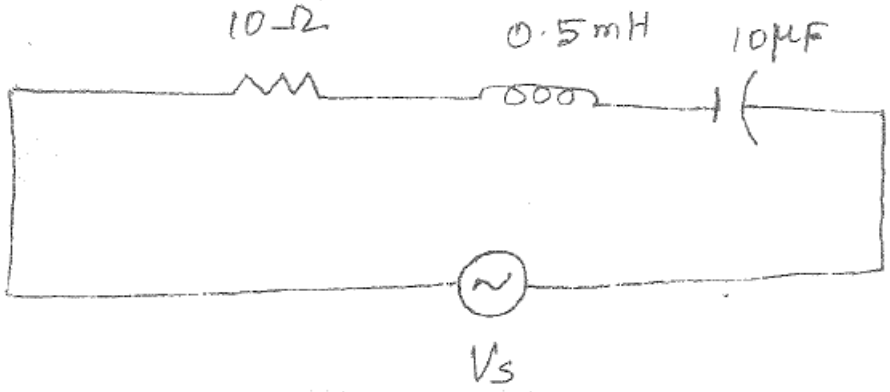


Or

	b	For the circuit shown find the current transient when the switch is closed at t=0.	AP	3	13



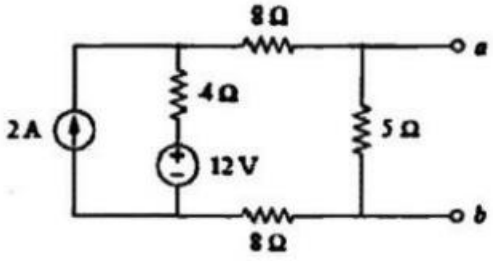
14.	a	i	Examine the impedance at resonant frequency, 10Hz above the resonant frequency and 10Hz below the resonant frequency for the circuit shown in the figure.	AP	4	7



		ii	Derive the expression Q factor for parallel resonance.	UN	4	6
			Or			
	b	i	Two identical coupled coils are connected in series has an equivalent inductance values of 0.084H and 0.0354H. Find L_1, L_2 and mutual inductance.	AP	4	7
		ii	Obtain the coefficient of coupling for a couple circuits.	UN	4	6
15.	a		With necessary phasor and circuit diagram, deduce the voltage, current, impedance and power relations in three phase delta connected system.	UN	5	13
			Or			
	b		Show that three phase power can be measured by using two wattmeter's in the balanced load and unbalanced load. Draw the phasor diagrams. Also derive an expression for power factor in terms of wattmeter readings.	UN	5	13

*PART – C (Marks 1*15 = 15)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
16.	a	i	Determine the Norton's equivalent circuit for the circuit shown in figure.	AP	2	9



		ii	In a parallel resonance circuit (Tank circuit) R=2Ω, L=1mH and C=10μF, determine the resonant frequency and bandwidth.	AP	4	6
			Or			

b	i	A balanced 3 Phase star connected load is fed from 400V, 3Ø, 50Hz supply. The current per phase is 25A (Lagging) and total power observed by load is 13.86KW. Determine i) Resistance and inductance of the load per phase ii) Total reactive power iii) Total Apparent power	AP	5	9
	ii	Two inductively coupled coils have self-inductances L_1 = 50 mH and L_2 = 200 mH. If coefficient of coupling is 0.5, Test for i) Mutual inductance between two coils ii) The maximum possible mutual inductance	AP	4	6