

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

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

Second Semester

Electronics and Communication Engineering

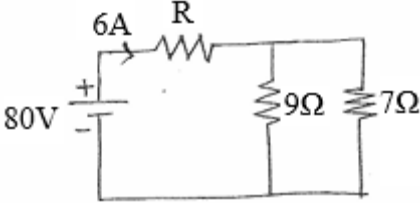
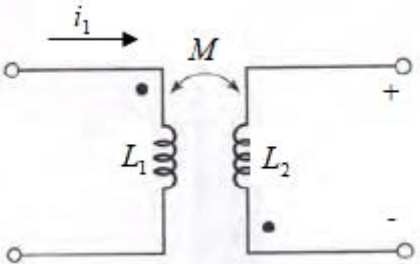
EC3251 – Circuit Analysis

Regulations - 2021

Duration : 3 Hrs

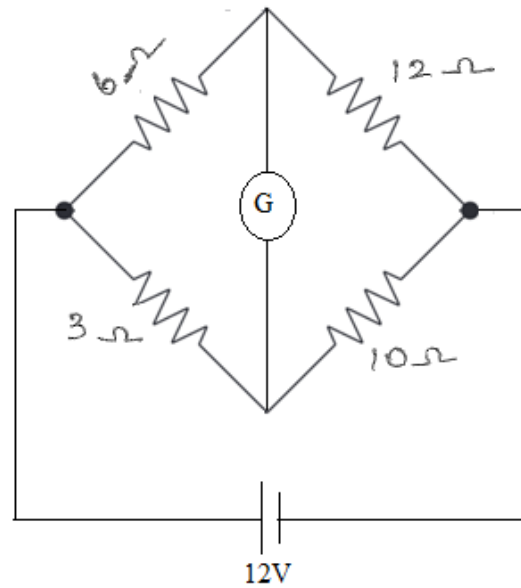
Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Define Kirchoff's voltage law.	UN	1	2
2.	Determine the value of R in the circuit shown below.	AP	1	2
				
3.	State Norton's theorem.	RE	2	2
4.	The open circuit voltage V_{oc} and Thevenin's resistance R_{th} is given as 12.6V and 32Ω . Calculate the maximum power transferred.	AP	2	2
5.	Represent an inductor and its associated voltage and current in time domain and frequency domain.	UN	3	2
6.	Give the relationship between apparent power and power factor. Give your inference.	RE	3	2
7.	For an RL circuit with $R=200\Omega$ and $L=50\text{mH}$, the inductor has a current $i_L=2\text{A}$ at $t=0$, find the expression for $i_L(t)$ at $t=200\mu\text{s}$.	AP	4	2
8.	Write the formula for Q-factor of RC and RLC circuits.	RE	4	2
9.	Assuming $M=10\text{H}$, coil L_2 is open circuited and $i_1 = -2e^{-5t}\text{A}$, find the voltage v_2 for the given circuit.	AP	5	2
				
10.	Define coupling coefficient.	RE	5	2

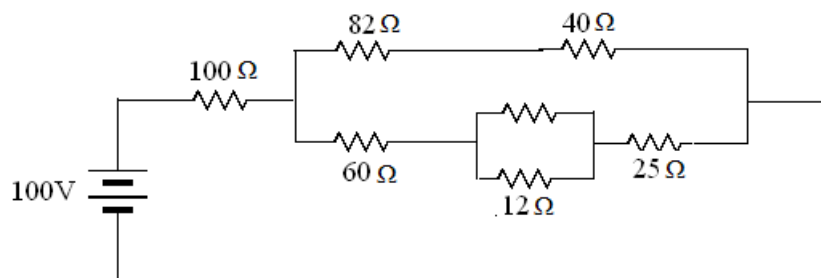
PART - B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

Q.No	Questions	BLT	CO	Marks
11.	a i From the given circuit, determine the current through the Galvanometer using Kirchoff's laws.	AP	1	7



- ii For the circuit shown below, find the total resistance.

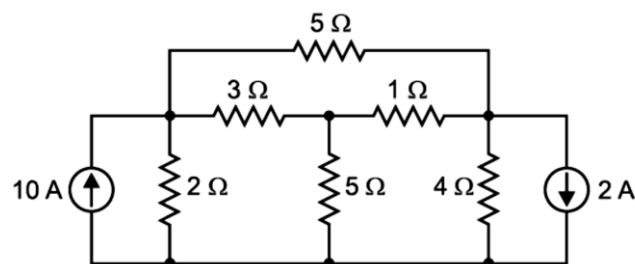
AP 1 6



Or

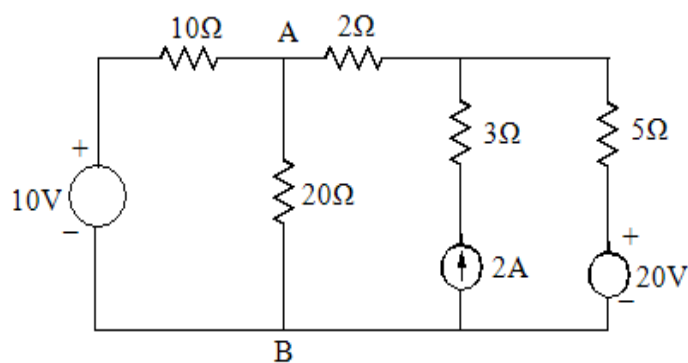
- b Use nodal analysis to find the currents in various resistors of the circuit shown below.

AP 1 13



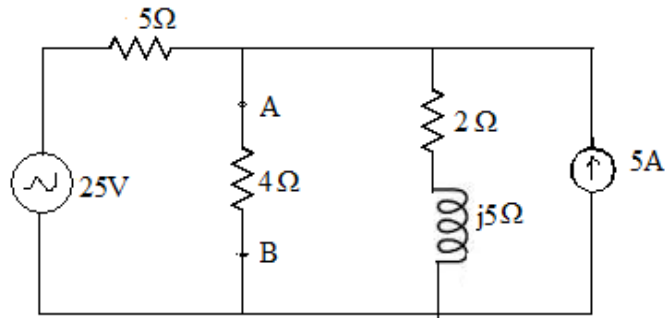
12. a By using the superposition theorem, find the voltage across the 2Ω resistor from the given circuit.

AP 2 13

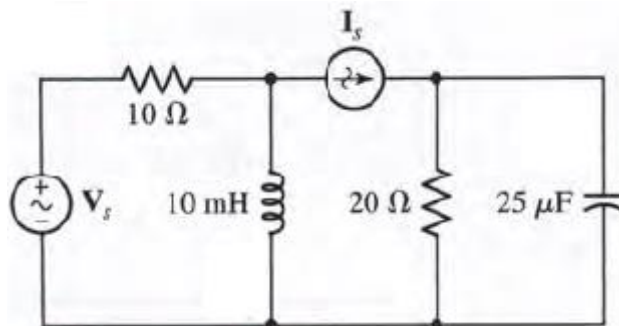


Or

- b From the given circuit, find the current through R_L connected across A-B terminals by utilizing the Thevenin's theorem. Also obtain the maximum power delivered to the load. AP 2 13

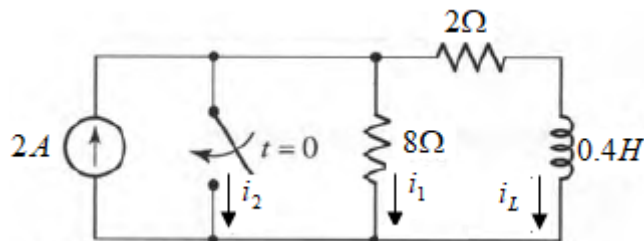


13. a For the circuit shown below, let $\omega = 1200 \text{ rad/s}$, $I_C = 1.2 \angle 28^\circ \text{ A}$ and $I_L = 3 \angle 53^\circ \text{ A}$. Analyze by finding (a) I_s (b) V_s and (c) $I_r(t)$. AN 3 13



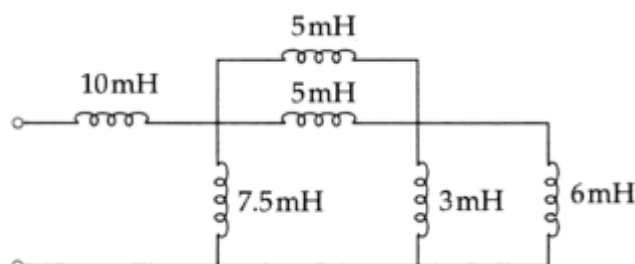
Or

- b A 100Ω resistor and 30mH inductor are connected in series across a 230V , 50Hz supply. Analyze by finding (a) Impedance (b) Current (c) Apparent power (d) Active power and (e) Voltage across the resistor and inductor. AN 3 13
14. a At $t = 0.15\text{s}$ in the circuit shown below, Find the value of (a) i_L (b) i_1 (c) i_2 . AP 4 13



Or

- b A parallel resonant circuit is composed of the elements $R = 8\text{K}\Omega$, $L = 50\text{mH}$ and $C = 80\text{nF}$. Find (a) ω_0 (b) Q_0 (c) ω_d (d) α (e) ζ . AP 4 13
15. a i Find and analyze the equivalent circuit of the following circuit shown in the following circuit. AN 5 7



- ii In a coupled circuit $L_2 = 16L_1$ and coupling coefficient $k = 0.6$. When L_1 and L_2 are connected in series coupling, the equivalent inductance is 73.2mH . Analyze by finding L_1 , L_2 and M . AN 5 6

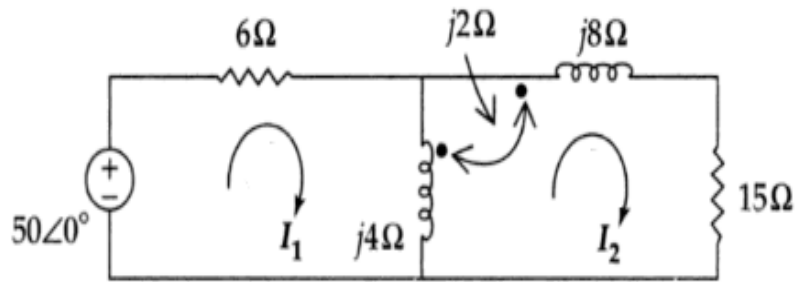
Or

b Analyze by calculating the mesh currents in the circuit shown below.

AN

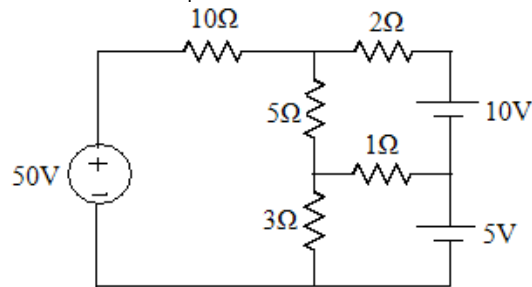
5

13



PART - C (Marks 1*15 = 15)

Q.No	Questions	BLT	CO	Marks
16.	a i Determine the mesh current I_1 in the circuit shown below.	AP	1	7

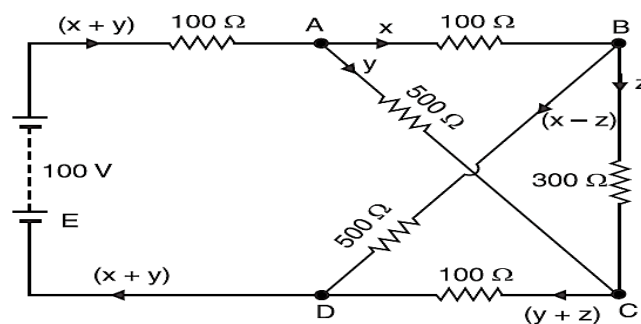


ii Determine the current supplied by the battery in the circuit shown in below.

AP

1

8



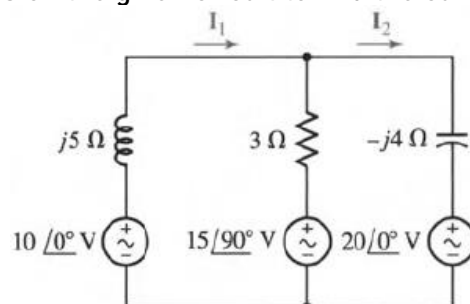
Or

b i Use Mesh analysis on the given circuit to find the currents I_1 and I_2 .

AP

3

8



ii Calculate values for the average power delivered to each of the two loads shown below, the apparent power supplied by the source and power factor of the combined loads.

AP

3

7

