ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2024

ELECTRONICS AND COMMUNICATION ENGINEERING

Semester II
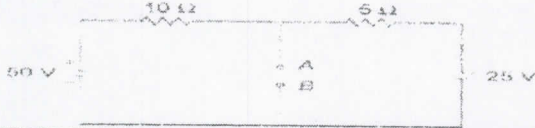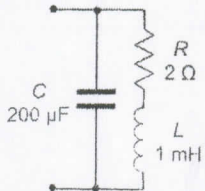
EC3201 & CIRCUIT THEORY

(Regulation 2023)

Time: 3hrs   Max. Marks: 100

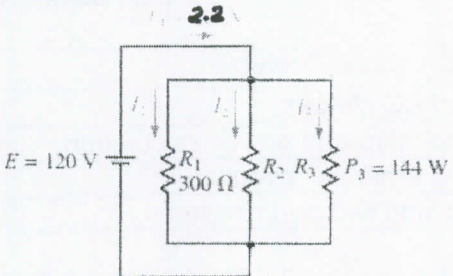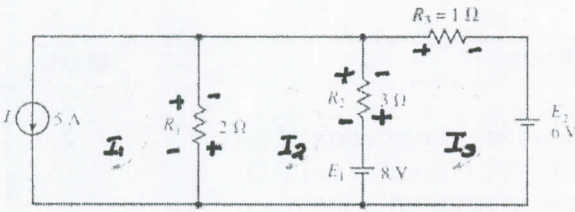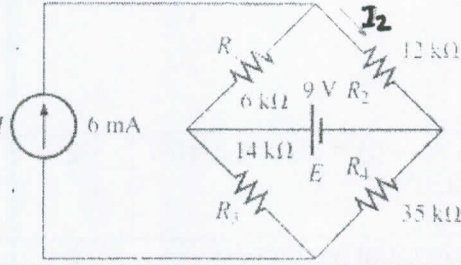|	
CO1	Ability to apply the basic laws for DC and AC circuits Analysis.
CO2	Ability to apply Network Theorems in DC and AC circuits.
CO3	Ability to analyse AC circuits for phase relationship and power calculation.
CO4	Ability to design and analyse first and second order AC circuits.
CO5	Ability to analyse inductively coupled circuits and two port networks.

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)
(Answer all Questions)

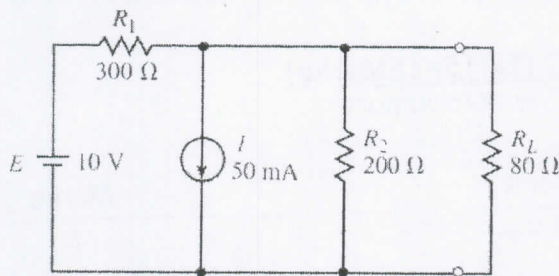| Q. No.	Questions	Marks	CO	BL
1	State Kirchoff's Current Law.	2	1	1
2	A 10 Ω resistor is in series with a parallel combination of two resistors of 15 Ω and 5 Ω. If the constant current in the 5 Ω resistor is 6A, what is the total power dissipated in the three resistors?	2	1	3
3	State Maximum Power Transfer Theorem.	2	2	1
4	Determine the Norton's equivalent circuit across AB for given circuit.	2	2	2
5	Draw phasor diagram for the following signals: $i_1(t) = 6Cos(\omega t-40°)$ A; $i_2(t) = 5Sin(\omega t-20°)$ A; $v_2(t) = 25Cos(\omega t+220°)$ V; $v_1(t) = -4Sin(\omega t+50°)$ V	2	3	2
6	Determine the admittance of the following circuit at frequency 400Hz.	2	3	5
7	Define time constant of RC network.	2	4	1
8	If R = 20 Ω, L = 0.6 H, what value of C will make an RLC series circuit critically damped.	2	4	3

| 9 | Find the coupling coefficient of two coils having $L_1 = 2H$, $L_2 = 8H$ and M=3H. | 2 | 5 | 3 |
| 10 | A 480/2400 V_{rms} step-up ideal transformer delivers a power of 50kW to a resistive load. Calculate the turns ratio, primary and secondary currents. | 2 | 5 | 5 |

PART- B (5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No.	Questions	Marks	CO	BL
11 (a)	Determine the total power delivered by the voltage source. Find the value of I_1, I_2, I_3, R_1 and R_2. Also calculate the power dissipated by each resistor.	13	1	3
	OR			
11 (b)	Determine I_1, I_2 and I_3 using mesh analysis.	13	1	4
12 (a)	Using the principle of superposition, find the current I_2 through the 12 KΩ resistor.	13	2	3
	OR			

12 (b)	Find the Thevenin equivalent circuit. Hence determine the current I_L through the load resistor R_L.	13	2	3
13 (a)	Using Mesh analysis, determine the loop currents.	13	3	3
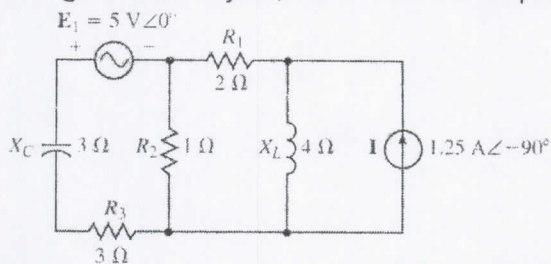
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13 (b)	Compute the following: (i) Real Power (ii) Reactive Power (iii) Complex Power (iv) Apparent Power (v) Power Factor.	13	3	5
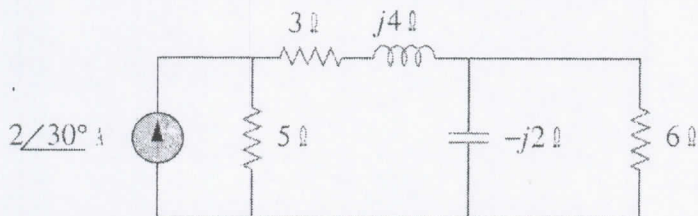
14 (a)	Obtain the voltage response and time constant of a source free RL circuit.	13	4	2

<div align="center">OR</div>

14 (b)(i)	Consider a series RLC circuit, Derive the formula for resonant frequency and quality factor of the circuit.	8	4	2
(ii)	In a series RLC circuit, R=50 Ω, L=2mH, C= 1 µF. Find the ω_o, f_o, Bandwidth and Q-factor.	5	4	3

15 (a)	Determine I_1 and I_2.	13	5	5
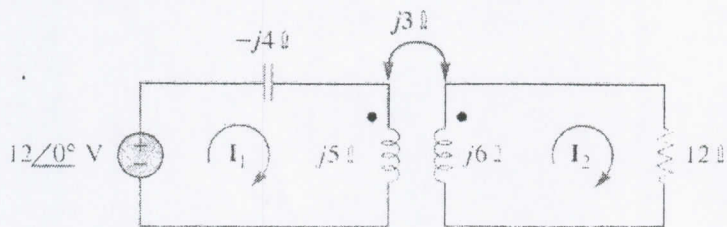
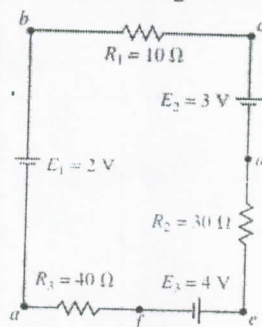<div align="center">OR</div>
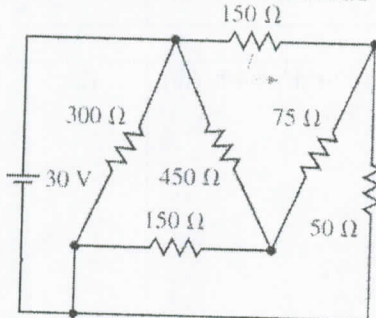
15 (b)	Explain how incidence matrix is derived from a graph with suitable example and express the branch current in terms of loop current using tie-set matrix.	13	5	3

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PART- C (1x 15=15Marks)
(Q.No.16 is compulsory)

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Q. No.	Questions	Marks	CO	BL
16. (i)	Find the voltages : V_{ac}, V_{ad}, V_{cf} and V_{eb}. 	8	1	5
(ii)	Determine the current value I. 	7	2	3