Q. Code:853225

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

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

Second Semester

EC22202– CIRCUIT THEORY

(Electronics and Communication Engineering)

(Regulation 2022)

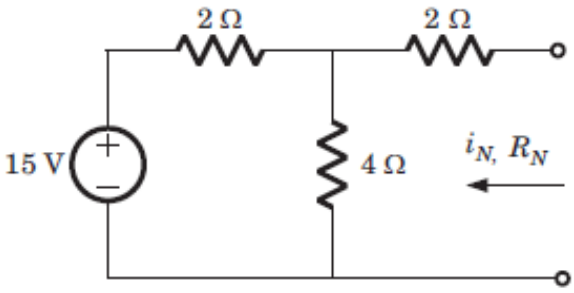
TIME: 2 HOURS **MAX. MARKS: 60**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply suitable network theorems and analyze AC and DC circuits.	**3**
CO 2	Infer the phenomenon of series and parallel resonance in electrical circuits and understand the effect of magnetic coupling between windings.	**2**
CO 3	Analyze the transient response for any RC, RL and RLC circuits.	**4**
CO 4	Evaluate the two port network parameters	**5**
CO 5	Sketch the various network topologies.	**4**

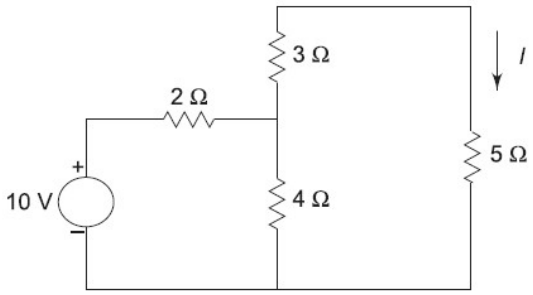
PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

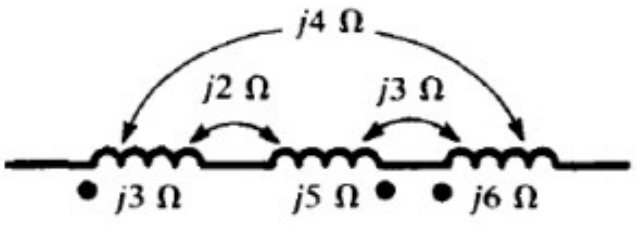
		CO	RBT LEVEL
1.	Find norton's equivalent resistance (R_N) for the below circuit.	**1**	**2**



2.	Verify the reciprocity theorem for the below circuit.	**1**	**2**

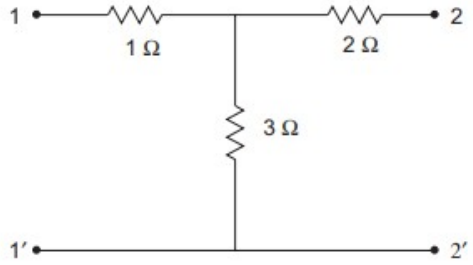


3. For the given circuit, determine the equivalent inductive reactance. **2** **4**

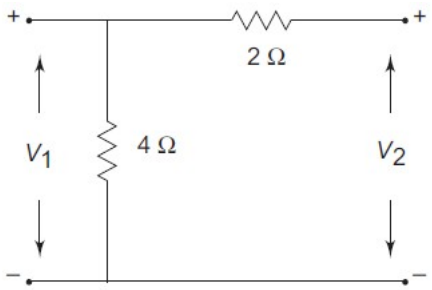


4. Compute the value of R and L when the current through the RL circuit excited by a 10V DC source is given by $i(t) = 2(1-e^{-10t})$ A. Assume zero initial condition. **3** **4**

5. Find the z- parameters of the following two port network. **4** **4**



6. Find the h-parameters of the following network. **4** **2**



7. The impedance parameters of a two-port network are Z11 = 6Ω; Z22 = 4 Ω; Z12 = Z21 = 3 Ω. Compute the Y parameters and write the describing equations. **4** **2**

8. For a two-port bilateral and reciprocal network, the three transmission parameters are given by A = 6/ 5, B = 17/ 5 and C = 1 /5, what is the value of D? **4** **4**

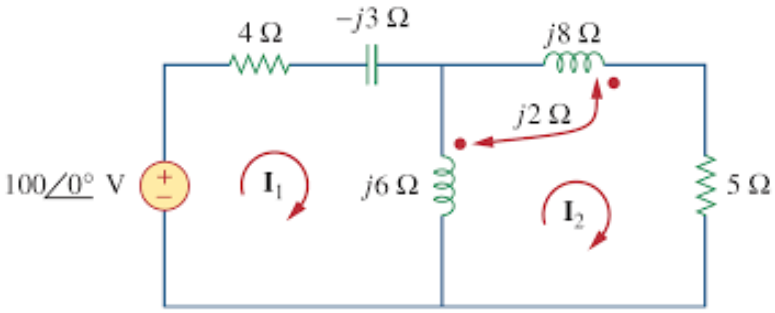
9. Define oriented graph. **5** **2**

10. For the reduced incidence matrix shown below, find the incidence matrix. **5** **4**

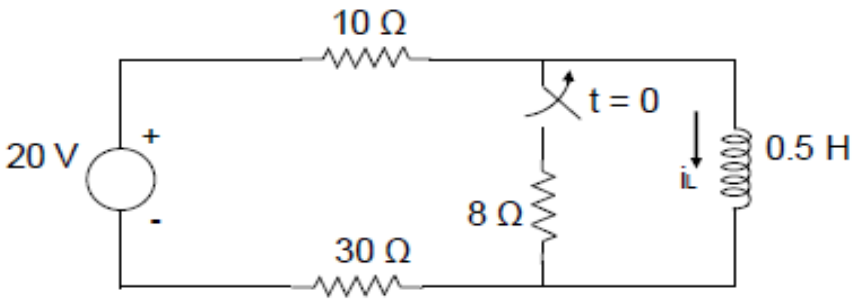
$$\begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{c} \begin{array}{cccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array} \\ \left[\begin{array}{cccccccc} 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & -1 & 1 & -1 \\ 0 & 0 & 0 & 1 & 0 & 0 & -1 & 0 \end{array}\right]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

PART- B (3 x 10 = 30 Marks)

		Marks	CO	RBT LEVEL
11. (a)	A series RLC circuit consists of R = 100 ohms, L=0.02 H and C=0.02 microfarad. Calculate resonance frequency, quality factor, bandwidth, half power frequencies and maximum current at resonance if 100V sinusoidal signal is applied.	**(10)**	**2**	**4**
	(OR)			
(b)	Find the mesh currents for the circuit shown below,	**(10)**	**2**	**4**

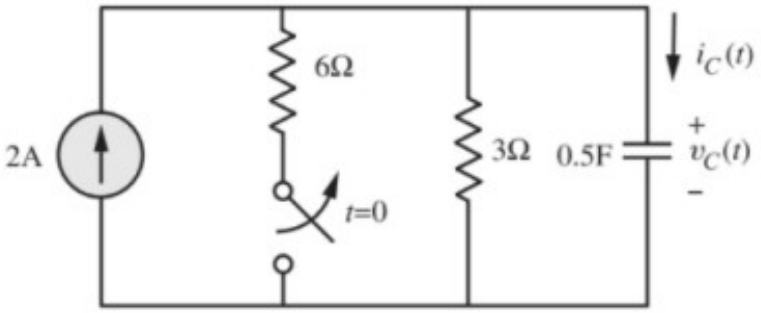


12. (a)	The switch in the circuit shown below was in closed position for a long time. Find current $i_L(t)$ for time t > 0.	**(10)**	**3**	**4**

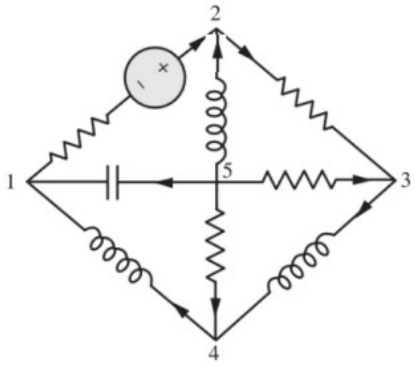


(OR)

(b)	Determine the voltage $V_C(t)$ and the current $i_C(t)$ for t ≥ 0 for the circuit shown below.	**(10)**	**3**	**4**

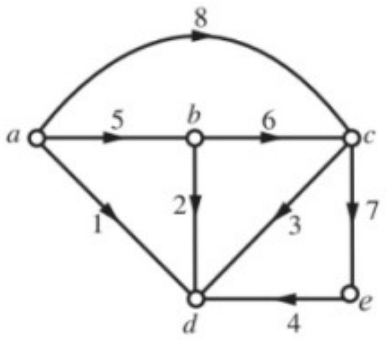


13. (a)	For the given network, determine the incidence matrix (A), Tie-set matrix (B), and cut-set matrix.	**(10)**	**5**	**4**



(OR)

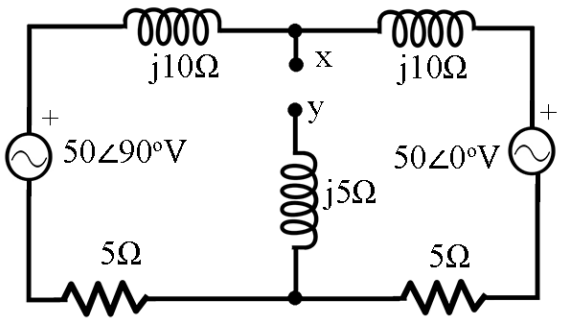
(b)	For the given network graph, determine the incidence matrix (A), Tie-set matrix (B), and cut-set matrix (C).	**(10)**	**5**	**4**



PART- C (1 x 10 = 10 Marks)

(Q.No.14 is compulsory)

		Marks	CO	RBT LEVEL
14.	If 10 Ω resistor is connected across XY terminal as load in the below circuit. Evaluate the current through the 10 Ω load resistor using thevenin's theorem.	**(10)**	**1**	**5**



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