28/12/24 (AN)

RollNo. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

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

ECE DEPARTMENT

II Semester

EC5251 - CIRCUIT THEORY

(Regulation 2019)

Time:3hrs Max.Marks: 100

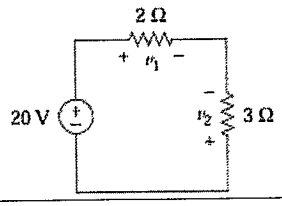
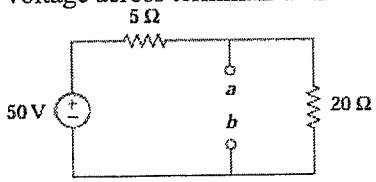
CO1	Ability to apply the basic laws for DC and AC circuits Analysis
CO2	Ability to apply Network Theorems in DC and AC circuits
CO3	Ability to analyse AC circuits for phase relationship and power calculation
CO4	Ability to design and analyse first and second order AC circuits
CO5	Ability to analyse inductively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

BL – Bloom's Taxonomy Levels

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

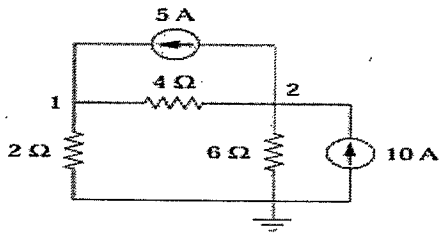
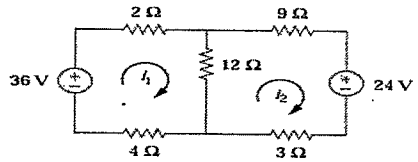
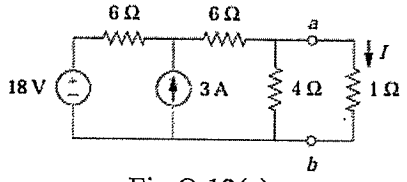
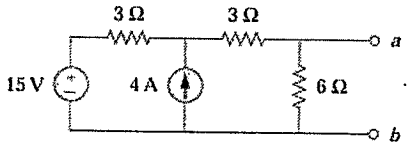
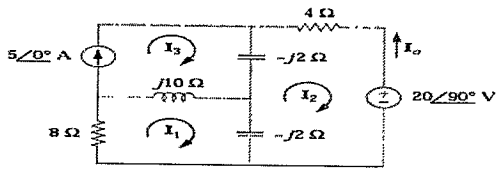
PART- A(10x2=20Marks)

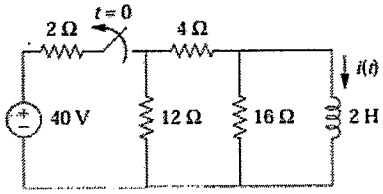
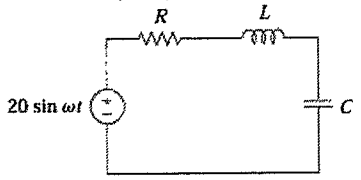
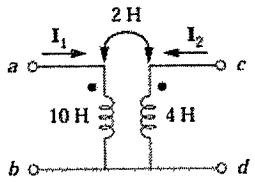
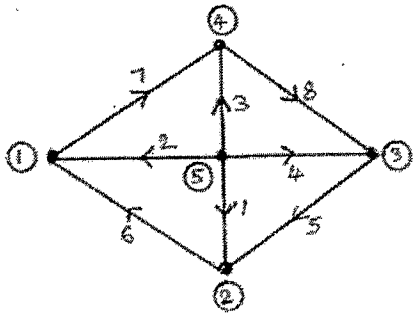
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Find the voltages v1,v2 from the given circuit 	2	1	4
2	Define Ohms Law	2	1	4
3	State Reciprocity Theorem	2	2	1
4	Find the Thevenin voltage across terminals a and b of the given circuit 	2	2	3
5	Draw phasor diagram for RL circuit.	2	3	3
6	Define Apparent power	2	3	3
7	A parallel resonant circuit with quality factor 120 has a resonant frequency of 6×106 rad/s. Calculate the bandwidth and half-power frequencies.	2	4	4
8	Define Quality Factor	2	5	2
9	Find the coupling coefficient k of two coils having L_1 = 2H, L_2= 8H and M=3H	2	5	4
10	What is an ideal transformer?	2	5	1

PART- B(5x 13=65Marks)

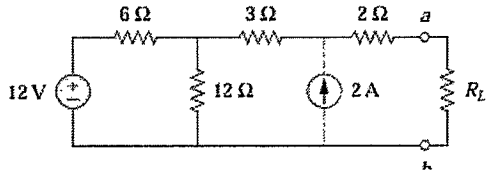
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Calculate the node voltages in the circuit shown in Fig.Q.11(a).  Fig.Q.11(a).	13	1	4
	OR			
11 (b)	Using Mesh Analysis, calculate the current i_1, i_2 from the given circuit in Fig.Q.11(b).  Fig.Q.11(b).	13	1	4
12 (a)	Using Thevenin's theorem, find the equivalent circuit to the left of the terminals in the circuit of Fig.Q.12(a) and Find I.  Fig.Q.12(a)	13	2	5
	OR			
12 (b)	Find the Norton equivalent circuit for the circuit in Fig.Q.12(b), at terminals a-b.  Fig.Q.12(b)	13	2	5
13 (a)	Determine current Io in the circuit of Fig.Q.13(a) using mesh analysis.  Fig.Q.13(a)	13	3	4
	OR			

13 (b)	A load Z draws 12 kVA at a power factor of 0.856 lagging from a 120-Vrms sinusoidal source. Find: (a) the average and reactive power delivered to the load (b) peak current (c) the load impedance	13	3	4
14 (a)	The switch in the circuit of Fig.Q.14(a) has been closed for a long time. At t=0, the switch is opened. Calculate i(t) for t>0  Fig.Q.14(a)	13	4	2
	OR			
14 (b)	In the circuit of Fig.Q.14(b), R= 2Ω, L= 1mH and C= 0.4 μF (a)Find the resonant frequency and the half-power frequencies. (b) Calculate the quality factor and bandwidth. (c) Determine the amplitude of the current at ω0, ω1, and ω2  Fig.Q.14(b)	13	4	2
	OR			
15 (a)	Determine the T-equivalent circuit of the linear transformer in Fig.Q.15(a)  Fig.Q.15(a)	13	5	3
	OR			
15 (b)	Form the tie-set schedule for the given network-oriented graph shown in Fig.Q.15(b). Outline the procedure to solve the branch currents using Tie-set matrix.  Fig.Q.15(b)	13	5	3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Find the value of R_L for maximum power transfer in the circuit of Fig.Q.16. Also calculate the maximum power.  Fig.Q.16	15	1	4