INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**NETWORK ANALYSIS**				
Course Code	**AEEB09**				
Programme	**B.Tech**				
Semester	**III**	**EEE**			
Course Type	**Core**				
Regulation	**IARE - R18**				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	-	-
Chief Coordinator	**Ms. S Swathi, Assistant Professor, EEE**				
Course Faculty	**Dr. D Shobharani, Professor, EEE** **Ms. S Swathi, Assistant Professor, EEE**				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Apply network theorems to obtain the equivalent circuit of electrical networks.
II	Analyze the transient response of series and parallel RL, RC, RLC circuits for DC and AC excitations.
III	Understand the concept of locus diagram for series and parallel circuits and also network functions for one port and two port networks.
IV	Evaluate the two port network parameters and Discuss their interrelation and interconnection of networks.
V	Design different types of filters and study their characteristics.

COURSE OUTCOMES (COs):

CO 1	Summarize the procedure of network theorems to reduce complex network into simple equivalent network with DC and AC excitation
CO 2	Estimate the transient response of series and parallel circuits with DC and AC excitation.
CO 3	Understand the concept of locus diagram for series and parallel circuits and Generalize the concept of network functions for one port and two port networks
CO 4	Calculate Z, Y, ABCD, H and image parameters of two port network and understand the concept of interrelation, interconnection, symmetry and reciprocity conditions.
CO 5	Design of low pass, high pass, band pass, band elimination and study their characteristics.

COURSE LEARNING OUTCOMES (CLOs):

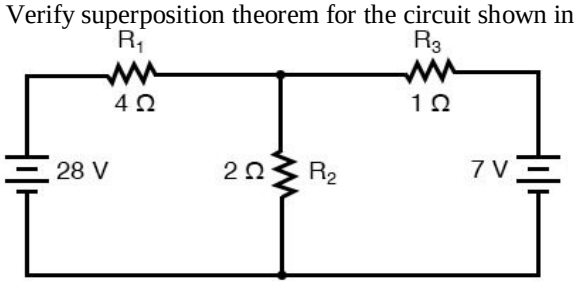
Students, who complete the course, will have demonstrated the ability to do the following:

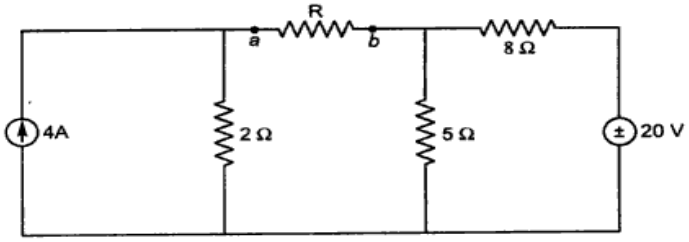
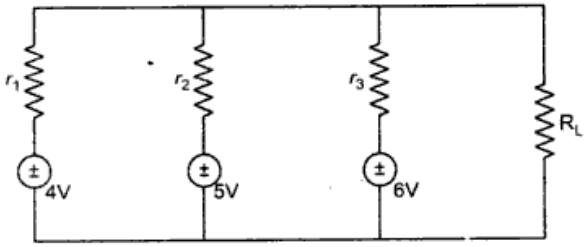
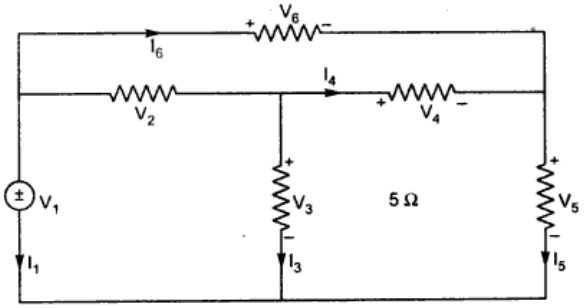
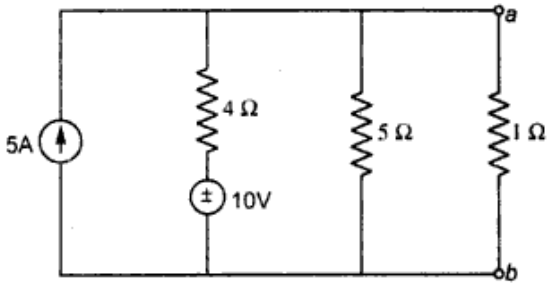
AEEB09.01	Verify the law of conservation of energy, Tellegen's, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitation.
AEEB09.02	Summarize the procedure of Thevenin's, Norton's and Milliman's theorems to reduce complex network into simple equivalent network.
AEEB09.03	Estimate the transient response of series and parallel circuits with DC excitation.
AEEB09.04	Analyze the transient response of series and parallel circuits with AC excitation.
AEEB09.05	Evaluate the transient response of first and second order electric circuits using differential equation approach.
AEEB09.06	Determine the transient response of first and second order electric circuits using Laplace transform technique.
AEEB09.07	Explain the concept of locus diagram for series and parallel circuits.
AEEB09.08	Generalize the concept of network functions for one port and two port networks
AEEB09.09	Observe the Time Response From pole - zero plots.
AEEB09.10	Examine the electric networks in time domain and frequency domain.
AEEB09.11	Calculate Z, Y, ABCD, H and image parameters of two port network.
AEEB09.12	Derive the condition for symmetry and reciprocity for different parameters of two port networks.
AEEB09.13	Inter relationships between various two port networks them.
AEEB09.14	Outline the concepts of interconnections of two port networks.
AEEB09.15	Design of low pass, high pass, band pass, band elimination and study their characteristics.
AEEB09.16	Apply the concept of network theorems, switching transient to solve real time world applications.
AEEB09.17	Process the knowledge and skills for employability and to succeed national and international level competitive examinations.

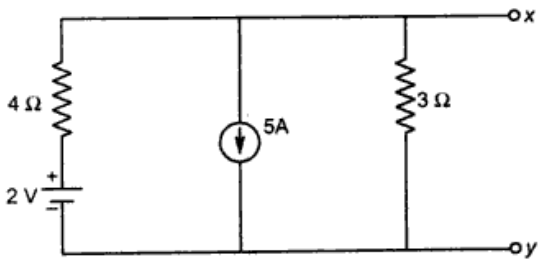
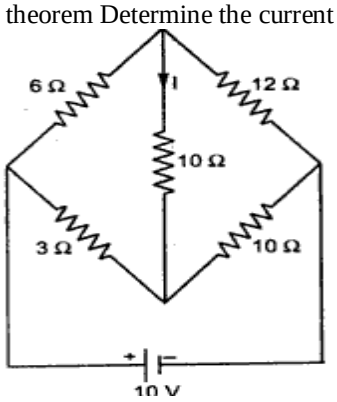
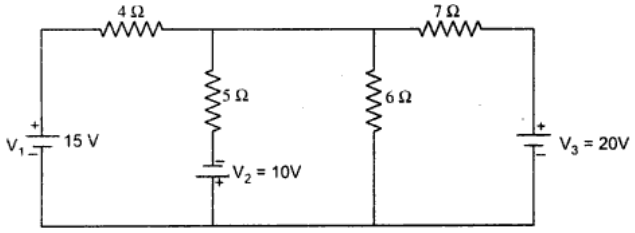
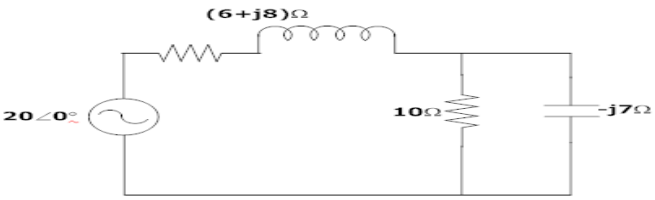
TUTORIAL QUESTION BANK

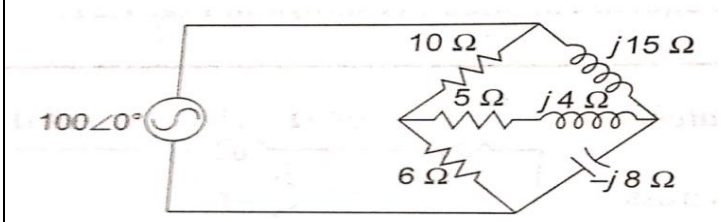
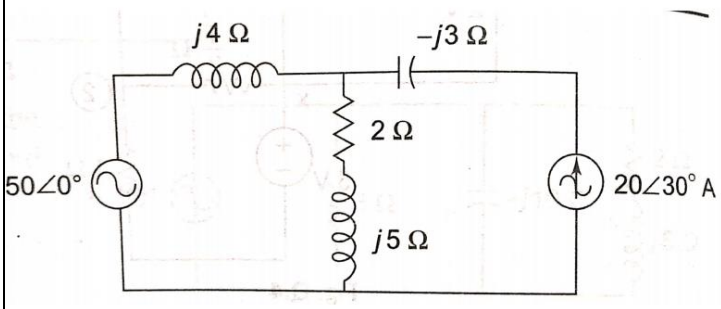
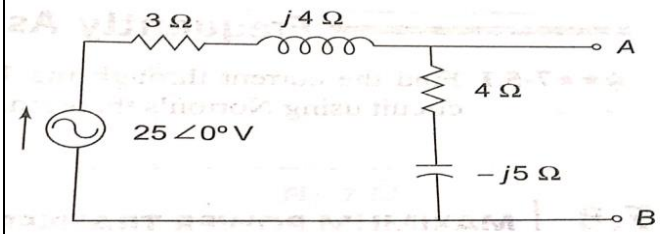
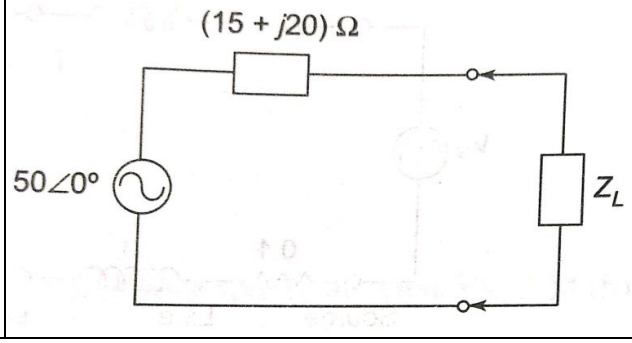
MODULE- I				
NETWORK THEOREMS (DC AND AC)				
PART – A (SHORT ANSWER QUESTIONS)				
S. No	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**	**Course Learning Outcomes (CLOs)**
1	State Tellegen's theorem.	Remember	CO 1	AEEB09.01
2	State Thevenin's theorem.	Remember	CO 1	AEEB09.02
3	State Norton's theorem.	Remember	CO 1	AEEB09.02

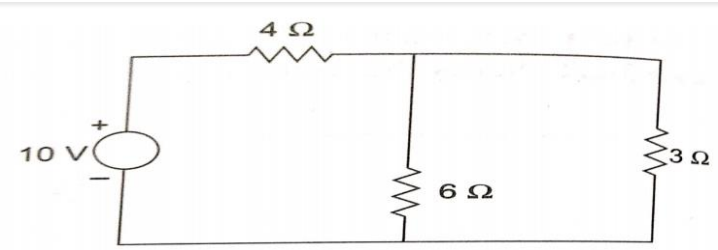
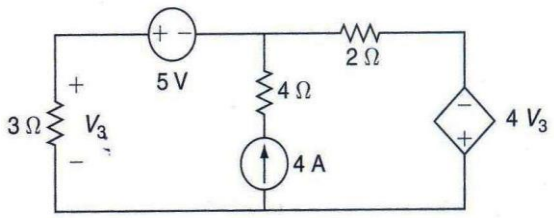
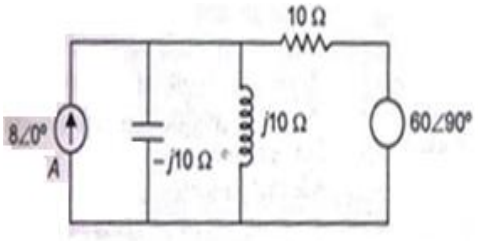
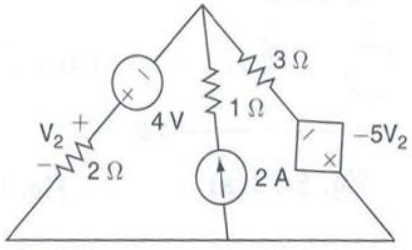
4	State super-position theorem.	Remember	CO 1	AEEB09.01
5	State reciprocity theorem.	Remember	CO 1	AEEB09.01
6	State compensation theorem.	Remember	CO 1	AEEB09.02
7	State Milliman's theorem.	Remember	CO 1	AEEB09.02
8	State maximum power transfer theorem	Remember	CO 1	AEEB09.01
9	Give the application of maximum power transfer theorem	Remember	CO 1	AEEB09.01
10	Write the importance of Thevenin's theorem.	Understand	CO 1	AEEB09.02
11	Give the importance of Norton's theorem.	Understand	CO 1	AEEB09.02
12	Write the importance of super-position theorem.	Understand	CO 1	AEEB09.01
13	Give the importance of Milliman's theorem.	Understand	CO 1	AEEB09.02
14	Write the importance of compensation theorem.	Understand	CO 1	AEEB09.02
15	Give the application of reciprocity theorem	Understand	CO 1	AEEB09.01
16	If the Thevenin's equivalent consists of 25v with 10 ohms draw the Norton's equivalent.	Understand	CO 1	AEEB09.02
17	If 25v, 15v and 10v are connected across AB terminals, Determine voltage measured across AB terminals.	Understand	CO 1	AEEB09.02
18	List the limitations of super-position theorem.	Understand	CO 1	AEEB09.01
19	The Norton's equivalent circuit consists of 10A in parallel with 8 ohms.Determine the load resistance for which maximum power Transfer takes place.	Understand	CO 1	AEEB09.02
20	If two branches are in parallel with 15V in series with 5 ohms and 5V in series with 1 ohm across AB terminals , calculate the current and power absorbed by 5 ohms resistor if it is connected across AB Terminals.	Understand	CO 1	AEEB09.01
PART – B (LONG ANSWER QUESTIONS)				
1	State and prove Tellegen's theorem with an example for DC excitation.	Understand	CO 1	AEEB09.01
2	State and verify Thevenin's theorem with an example for DC excitation.	Understand	CO 1	AEEB09.02
3	State and verify Norton's theorem with an example for DC excitation.	Understand	CO 1	AEEB09.02
4	State and prove super-position theorem with an example for DC excitation.	Understand	CO 1	AEEB09.01
5	State and prove reciprocity theorem with an example for DC excitation.	Understand	CO 1	AEEB09.01
6	State and explain compensation theorem with an example for DC excitation.	Understand	CO 1	AEEB09.02
7	State and prove Milliman's theorem with an example for DC excitation.	Understand	CO 1	AEEB09.02
8	State and verify Thevenin's theorem with an example for AC excitation.	Understand	CO 1	AEEB09.01
9	State and prove super-position theorem with an example for AC excitation.	Understand	CO 1	AEEB09.01

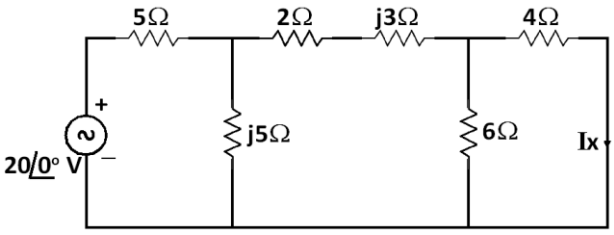
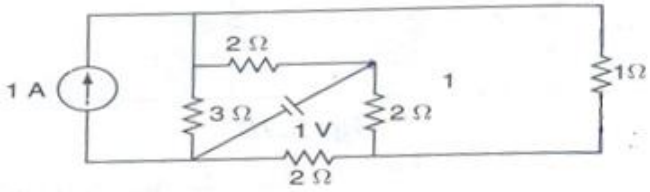
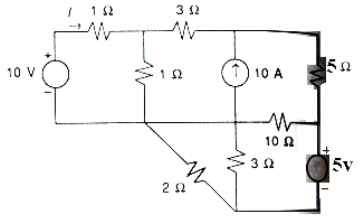
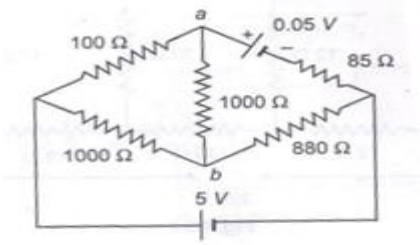
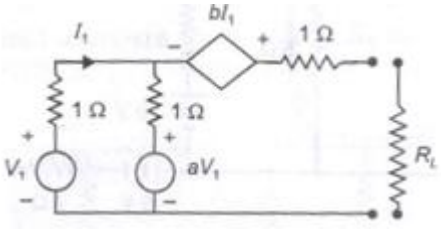
10	State and verify Norton's theorem with an example for AC excitation.	Understand	CO 1	AEEB09.02
11	Derive the condition for maximum power transfer with DC excitation and verify with an example.	Understand	CO 1	AEEB09.01
12	Derive the condition for maximum power transfer with AC excitation and verify with an example.	Understand	CO 1	AEEB09.01
13	State and explain the Milliman's theorem with AC excitation.	Understand	CO 1	AEEB09.01
14	Explain the Thevenin's equivalent and Norton's equivalent circuit with their importance.	Understand	CO 1	AEEB09.02
15	Two parallel branches are connected across AB terminals , they are 10V in series with 2 ohms and 20V in series with 5 ohms, use the necessary theorem and calculate the power absorbed by load resistor with maximum power across AB.	Understand	CO 1	AEEB09.02
16	In a series circuit the source impedance is (3 + 8j) ohms with 100V supply Design load impedance to absorb maximum power and	Understand	CO 1	AEEB09.02
17	In a network consisting three parallel branches, first across is defined as 20V in series with 5 ohms, second branch 7 ohms and third branch 10V in series with 4 ohms. Apply super-position theorem to Determine voltage drop across 7 ohm.	Understand	CO 1	AEEB09.02
18	In a network consisting of three parallel branches, first is defined as 100 series with (3 + 4j) ohms, second branch 7 ohms and third branch 50V.In series with (2 + 3j) ohms. Apply Milliman's theorem to Determine current flowing through 7 ohms	Understand	CO 1	AEEB09.02
19	In a circuit branch AB = 10 OHMS, BC = 20 OHMS, CD = 15 OHMS, BD = 8 ohms and DA = 5 OHMS and an source Of 100V in series with 5 OHMS connected across A and C. Verify the Tellegen's theorem.	Understand	CO 1	AEEB09.02
20	In a series circuit Z1 = (10 + 10j) ohms, Z2 = (5 + 3j) ohms with 100 with 45 degrees supply. Apply compensation theorem and Determine the response in Z2.	Understand	CO 1	AEEB09.02
Part - C (Problem Solving and Critical Thinking Questions)				
1	In a series circuits source resistance is 45 ohms and load resistor is with 20Vdc supply. If R_L is variable of resistances 10, 20, 30, 50, 60, 70 ohms respectively. Determine for what resistance of load maximum power is transfer, maximum power value, I and voltage drops in each case.	Understand	CO 1	AEEB09.01
2	Verify superposition theorem for the circuit shown in figure below 	Understand	CO 1	AEEB09.01

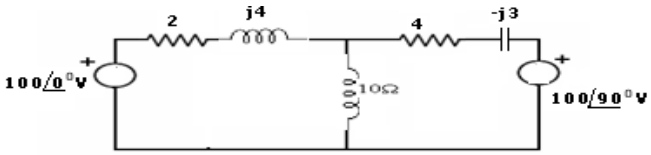
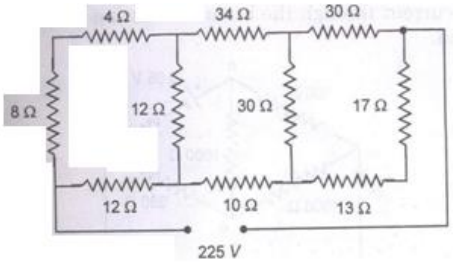
3	Determine the value of resistance R so the maximum power transfer takes place from the rest of the network to R in fig. 	Understand	CO 1	AEEB09.01
4	Using Milliman's theorem Determine the current throught R_L in the circuit and the voltage drop.($r_1 = r_2 = r_3 = 2\Omega$, $R_L = 5\Omega$) 	Understand	CO 1	AEEB09.01
5	Verify Tellegen's theorem provide $V_1 = 8V$, $V_2 = 4V$, $V_4 = 2V$, $I_1 = 4A$, $I_2 = 2A$ and $I_3 = 1A$. 	Understand	CO 1	AEEB09.02
6	Determine power loss in 1Ω resistor by Thevenin's theorem 	Understand	CO 1	AEEB09.01

7	Draw the Norton's equivalent circuit across x-y for the fig below 	Understand	CO 1	AEEB09.02
8	Using Thevenin's theorem Determine the current I in the network. 	Understand	CO 1	AEEB09.02
9	Determine the current through the 6Ω resistor using Thevenin's theorem. 	Understand	CO 1	AEEB09.02
10	Verify Tellegen's theorem for circuit shown in figure below? 	Understand	CO 1	AEEB09.02

11	Find the Thevenin's equivalent for the network shown in figure below? 	Understand	CO 1	AEEB09.02
12	Determine voltage across 2+j5 using superposition theorem? 	Understand	CO 1	AEEB09.01
13	Determine the Norton's equivalent ant between the terminals AB? 	Understand	CO 1	AEEB09.02
14	For The Circuit Shown In Figure Below Find The Value Of Load Impedance and Also find The Maximum Power? 	Understand	CO 1	AEEB09.01

15	Determine the current flowing through ammeter having 1ohm internal resistance in series with 3ohm resistance using compensation theorem? 	Understand	CO 1	AEEB09.02
16	Determine the current through the 2Ω resistor using the Superposition principle 	Understand	CO 1	AEEB09.02
17	Using Thevenin's theorem, determine the current through the 10Ω inductive branch of the network. 	Understand	CO 1	AEEB09.02
18	Find the current through the 3Ω resistor using the Superposition theorem. 	Understand	CO 1	AEEB09.02

19	Verify the reciprocity theorem for the circuit shown in figure 	Understand	CO 1	AEEB09.02
20	Determine the current through the 1Ω resistor using Thevenin's and Superposition theorem. 	Understand	CO 1	AEEB09.02
21	Determine the Current I in the circuit shown in figure using Superposition theorem. 	Understand	CO 1	AEEB09.02
22	Determine the current through branch ab using Thevenin's Theorem and Superposition theorem. 	Understand	CO 1	AEEB09.02
23	For the Network's shown determine Thevenin's equivalent source and series impedance. 	Understand	CO 1	AEEB09.02

24	For the circuit shown below, determine the current through 10Ω resistance by superposition theorem and verify by using Thevenin's theorem. 	Understand	CO 1	AEEB09.02
25	Determine the current through 10Ω resistor in network by Thevenin's Theorem 	Understand	CO 1	AEEB09.02

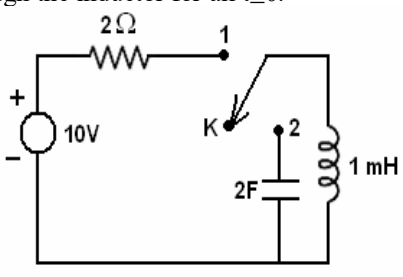
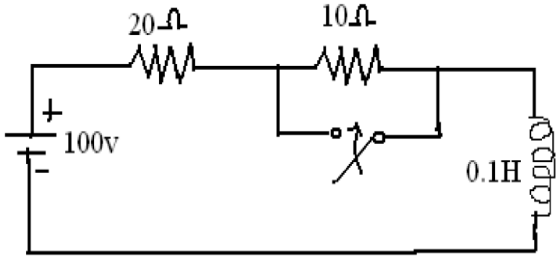
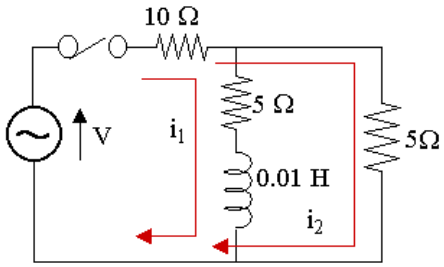
MODULE – II

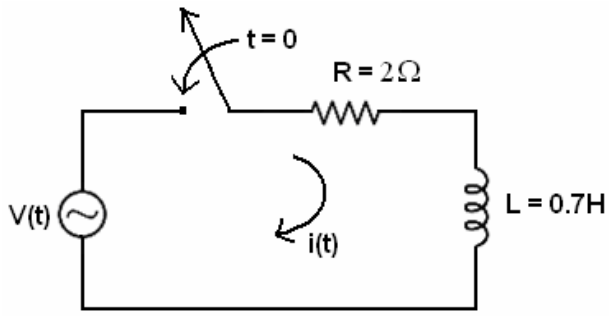
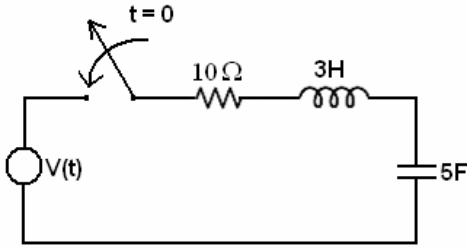
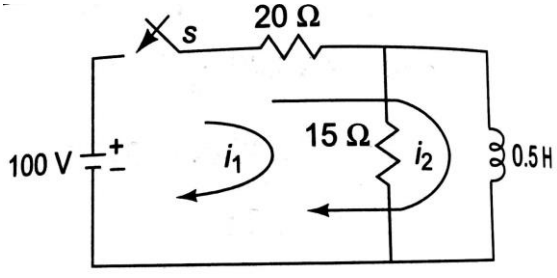
SOLUTION OF FIRST AND SECOND ORDER NETWORKS

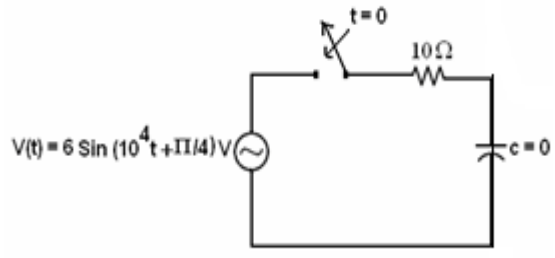
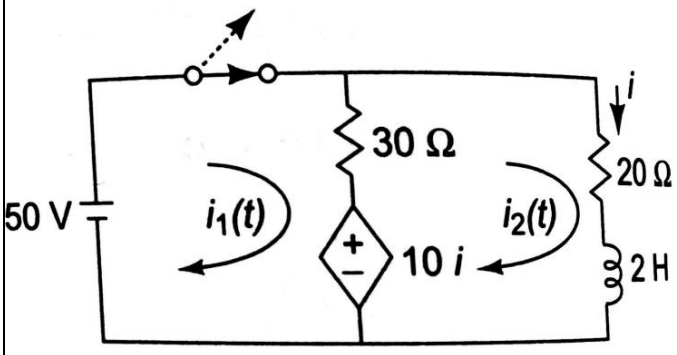
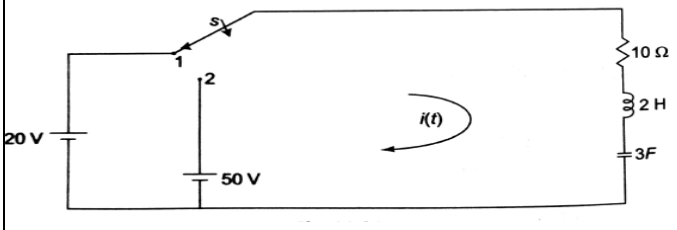
PART – A (SHORT ANSWER QUESTIONS)

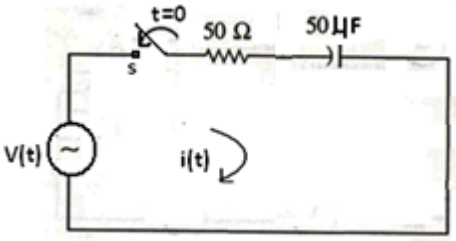
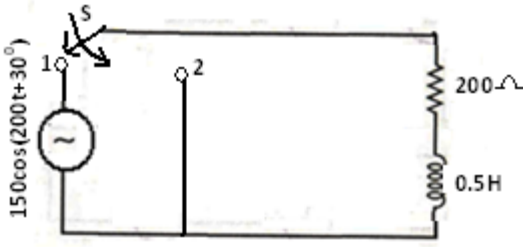
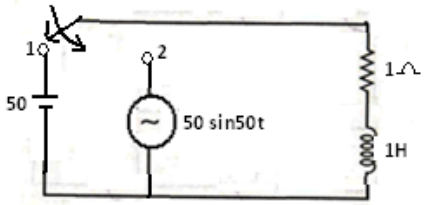
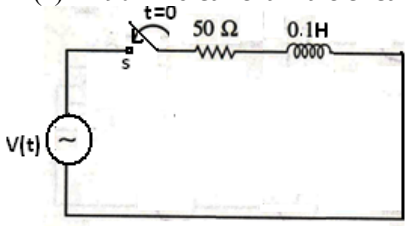
1	Explain why the current in a pure inductance cannot change in zero time	Understand	CO 2	AEEB09.03
2	Explain why the voltage across a capacitor cannot change instantaneously	Understand	CO 2	AEEB09.03
3	What is the significance of time constant of R-L circuit?	Understand	CO 2	AEEB09.04
4	What are the different ways of defining time constant	Understand	CO 2	AEEB09.03
5	What are transients in electric circuits?	Understand	CO 2	AEEB09.03
6	Distinguish between steady state and transient response.	Remember	CO 2	AEEB09.03
7	What is mean by steady state condition?	Understand	CO 2	AEEB09.03
8	Explain initial conditions in a network?	Remember	CO 2	AEEB09.03
9	Explain initial conditions of basic passive elements?	Remember	CO 2	AEEB09.03
10	What is the significance of initial conditions in a step response of RL and RC circuits	Understand	CO 2	AEEB09.03
11	What is meant by step response of circuit?	Understand	CO 2	AEEB09.03
12	Calculate the time constant of simple RL circuit with R=10 MΩ and L=10 μH.	Understand	CO 2	AEEB09.04
13	What is meant by driven circuit and un driven circuit ?	Understand	CO 2	AEEB09.03
14	Explain the significance of time constant in case of series RC circuit ?	Understand	CO 2	AEEB09.04
15	Define laplace transform of function f(t).and state the properties of laplace transform?	Understand	CO 2	AEEB09.05

16	Define and explain characteristics of unit step function .	Understand	CO 2	AEEB09.04
17	Define and explain characteristics of unit ramp function .	Understand	CO 2	AEEB09.04
18	Define and explain characteristics of unit impulse function.	Understand	CO 2	AEEB09.04
19	State intial value theorem.	Understand	CO 2	AEEB09.04
20	State final value theorem.	Understand	CO 2	AEEB09.04
PART – B (LONG ANSWER QUESTIONS)				
1	Explain the significance of initial conditions. Write a note on initial conditions in elements.	Understand	CO 2	AEEB09.04
2	Define time constant. Explain time constant of series RL and RC circuit.	Understand	CO 2	AEEB09.04
3	Derive the transient response for series RL circuit for DC excitation using differential equation approach.	Understand	CO 2	AEEB09.05
4	Derive the transient response for series RC circuit for DC excitation using differential equation approach.	Understand	CO 2	AEEB09.05
5	Derive the transient response for series RLC circuit for DC excitation using differential equation approach.	Understand	CO 2	AEEB09.05
6	Derive the transient response for series RL circuit for DC excitation using Laplace approach.	Understand	CO 2	AEEB09.06
7	Derive the transient response for series RC circuit for DC excitation using Laplace approach.	Understand	CO 2	AEEB09.06
8	Derive the transient response for series RLC circuit for DC excitation using Laplace approach.	Understand	CO 2	AEEB09.06
9	Derive the transient response for series RL circuit for ac excitation using differential equation approach.	Understand	CO 2	AEEB09.05
10	Derive the transient response for series RC circuit for ac excitation using differential equation approach.	Understand	CO 2	AEEB09.05
11	Derive the transient response for series RLC circuit for ac excitation using differential equation approach.	Understand	CO 2	AEEB09.05
12	Derive the transient response for series RL circuit for ac excitation using Laplace approach.	Understand	CO 2	AEEB09.06
13	Derive the transient response for series RC circuit for ac excitation using Laplace approach.	Understand	CO 2	AEEB09.06
14	Derive the transient response for parallel RL circuit for DC excitation using differential equation approach.	Understand	CO 2	AEEB09.05
15	Derive the transient response for parallel RC circuit for DC excitation using Laplace approach.	Understand	CO 2	AEEB09.06
16	A series RL circuit with R = 10 ohms and L = 0.1 H has a sinusoidal voltage source V = 150 volts applied at a time t=0. Find the expression for the total current. Use differential equation method	Understand	CO 2	AEEB09.05
17	A series RL circuit with R = 10 ohms and C = 1 μF has a sinusoidal voltage source V = 200 volts applied at a time t=0. Find the expression for the total current. Use differential equation method	Understand	CO 2	AEEB09.05

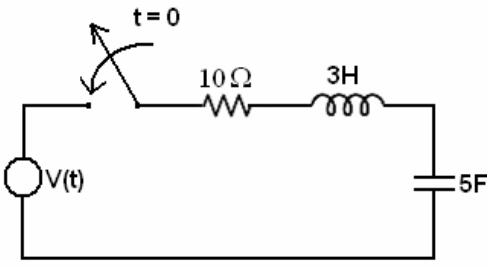
18	A series R C circuit with R = 100 Ω and C = 25 μF has a sinusoidal excitation V(t) = 250. Find the total current assuming that the capacitor is initially uncharged. Use Laplace transformation approach.	Understand	CO 2	AEEB09.06
19	A series RL circuit with R = 50 ohms and L = 0.2 H has a sinusoidal voltage source V = 150 sin(500*t* + 30°) volts applied at a time when t=0. Find the expression for the total current for t> 0. Use Laplace transforms method.	Understand	CO 2	AEEB09.06
20	A series R C circuit with R = 100 Ω and C = 25 μF has a sinusoidal excitation V(t) = 250 Sin 500t. Find the total current assuming that the capacitor is initially uncharged. Use time domain approach.	Understand	CO 2	AEEB09.06
	PART – C (ANALYTICAL QUESTIONS)			
1	For the circuit given in Figure steady state conditions are reached for the switch K in position '1'. At t = 0, the switch is changed to position 2. Use the time domain method to determine the current through the inductor for all t≥0. 	Understand	CO 2	AEEB09.05
2	A dc voltage of 100V is applied in the circuit shown in figure a and the switch is kept open. The switch K is closed at t = 0. Find the complete expression for the current 	Understand	CO 2	AEEB09.05
3	In the two mesh network shown in fig, the switch is closed at t=0 and the voltage source is given by V=150 sin (1000t) V. Find the currents i1 and i2 	Understand	CO 2	AEEB09.05

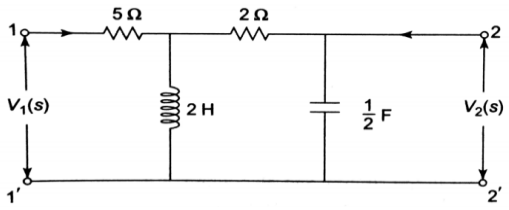
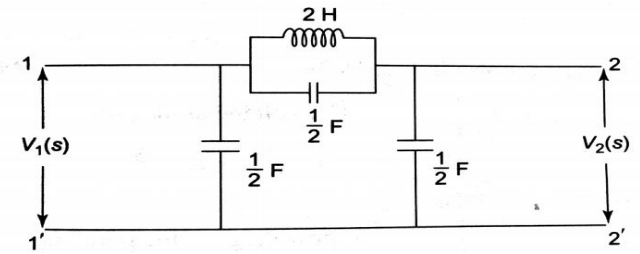
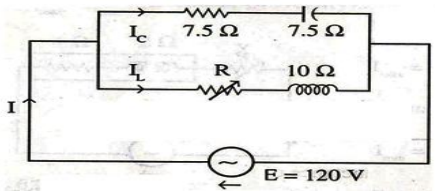
4	Obtain the current i(t) for $t \geq 0$ for a series RLC circuit with R = 10 Ω, L = 0.5 H, C = 1 μF for V = 100 using differential equation approach.	Understand	CO 2	AEEB09.05
5	Obtain the current i(t) for $t \geq 0$ for a series RLC circuit with R = 25 Ω, L = 1 H, C = 10 μF for V = 10 using Laplace approach.	Understand	CO 2	AEEB09.06
6	A Sinusoidal Voltage of 12 sin 8 t Volts is applied at t = 0 to a RL series of R= 5Ω and L = 1 H. By using time domain approach, determine the circuit current i (t) for. Assume zero initial condition.	Understand	CO 2	AEEB09.04
7	A Sinusoidal Voltage of 12 sin 8 t Volts is applied at t = 0 to a RC series of R= 5Ω and C = 1 uF. Determine the circuit current i (t) for. Assume zero initial condition.	Understand	CO 2	AEEB09.04
8	For the circuit given below in Figure.2, the applied voltage is V(t) = 10sin(200t+60°) Find the current through the circuit for t ≥ 0. Assume zero initial Condition. Use time domain approach. 	Understand	CO 2	AEEB09.04
9	In the circuit shown determine the complete solution for the current, when the witch is closed at t=0. Applied voltage is v(t) = 400 cos (500t + 30). Find the total current at t > 0 using time domain approach. 	Understand	CO 2	AEEB09.03
10	For the circuit shown in figure determine the currents i_1 and i_2 when the switch is closed at t=0 	Understand	CO 2	AEEB09.03

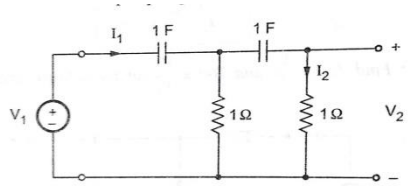
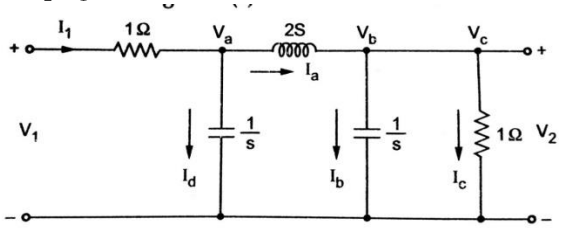
11	For the circuit shown in figure determine the particular solution of the current i(t)? 	Understand	CO 2	AEEB09.03
12	For the circuit shown in figure below find the current in 20ohm when the switch is opened at t=0 	Understand	CO 2	AEEB09.04
13	In the network shown in figure below the switch is moved from the position 1 to 2 at t=0.the switch is in position 1 for a long time. determine the current expression i(t) 	Understand	CO 2	AEEB09.03
14	A series RL circuit with R = 50 ohms and L = 0.2 H has a sinusoidal voltage source V = 150 sin(500*t* + 30°) volts applied at a time when t=0. Find the expression for the total current for t> 0. Use Laplace transforms method.	Understand	CO 2	AEEB09.05
15	A series R C circuit with R = 100 Ω and C = 25 μF has a sinusoidal excitation V(t) = 250 Sin 500t. Find the total current assuming that the capacitor is initially uncharged. Use time domain approach.	Understand	CO 2	AEEB09.05

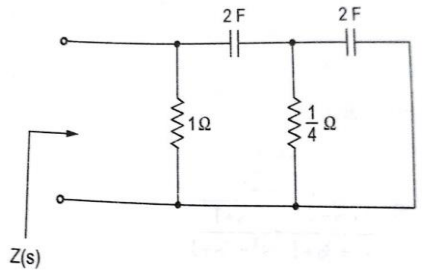
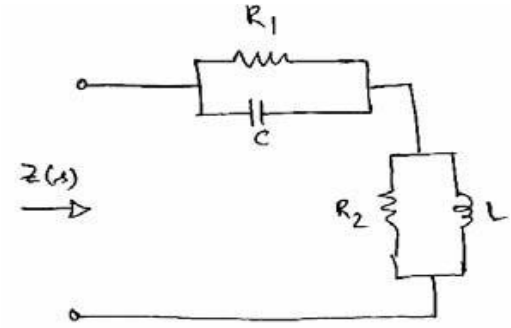
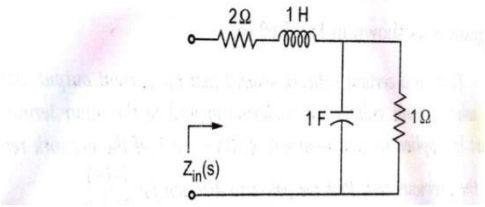
16	The series RC circuit shown in figure has sinusoidal voltage source V(t)= 100sin(100t+Φ)volts. If the switch is closed when Φ= 90^0, find current assuming zero initial charge on the capacitor. 	Understand	CO 2	AEEB09.05
17	For the circuit shown in figure determine the transient current when the switch is moved from position 1 to position 2 at t=0. The circuit is in steady state with the switch in position 1. The voltage applied to the circuit is v=150cos(200t+30^0)V. 	Understand	CO 2	AEEB09.05
18	For the circuit shown in figure determine the current through the circuit, when the switch is moved from position 1 to position 2. Use Laplace Transform method. 	Understand	CO 2	AEEB09.05
19	The series RL circuit shown below has a sinusoidal voltage source v(t)=100sin(1000t+ Φ)volts. If the switch is closed when (a) Φ=0^0 and (b) Φ=90^0 find current in the circuit 	Understand	CO 2	AEEB09.05
20	for a series RLC circuit with R = 25 Ω, L = 1 H, the switch is closed at t=0.assume initial current through inductor is zero. find i, di/dt,d^2i/d^2t at t=0+	Remember	CO 2	AEEB09.05
	MODULE – III			
	LOCUS DIAGRAMS AND NETWORKS FUNCTIONS			
	PART – A (SHORT ANSWER QUESTIONS)			
1	Draw the locus diagram of series RL circuit with variable R and constant L.	Remember	CO 3	AEEB09.07

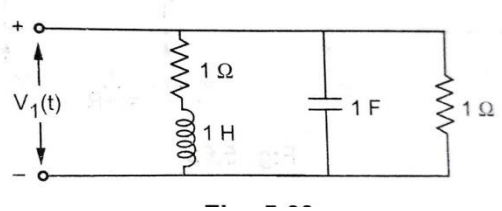
2	Draw the locus diagram of series RC circuit with variable R and constant C.	Remember	CO 3	AEEB09.07
3	What is the significance of locus diagram?	Understand	CO 3	AEEB09.07
4	Draw the locus diagram of series RC circuit with variable C and constant R.	Remember	CO 3	AEEB09.07
5	Write the expression for radius and centre for series RL circuit with variable R and constant L.	Remember	CO 3	AEEB09.07
6	Draw the locus diagram of series RL circuit with variable L and constant R.	Remember	CO 3	AEEB09.07
7	Write the expression for radius and centre for series RL circuit with variable L and constant C.	Remember	CO 3	AEEB09.07
8	Write the expression for radius and centre for series RC circuit with variable C and constant R.	Remember	CO 3	AEEB09.07
9	Write the expression for radius and centre for series RC circuit with variable R and constant C.	Remember	CO 3	AEEB09.07
10	Draw the locus diagram of RC circuit in parallel with variable R.	Understand	CO 3	AEEB09.07
11	Write the equation which governs the locus diagram of a series RL circuit with variable R	Remember	CO 3	AEEB09.07
12	Write the equation which governs the locus diagram of a series RC circuit with variable R	Remember	CO 3	AEEB09.07
13	Write the equation which governs the locus diagram of a series RL circuit with variable L	Remember	CO 3	AEEB09.07
14	Write the equation which governs the locus diagram of a series RC circuit with variable C	Remember	CO 3	AEEB09.07
15	What is a transfer function? Give one example.	Remember	CO 3	AEEB09.08
16	Explain any two necessary conditions for transfer functions.	Understand	CO 3	AEEB09.08
17	What is a driving point impedance function? Explain with one example.	Understand	CO 3	AEEB09.08
18	Obtain the transform representation of a series RLC circuit	Remember	CO 3	AEEB09.08
19	Obtain the transform impedance of an inductor.	Understand	CO 3	AEEB09.08
20	Obtain the transform impedance of a capacitor.	Understand	CO 3	AEEB09.08
21	Explain any two necessary conditions for driving point functions.	Understand	CO 3	AEEB09.08
22	What is a driving point function? Explain with one example.	Remember	CO 3	AEEB09.08
23	Explain the concept of complex frequency.	Understand	CO 3	AEEB09.10
24	Define voltage transfer ratio.	Understand	CO 3	AEEB09.08
25	Define current transfer ratio.	Understand	CO 3	AEEB09.08
26	Define transfer impedance and transfer admittance.	Understand	CO 3	AEEB09.08

27	Define driving point impedance function.	Understand	CO 3	AEEB09.09
28	Define driving point admittance function.	Understand	CO 3	AEEB09.09
29	Define poles and zeros for a transfer function?	Understand	CO 3	AEEB09.09
	PART – B (LONG ANSWER QUESTIONS)			
1	What is Locus diagram and show that the locus diagram of series RL circuit with variable R and fixed value of L is a semi-circle.	Remember	CO 3	AEEB09.07
2	Draw the locus diagram of series RC circuit with fixed value of R and variable C.	Remember	CO 3	AEEB09.07
3	Explain the locus diagram of series RL circuit with variable L and fixed value of R.	Remember	CO 3	AEEB09.07
4	Draw the locus diagram of series RC circuit with fixed value of C and variable R.	Remember	CO 3	AEEB09.07
5	Show that the locus diagram of RL circuit in parallel with variable R is a straight line.	Remember	CO 3	AEEB09.07
6	Show that the locus diagram of RC circuit in parallel with variable R is a straight line.	Remember	CO 3	AEEB09.07
7	Explain the locus diagram of Parallel RLC circuit with variable L and C.	Remember	CO 3	AEEB09.07
8	Explain the locus diagram of Parallel RLC circuit with variable R_L and C.	Remember	CO 3	AEEB09.07
9	The transform voltage V(s) of a network is given by V(s) $=4s/(s+2)(s^2+2s+2)$ plot its pole-zero diagram and hence obtain v(t)	Understand	CO 3	AEEB09.09
10	What is a driving point function? Explain the necessary conditions for driving point functions	Understand	CO 3	AEEB09.09
11	What is a transfer function? Explain the necessary conditions for transfer functions.	Understand	CO 3	AEEB09.09
12	For the given network function draw pole zero diagram and hence obtain the time domain response i(t) if $I(s) = 5S /(S+1)(s^2+4S+8)$	Understand	CO 3	AEEB09.09
13	Explain the transfer functions of two port networks?	Understand	CO 3	AEEB09.09
14	Define and explain the following: port, driving point functions and Transfer functions.	Understand	CO 3	AEEB09.09
15	Draw the transformed network for the given circuit 	Understand	CO 3	AEEB09.09

16	The Laplace transform of a voltage v(t) is V(s)=4(s+1)/(s+2)(s+3). Draw poles and zeros of this function and determine v(t) using pole-zero plot	Understand	CO 3	AEEB09.10
17	What is a pole-zero plot? What is its significance? Explain time domain behavior from pole zero plot.	Understand	CO 3	AEEB09.08
18	For the two port network shown in figure determine driving point impedance function $Z_{11}(s)$,transfer impedance $Z_{21}(s)$,and voltage transfer ratio $G_{21}(s)$ 	Understand	CO 3	AEEB09.08
19	For the network shown in figure determine the following transfer functions $G_{21}(s)$ and $Z_{21}(s)$ 	Understand	CO 3	AEEB09.08
20	The Laplace transform of a voltage v(t) is V(s)=(s+6)/(s+2)(s+4) Draw poles and zeros of this function and determine v(t) using pole-zero plot	Understand	CO 3	AEEB09.10
21	A series circuit consisting of a resistance of 60ohm, an inductance of 0.4H and a capacitance of 17.9uF is connected to a variable frequency source, the potential of which is maintained constant at 120V. if the frequency is varied through a range 40 to 80Hz. Calculate a) the resonant frequency b) current and P.F. at 40Hz and 80Hz. Draw the complete current locus for the problem.	Understand	CO 3	AEEB09.10
22	In the circuit shown in fig. R is varied from 0 to ∞. Draw the total current locus. Find a) the UPF current b) the minimum p.f. and the corresponding current c) the maximum current and the corresponding p.f. 	Understand	CO 3	AEEB09.10
23	An impedance coil having a resistance of 20 ohms and an inductive reactance of 10 ohms is connected in series with a capacitive reactance, which varies from 16 to 24 ohms. Draw the locus diagram of the current.	Understand	CO 3	AEEB09.10

24	A pure inductive reactance of X_L ohms is connected in parallel with a branch consisting of a resistance R which is variable from 0 to ∞ and a capacitive reactance $X_c=X_L/2$. If the applied voltage is E volts, sketch the current locus.	Understand	CO 3	AEEB09.10
	PART – C (ANALYTICAL QUESTIONS)			
1	For a series RL circuit with variable R, plot the locus of the current, mark the range of I for maximum and minimum values of R, and maximum power consumed in the circuit. Assume X_L=25Ω and R = 50 Ω. The voltage is 200 V, 50 Hz.	Remember	CO 3	AEEB09.07
2	For a series RL circuit with variable L, plot the locus of the current, mark the range of I for maximum and minimum values of X_C, and maximum power consumed in the circuit. Assume X_L=25Ω and R = 50 Ω. The voltage is 200 V, 50 Hz.	Understand	CO 3	AEEB09.07
3	For a series RL circuit with variable L, plot the locus of the current, mark the range of I for maximum and minimum values of X_C, and maximum power consumed in the circuit. Assume X_L=30Ω and R = 75 Ω. The voltage is 230 V, 50 Hz.	Understand	CO 3	AEEB09.07
4	For a series RL circuit with variable R, plot the locus of the current, mark the range of I for maximum and minimum values of R, and maximum power consumed in the circuit. Assume X_L=60Ω and R = 20 Ω. The voltage is 400 V, 50 Hz.	Remember	CO 3	AEEB09.07
5	For a series RC circuit with variable X_C, draw the locus of the current, mark the range of I for maximum and minimum values of X_C. Assume X_C=50Ω and R = 10 Ω. The voltage is 400 V,	Understand	CO 3	AEEB09.07
6	For a series RC circuit with variable X_C, draw the locus of the current, mark the range of I for maximum and minimum values of X_C. Assume X_C=40Ω and R = 25 Ω. The voltage is 230 V, 50 Hz.	Understand	CO 3	AEEB09.07
7	For the network shown in the figure,find the expressions for V_2/V_1, I_2/I_1. 	Understand	CO 3	AEEB09.08
8	For the network shown in the figure, find the voltage transfer function V_2/V_1 	Understand	CO 3	AEEB09.08

9	For the network shown in the figure, find the driving point function Z(s) and plot the poles and zeros of Z(s) on s-plane. 	Understand	CO 3	AEEB09.08
10	Find the transfer impedance of the following circuit shown in figure 	Understand	CO 3	AEEB09.09
11	The Laplace transform of a voltage v(t) is V(s)=50(s+1)/(s+2)(s+3). Draw poles and zeros of this function and determine v(t) using pole-zero plot	Understand	CO 3	AEEB09.10
12	The transform voltage V(s) of a network is given by V(s) =s/(s+2)(s^2+2s+2) plot its pole-zero diagram and hence obtain v(t)	Understand	CO 3	AEEB09.09
13	For the given network function draw pole zero diagram and hence obtain the time domain response i(t) if I(s) = 10S /	Remember	CO 3	AEEB09.09
14	find the input impedance function for the network shown in figure below? 	Understand	CO 3	AEEB09.09

15	Find the driving point admittance function Y(s) for the network shown in figure and also plot the pole zero diagram.  	Understand	CO 3	AEEB09.08

MODULE – IV

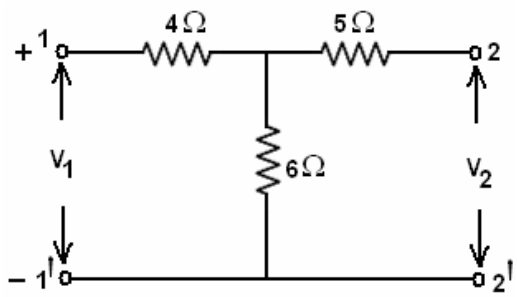
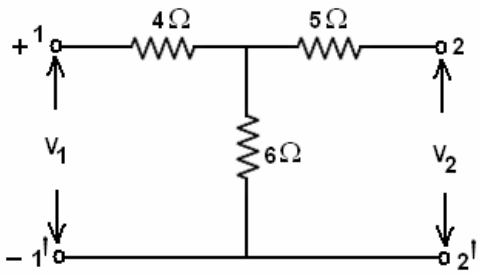
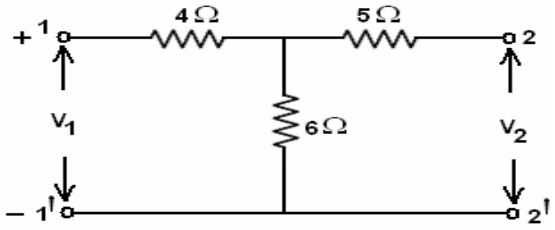
TWO PORT NETWORK PARAMETERS

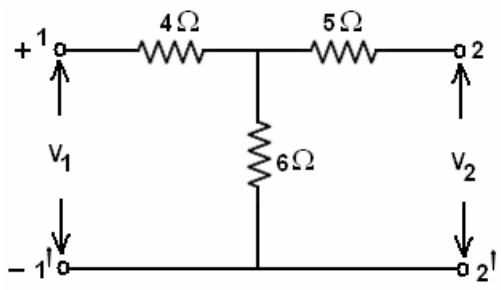
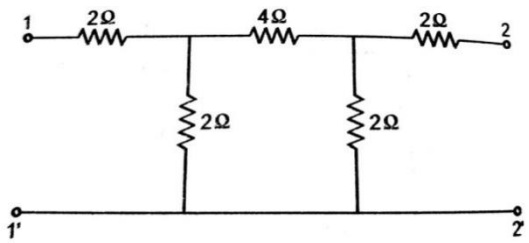
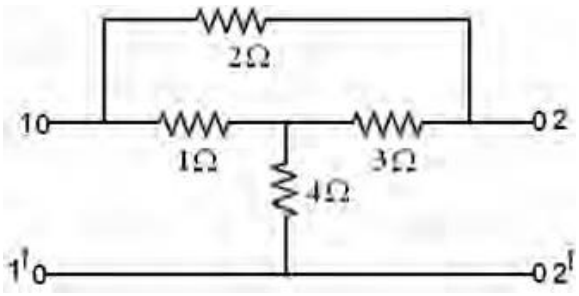
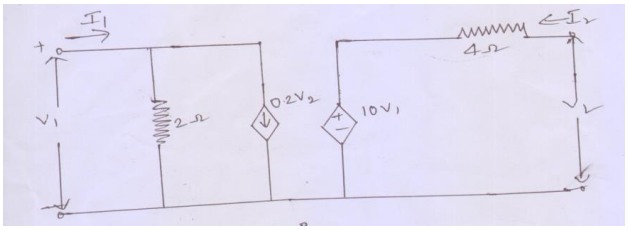
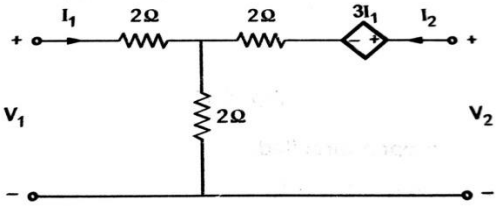
PART – A (SHORT ANSWER QUESTIONS)

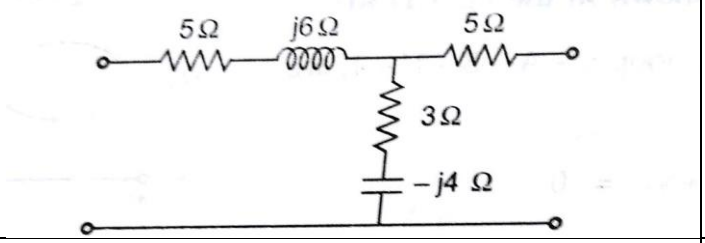
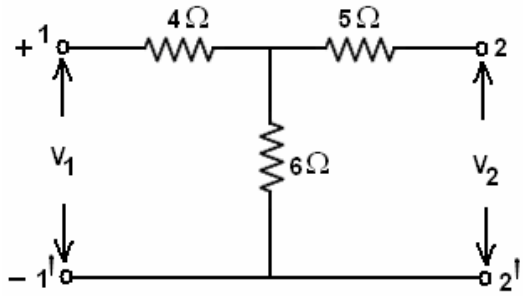
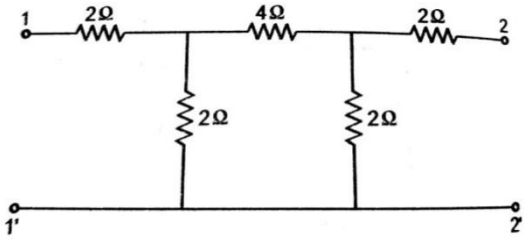
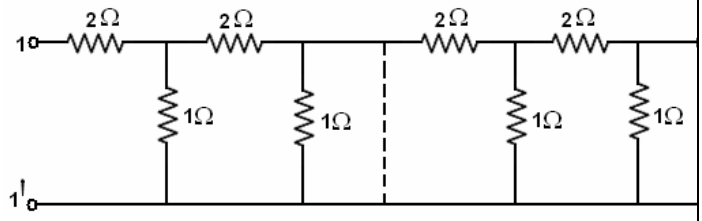
1	Define active and passive ports	Understand	CO 4	AEEB09.11
2	Why Z-parameters are called as open circuit impedance (Z) parameter	Remember	CO 4	AEEB09.11
3	Define open circuit forward transfer impedance.	Understand	CO 4	AEEB09.11
4	Give the condition for reciprocity for Z parameters.	Understand	CO 4	AEEB09.12
5	Give the condition for symmetry for Z parameters	Understand	CO 4	AEEB09.12
6	Why Y parameters are called as short circuit admittance parameters.	Remember	CO 4	AEEB09.11
7	What are the applications of cascaded ABCD parameters?	Remember	CO 4	AEEB09.14
8	Express y-parameters in terms of h-parameters.	Understand	CO 4	AEEB09.11
9	Express Z-parameters in terms of h-parameters.	Understand	CO 4	AEEB09.13
10	Express Z parameters in terms of ABCD parameters.	Remember	CO 4	AEEB09.13
11	Express h-parameters in terms of ABCD parameters.	Understand	CO 4	AEEB09.13
12	Define two port networks?	Remember	CO 4	AEEB09.11
13	Define one port network?	Remember	CO 4	AEEB09.11
14	Write the condition for a two port network to be reciprocal.	Understand	CO 4	AEEB09.12
15	Which parameters are widely used in transmission line theory?	Understand	CO 4	AEEB09.11
16	How can we obtain the h parameters of a circuit?	Understand	CO 4	AEEB09.11
17	Give the equation for the transfer impedance of a two port network.	Remember	CO 4	AEEB09.11
18	Write condition for reciprocity for ABCD parameters.	Remember	CO 4	AEEB09.12
19	Give the condition for symmetry for Y parameters	Remember	CO 4	AEEB09.12
20	Write condition for reciprocity for h parameters	Remember	CO 4	AEEB09.12

PART – B (LONG ANSWER QUESTIONS)

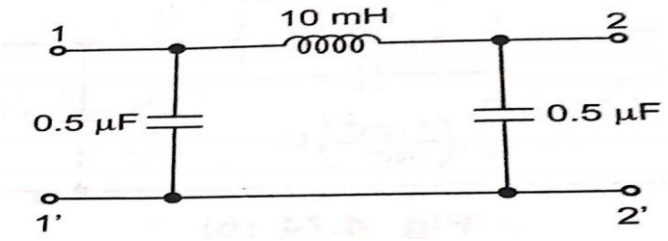
1	Write a short notes on (a) Z-parameters, (b) Y-parameters	Understand	CO 4	AEEB09.11

2	Write a short notes on (a) ABCD parameters, (b) h-parameters	Remember	CO 4	AEEB09.11
3	Derive the condition for symmetry (a) Z-parameters, (b) Y-parameters	Understand	CO 4	AEEB09.12
4	Discuss in detail about series connection of two port networks.	Remember	CO 4	AEEB09.14
5	Find the Z parameters of the circuit shown 	Understand	CO 4	AEEB09.11
6	Find the h parameters of the circuit shown 	Understand	CO 4	AEEB09.11
7	Determine the image parameters of a T network with branch impedances 1 ohm, 2 ohm and 5 ohm.	Understand	CO 4	AEEB09.11
8	Explain image parameters with necessary expressions.	Understand	CO 4	AEEB09.11
9	The Z parameters of a two port network are Z_{11} = 10 ohm, Z_{22} = 15 ohm, Z_{12}= 20 ohm, Z_{21} = 5 ohm. Find the equivalent T network.	Understand	CO 4	AEEB09.13
10	The Z parameters of a two port network are Z_{11} = 10 ohm, Z_{22} = 15 ohm, Z_{12}= Z_{21} = 5 ohm. Find the ABCD parameters.	Understand	CO 4	AEEB09.13
11	Obtain the expressions for Y parameters of when 2 two - port networks are connected in parallel.	Remember	CO 4	AEEB09.14
12	Derive the condition for reciprocity for Z-parameters and Y-parameters.	Remember	CO 4	AEEB09.12
13	Find the ABCD parameters of the circuit shown. 	Understand	CO 4	AEEB09.11

PART – C (ANALYTICAL QUESTIONS)				
1	Find the Y parameters of the circuit shown. 	Understand	CO 4	AEEB09.11
2	Find Y-parameters for the network shown in the figure. 	Understand	CO 4	AEEB09.11
3	For the following network shown in figure determine Z parameters 	Understand	CO 4	AEEB09.11
4	Find the transfer admittance of the circuit given below 	Understand	CO 4	AEEB09.11
5	Find the Z parameters of the circuit shown 	Remember	CO 4	AEEB09.11

6	Obtain the ABCD parameters for the network shown in the figure. 	Understand	CO 4	AEEB09.11
7	Find the h-parameters for the circuit in Figure. 	Understand	CO 4	AEEB09.11
8	Find h-parameters for the network shown in the figure. 	Understand	CO 4	AEEB09.11
9	Determine the ABCD parameters of two networks connected in cascade as shown. 	Remember	CO 4	AEEB09.14
10	The Z parameters of a two port network are Z_{11} = 10 ohm, Z_{22} = 15 ohm, Z_{12}= Z_{21} = 5 ohm. Find the h-parameters.	Understand	CO 4	AEEB09.13
	MODULE – V			
	FILTER CIRCUITS			
	PART – A (SHORT ANSWER QUESTIONS)			
1	What is low pass filter derive expression for cutoff frequency of proto type low pass filter in terms of L and C?	Understand	CO 5	AEEB09.15
2	Obtain design equations of high pass filter?	Remember	CO 5	AEEB09.15

3	Draw a circuit of a band stop filter and explain its working with neat reactance curves?	Understand	CO 5	AEEB09.15
4	For band stop filter show that resonant frequency is the geometric mean of two cutoff frequencies?	Understand	CO 5	AEEB09.15
5	What are disadvantages of proto type filters?	Remember	CO 5	AEEB09.15
6	Explain in brief m-derived filter section overcome limitations of proto type filter section?	Understand	CO 5	AEEB09.15
7	Write notes on termination with m-derived half section?	Understand	CO 5	AEEB09.15
8	Categorize filters and explain.	Understand	CO 5	AEEB09.15
9	Write the design equations for proto type T- section band stop filter.	Understand	CO 5	AEEB09.15
10	Write the design equations for proto type T- section band pass filter.	Remember	CO 5	AEEB09.15
11	Define the term pass band?	Understand	CO 5	AEEB09.15
12	Define the term stop band?	Remember	CO 5	AEEB09.15
13	Define the term cut-off frequency?	Understand	CO 5	AEEB09.15
14	What are desirable characteristics of ideal filter?	Understand	CO 5	AEEB09.15
15	What is constant k-section?	Remember	CO 5	AEEB09.15
16	Draw a circuit of a band stop filter and explain its reactance curve?	Understand	CO 5	AEEB09.15
17	Write expression for resonant frequency for band pass filter?	Understand	CO 5	AEEB09.15
18	Obtain design equations of low pass filter?	Understand	CO 5	AEEB09.15
19	Define the term attenuation?	Understand	CO 5	AEEB09.15
20	Write the condition for pass band in terms of impedances and also cut-off frequency ?	Remember	CO 5	AEEB09.15
PART – B (LONG ANSWER QUESTIONS)				
1	Define a filter and what are the classifications of filters?	Understand	CO 5	AEEB09.15
2	Explain the formula for characteristic impedance of symmetrical T-Section.	Understand	CO 5	AEEB09.15
3	Explain the design procedure for a constant-k low pass filter and its characteristics.	Remember	CO 5	AEEB09.15
4	Explain the design procedure for a constant-k high pass filter and its characteristics.	Understand	CO 5	AEEB09.15
5	Explain the design procedure for band pass filter and draw its characteristics.	Understand	CO 5	AEEB09.15
6	Explain the design procedure for band stop filter and draw its characteristics.	Remember	CO 5	AEEB09.15
7	Design m-derived high pass filter and draw its characteristics.	Remember	CO 5	AEEB09.15
8	Explain the classification of pass band and stop band?	Remember	CO 5	AEEB09.15

9	Design m-derived low pass filter and draw its characteristics.	Remember	CO 5	AEEB09.15
10	Explain the formula for characteristic impedance of symmetrical π-Section.	Understand	CO 5	AEEB09.15
11	A constant K low pass filter is designed to cut off at a frequency of 1000Hz and the resistance of the load circuit is 50ohm.Calculate the values of the corresponding components required	Remember	CO 5	AEEB09.15
12	A constant K high pass filter is designed to cut off at a frequency of 1000Hz and the resistance of the load circuit is 600ohm .Calculate the values of the corresponding components required	Remember	CO 5	AEEB09.15
13	Design a proto type section of band stop filter having cutoff frequencies of 2KHz and, 6 KHz and a design impedance of 600ohm	Remember	CO 5	AEEB09.15
14	Design a proto type section of band pass filter having cutoff frequencies of 1KHz and, 5KHz and a design impedance of 600ohm	Understand	CO 5	AEEB09.15
15	Design a constant K band elimination filter with cut off frequency 1750 Hz to 4250 Hz and a characteristic impedance of 250Ω.	Understand	CO 5	AEEB09.15
PART – C (ANALYTICAL QUESTIONS)				
1	Design a low pass filter (both T and π sections) having a cutoff frequency of 2 KHz to operate with a terminated load resistance of 500Ω.	Understand	CO 5	AEEB09.15
2	Design both T and π sections of a high pass filter have infinite frequency characteristic impedance of 300ohm resistance. The cut-off frequency is 2KHz.	Understand	CO 5	AEEB09.15
3	Design a constant–k band elimination filter with cut off frequency 1750 Hz to 4250 Hz and a characteristic impedance of 250Ω.	Understand	CO 5	AEEB09.15
4	Find the component values of Π-section & T-section constant-K high pass filter having a cut off frequency of 8 kHz and nominal characteristic impedance of 500Ω.	Understand	CO 5	AEEB09.15
5	Design m-derived low pass T and π-section filter to have termination of 600ohm resistance. The cut-off frequency is 1.8KHz and infinite attenuation occurs at 2KHz.	Understand	CO 5	AEEB09.15
6	Determine the cut-off frequency for the given π-section of low pass filter as shown in figure below? 	Understand	CO 5	AEEB09.15
7	Design a proto type section of band pass filter having cut-off frequencies of 12KHz and, 16 KHz and a design impedance of 600 ohm.	Understand	CO 5	AEEB09.15
8	Design a low pass filter (both T and π sections) having a cutoff frequency of 2 KHz to operate with a terminated load resistance of 500Ω	Understand	CO 5	AEEB09.15

9	Find the component values of a constant K LPF having characteristic impedance Z0= 500Ω and cut off frequency of f = 500 Hz. Find the frequency at which this filter produces an alternation constant of 38.2 dB	Understand	CO 5	AEEB09.15
10	Design a proto type section of band pass filter having cut-off frequencies of 12KHz and 16 KHz and a design impedance of 600 ohm	Understand	CO 5	AEEB09.15

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