Q. Code:812654

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Third -Semester

EC18303 – CIRCUIT THEORY

(Electronics and Communication Engineering)

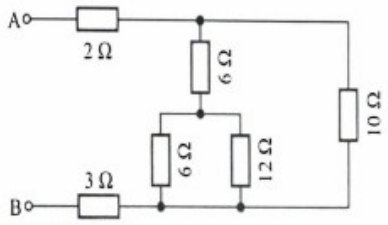
(Regulation 2018/2018A)

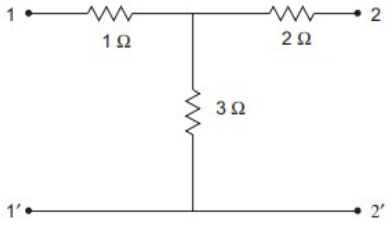
TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Determine the characteristics of electrical circuits by applying circuit laws	**4**
CO 2	Compare the phasor diagram of R, L and C and analyze the AC circuit power	**4**
CO 3	Infer the phenomenon of series and parallel resonance in electrical circuits and understand the effect of magnetic coupling between windings	**4**
CO 4	Compare the characteristics of RC, RL and RLC circuits for AC and DC inputs and evaluate the two port network parameters	**4**
CO 5	Sketch the various network topologies	**3**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

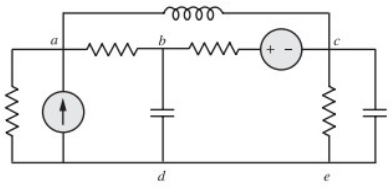
		CO	RBT LEVEL
1.	When two resistors R1 and R2 are connected in series then the equivalent resistance is 25Ω and if in parallel equivalent resistance is 6Ω. Then find R1 and R2?	**1**	**2**
2.	Determine the equivalent resistance between the terminals A and B in following circuit. 	**1**	**2**
3.	For a series RL circuit if the supply voltage is v(t) =10cos(2t+60^0)V, R= 10Ω and L=5H.Find current in the circuit in polar form?	**2**	**4**
4.	What is phasor? why phasor concept is required in AC circuit analysis?	**2**	**2**
5.	A series RLC circuit has R=100Ω, X_C=62.833 Ω. Find the value of L for resonance at 50Hz.	**3**	**3**
6.	What is the maximum possible mutual inductance of two inductively coupled coils with self-inductances of 400mH and 800mH?	**3**	**2**
7.	Compute the value of R and L when the current through the RL circuit excited by a 10V DC source is given by i(t) = 2(1-e^{-10t}) A. Assume zero initial condition.	**4**	**4**
8.	Find the Z- parameters of the following two port network.	**4**	**2**



9. Find the incidence matrix for the below reduced incidence matrix. **5** **2**

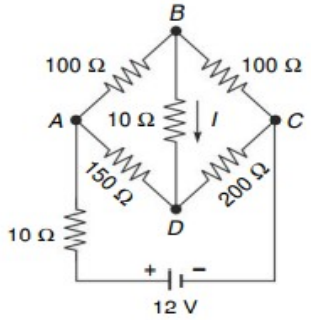
$$\begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{c} \begin{array}{cccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array} \\ \left[\begin{array}{cccccccc} 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & -1 & 1 & -1 \\ 0 & 0 & 0 & 1 & 0 & 0 & -1 & 0 \end{array}\right] \end{array}$$

10. For the circuit shown below, draw the graph, one tree and its co-tree. **5** **2**



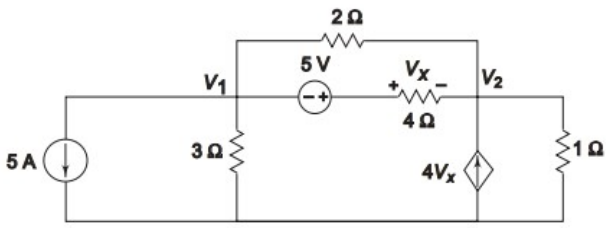
PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	In the bridge circuit shown below, find the current through 10 Ω resistor across BD using mesh analysis.	**(14)**	**1**	**4**

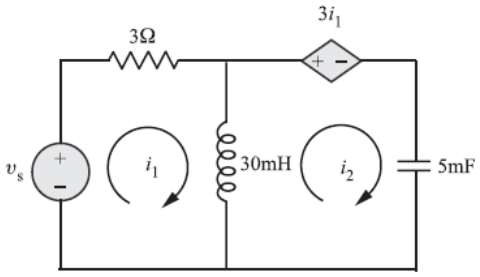


(OR)

(b)	Find the node voltages and voltage V_X for the following circuit.	**(14)**	**1**	**4**

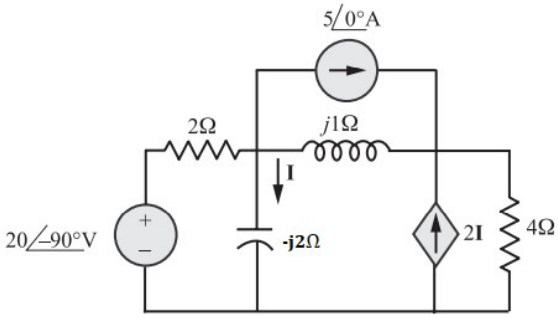


12. (a)	Find steady state sinusoidal currents i_1 and i_2 for the circuit shown below, when $V_s = 10\sqrt{2}\cos(100t + 45^0)$ V.	**(14)**	**2**	**4**



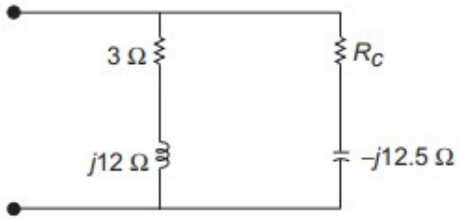
(OR)

(b) Find the node voltages in the circuit shown below? **(14)** **2** **4**



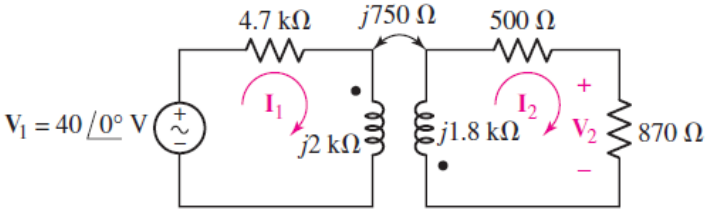
13. (a) **(i)** A series RLC circuit consists of R = 100 ohms, L=0.02 H and C=0.02 microfarad. Calculate resonance frequency, quality factor, bandwidth and maximum current at resonance if 50V sinusoidal signal is applied. **(7)** **3** **4**

(ii) For the below circuit, determine the value of R_C for which the given circuit resonates **(7)** **3** **4**

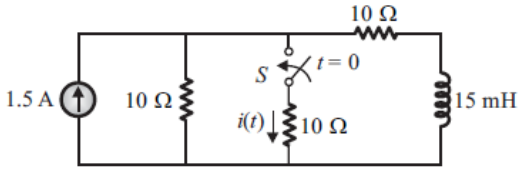


(OR)

(b) For the given circuit, determine the mesh currents I_1 and I_2. And also find the voltage drop across 870 Ω resistor. **(14)** **3** **4**

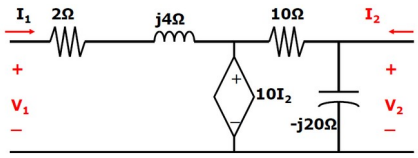


14. (a) In the circuit shown, the switch *S* is open for a long time and is closed at t =0. Determine the current $i(t)$ for $t \geq 0^+$. **(14)** **4** **4**

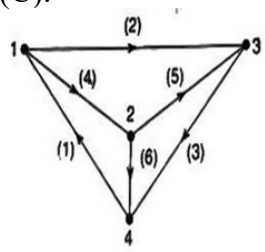


(OR)

(b) Find the open circuit impedance parameters of the following circuit. **(14)** **4** **4**

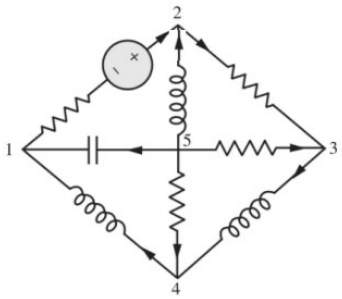


15. (a) For the given graph, find Incidence matrix (A), Tie-set matrix (B) and fundamental cut-set matrix (C). **(14)** **5** **4**



(OR)

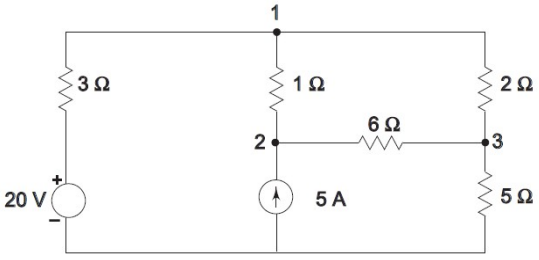
(b) For the given network, determine the incidence matrix(A), Tie-set matrix(B), and cut-set matrix(C). **(14)** **5** **4**



PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Evaluate the power dissipated in the 6Ω resistor for the following circuit?	**(10)**	1	**5**



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