SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NAAC with "A+" Grade & ISO 9001 : 2008 Certified Institution)

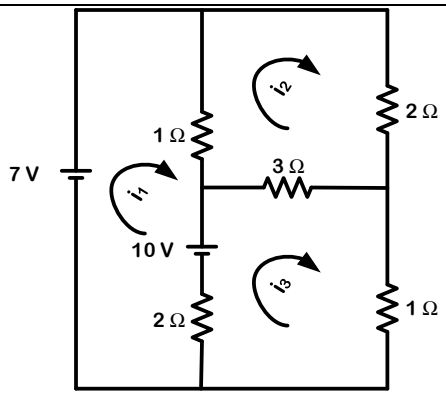
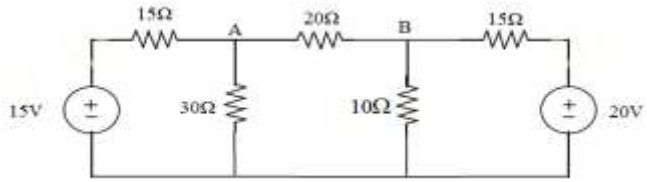
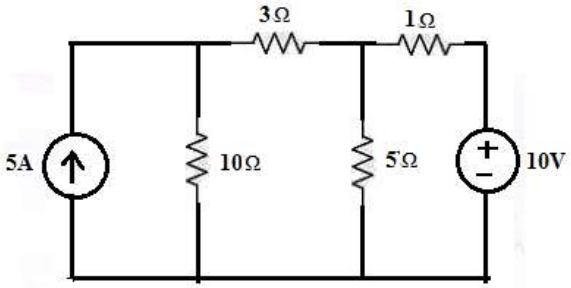
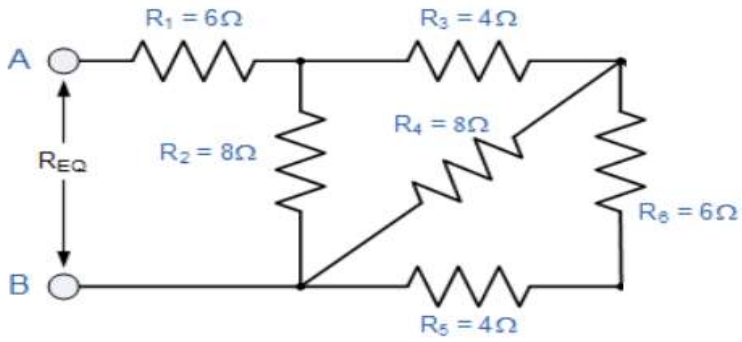
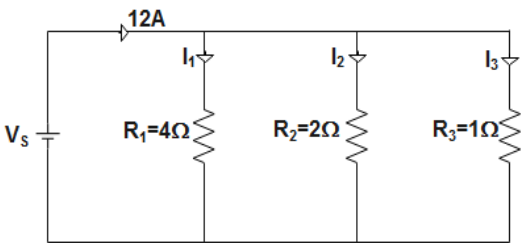
QUESTION BANK (DESCRIPTIVE)

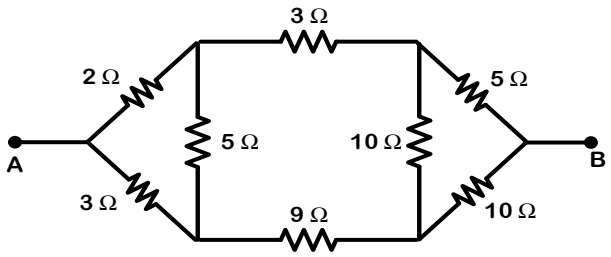
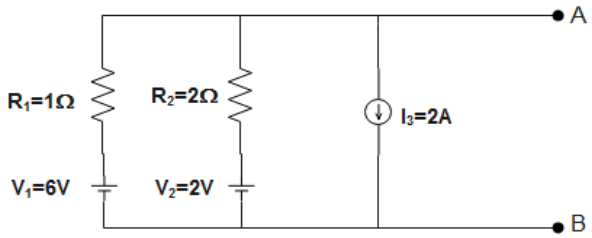
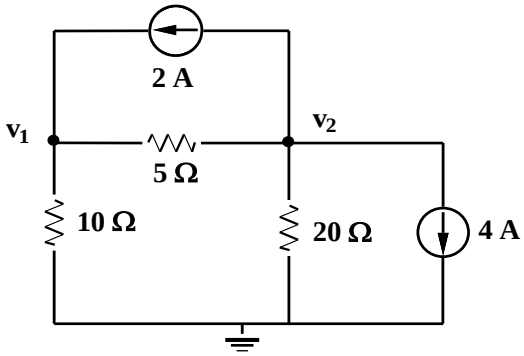
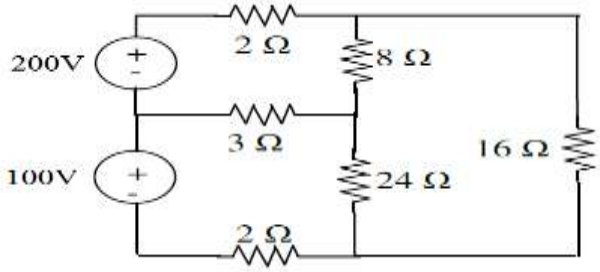
Subject with Code : PRINCIPLES OF ELECTRICAL CIRCUITS (20EE0253)
Course & Branch : B. Tech -ECE
Year & Semester : I - B. Tech. & I - Semester **Regulation :** R20

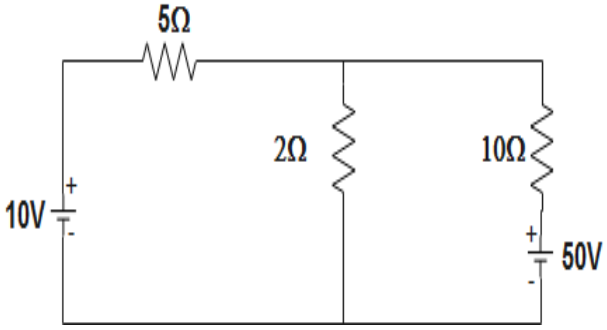
UNIT-I

FUNDAMENTALS OF ELECTRIC CIRCUITS

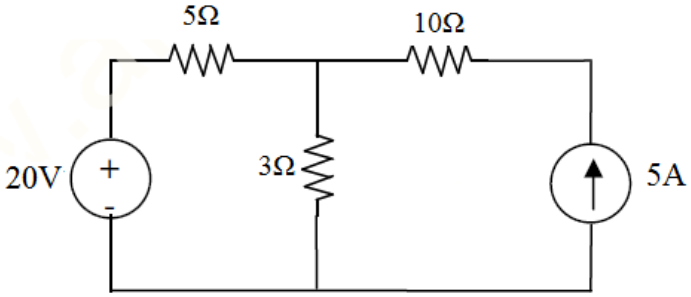
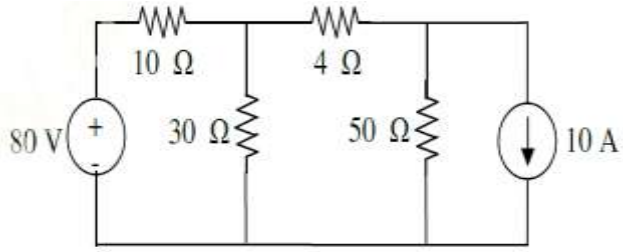
1.	a)	Define active and passive elements with suitable examples.	[L2] [CO1][2M]
	b)	Write the difference between active and passive elements	[L2] [CO1][2M]
	c)	Explain in detail about R,L, and C elements with voltage and current equation.	[L2] [CO1][8M]
2.	a)	Three resistances of values 20, 30 and 50 are connected in series across 20 V DC supply. Calculate, i) Equivalent resistance of the circuit. ii) Total current from the supply. iii) Voltage drop across each resistor. iv) Power dissipated in each resistor	[L3] [CO1] [4M]
	b)	Determine the Equivalent capacitance when the two capacitor are connected series and parallel	[L3] [CO1] [2M]
	c)	Three capacitances of values 0.1, 0.3 and 0.5 mF are connected in series across 10 V DC supply. Calculate, Equivalent capacitance of the circuit.	[L3] [CO1] [2M]
	d)	Determine the Equivalent inductance when the two inductor are connected series and parallel	[L3] [CO1] [2M]
	e)	Two inductances of values 2H and 3H are connected in parallel across 5V DC supply. Calculate, Equivalent inductance of the circuit.	[L3] [CO1] [2M]
3.	a)	State and explain Ohm's law with limitations.	[L2] [CO1] [6M]
	b)	State and prove Kirchhoff's voltage law with suitable examples.	[L3] [CO1] [3M]
	c)	State and prove Kirchhoff's current law with suitable examples.	[L3] [CO1] [3M]
4	a)	Find i_1, i_2, i_3 for the given circuit by using Kirchhoff's laws?	[L3] [CO1] [6M]

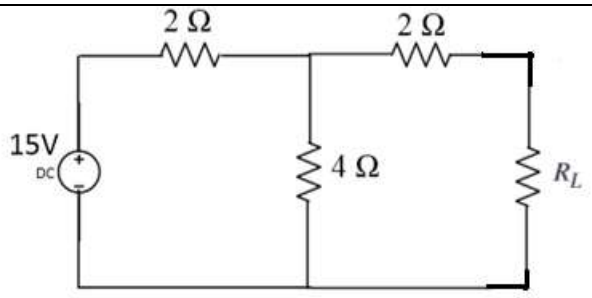
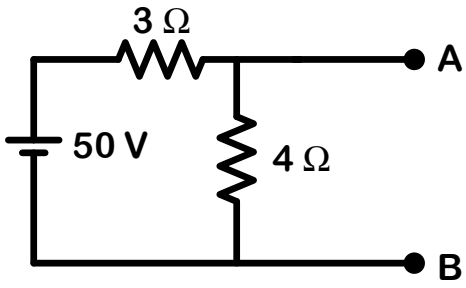
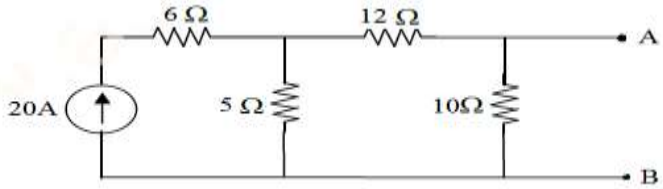
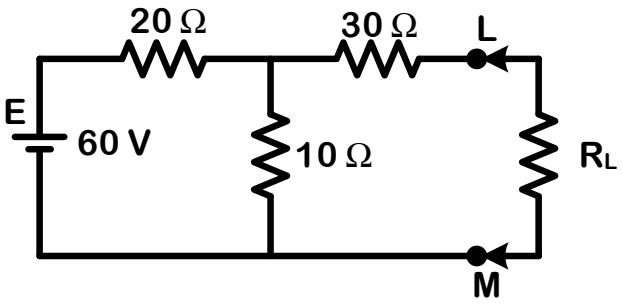
			
	b)	Determine the current in branch A-B by using KVL 	[L2] [CO1] [6M]
5	a)	Determine the current in 10Ω resistor for the following network by using KCL. 	[L3] [CO1] [4M]
	b)	Find the equivalent resistance for the circuit shown below. 	[L3] [CO1] [4M]
	c)	Determine Current through each resistor in the circuit? Using Current division method? 	[L3] [CO1] [6M]

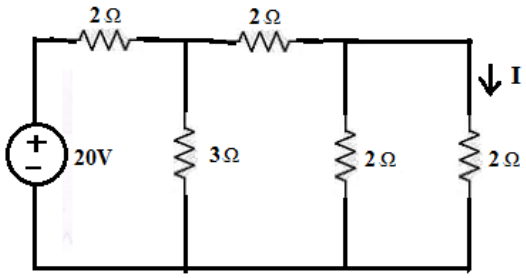
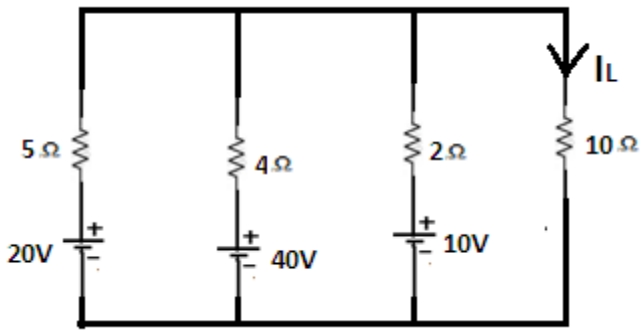
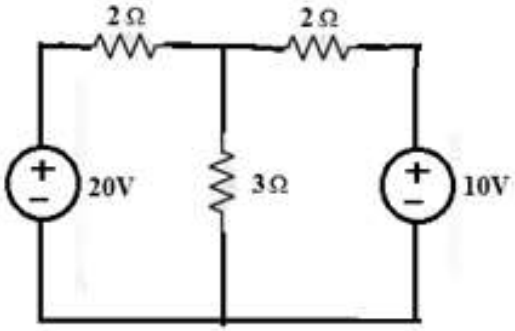
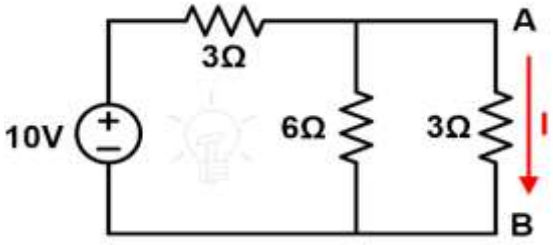
6	a)	Explain in detail about star to delta transformation of a resistive network.	[L3] [CO1] [6M]
	b)	Explain in detail about delta to star transformation of a resistive network.	[L3] [CO1] [6M]
7		Find the voltage to be applied across AB in order to drive a current of 5A into the circuit. 	[L3] [CO1] [12M]
8	a)	Explain about source transformation briefly.	[L2][CO1][6M]
	b)	Determine the equivalent current source between the terminals A-B. 	[L3] [CO1] [6M]
9	a)	Explain nodal analysis by taking one example	[L2][CO2][6M]
	b)	Determine the current in 5Ω resistor for the following network by using nodal analysis. 	[L3] [CO2] [6M]
10.	a)	Determine the mesh currents for the circuit shown below. 	[L3] [CO2] [6M]

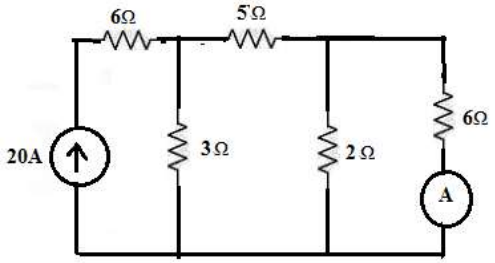
	b)	Write the Mesh Current equations in the Circuit shown in figure below, and determine the currents 	[L3] [CO2] [6M]

UNIT - II
NETWORK THEOREMS

1.	a)	State & explain Super position theorem	[L1] [CO3][4M]
	b)	By using superposition theorem find the current flowing through the 3 ohm resistor 	[L3] [CO3] [8M]
2.		Verify Superposition Theorem for 4Ω resistor for the following circuit. 	[L3][CO3][12M]
3.	a)	State &explain Thevenin's theorem	[L1] [CO3] [4M]
	b)	Find load current by using Thevenin's theorem for the following circuit where R_L =3Ω.	[L3] [CO3] [8M]

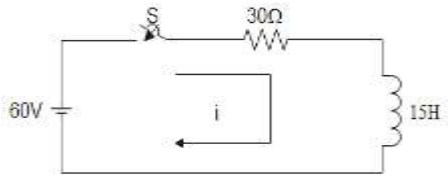
			
4.	a)	State Norton's theorem.	[L1] [CO3] [2M]
	b)	Find Norton's equivalent circuit across AB for the circuit shown. 	[L3] [CO3] [5M]
	c)	Find the Norton's equivalent for the circuit shown below. 	[L3][CO3][5M]
5.	a)	State and prove maximum power transfer theorem.	[L3][CO3][6M]
	b)	Determine the maximum power delivered to the load resistance R_L 	[L3][CO3][6M]
6.	**a)**	State and explain Reciprocity theorem with suitable example.	[L3][CO3][6M]
	b)	Verify reciprocity theorem for the network shown in below figure.	[L3][CO3][6M]

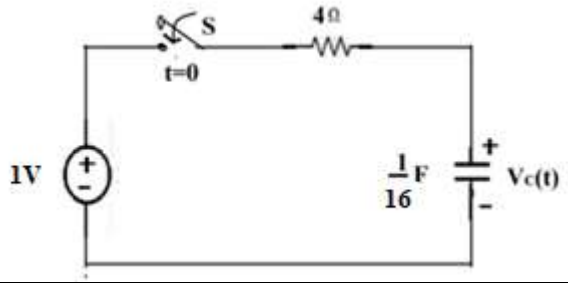
			
7.	**a)**	State &explain Milliman's theorem	[L3][CO3][6M]
	b)	Find the current I_L, use millman's theorem as shown in figure below. 	[L3][CO3][6M]
8.	**a)**	State and explain Tellegen's theorem with one example.	[L3][CO3][6M]
	b)	Verify Tellegen's theorem for the circuit shown in below figure. 	[L3][CO3][6M]
9.	**a)**	State Compensation theorem.	[L3][CO3][4M]
	b)	Find the current passing through the branch AB using compensation theorem when the 3Ω resistance is changed to 9Ω. 	[L3][CO3][8M]
10.		Determine the ammeter reading where it is connected to 6Ω resistor as shown in below figure. The internal resistance of the ammeter is 2Ω.,by using compensation theorem.	[L2][CO3][12M]

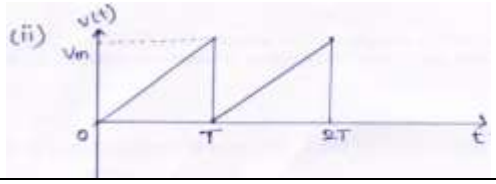
UNIT – III

DC TRANSIENT ANALYSIS

1	**a)**	Define transient response.	[L2][CO4][3M]
	b)	Derive the Transient Response of series RL-circuit with D.C excitation.	[L2][CO4][6M]
	c)	Explain the application of transient analysis.	[L2][CO4][3M]
2	**a)**	A series RL circuit with R=30Ω and L= 15H has a constant voltage V=60v applied at t=0.Determine the current "I", voltage across resistor and voltage across inductor.	[L4][CO4][6M]
	b)	A Series RL circuit with R=50Ω and L=10H has constant voltage V=100volts applied at t=0 by the closing the switch find the complete current.	[L4][CO4][6M]
3	**a)**	A series RL circuit with R=30 Ω and L=15H has a constant voltage V=60V applied at t=0 as shown in figure below. Determine the current I, the voltage across the resistor and across the inductor. 	[L4][CO4][6M]
	b)	Derive the Transient Response of series RC-circuit with D.C excitation.	[L2][CO4][6M]
4	**a)**	A series RC circuit consists of a resistor of 10Ω and capacitor of 0.1 F with a constant voltage of 20v, is applied to the circuit at t=0.Obtain the current equation. Determine the voltage across the resistor and the capacitor.	[L4][CO4][6M]
	b)	Define the term initial conditions and transient response.	[L2][CO4][6M]
5		Determine The Current I for T>0 If $V_c(0)$ = 9V For The Circuit Shown In Fig.	[L2][CO4][12M]

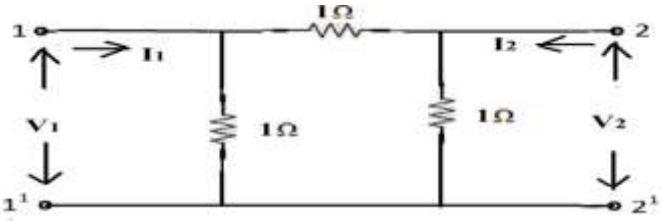
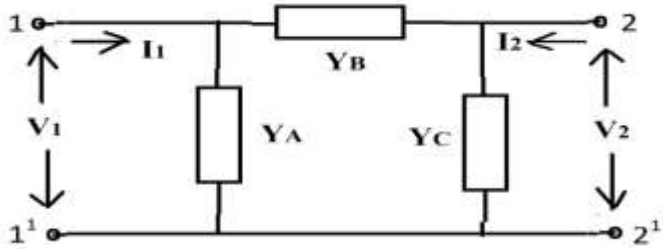
			
6	**a)**	A Series RC circuit consists of R=5000Ω,C=20MF has a constant voltage V=100v applied at t=0 and capacitor has no initial charge. Find the equation of i, V_R and V_C.	[L4][CO4][12M]
7	**a)**	Define Time constant of RL circuit.	[L4][CO4][6M]
	b)	Define Time constant of RC circuit.	[L4][CO4][6M]
8		Derive the Transient Response of series RLC-circuit with D.C excitation.	[L2][CO4][12M]
9	**a)**	The Circuit Consists Of Resistance=20 Ohm, Inductance = 0.05H, Capacitance = 20uF in Series With a 100V Constant at t=0. Find The Current Transient.	[L2][CO4][6M]
	b)	What is Laplace transform. Write the advantages.	[L2][CO4][6M]
10	**a)**	Derive the Laplace Transform of Series RL Circuit.	[L2][CO4][6M]
	b)	Derive the Laplace Transform of Series RC Circuit	[L2][CO4][6M]

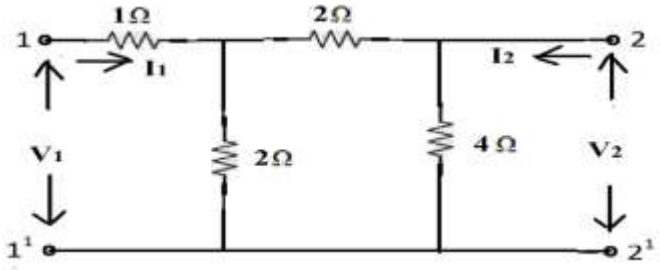
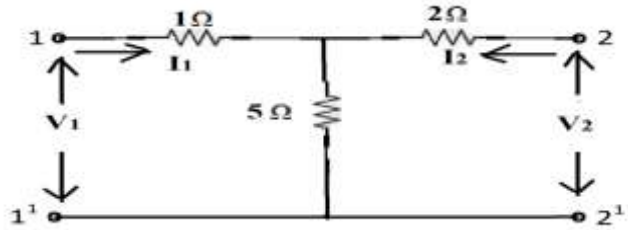
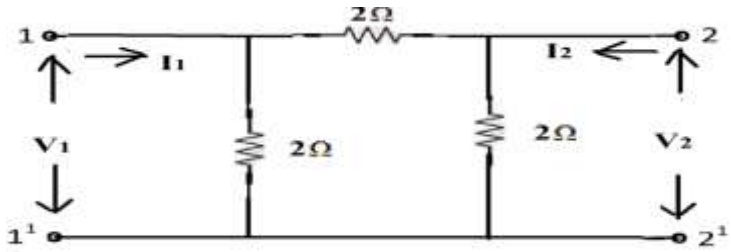
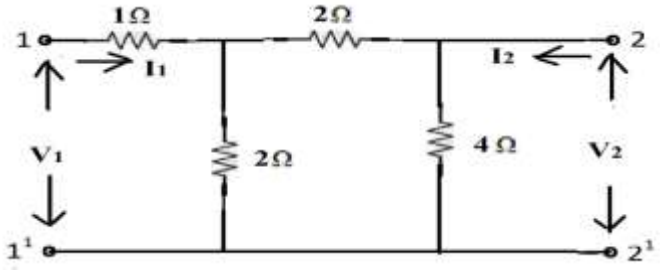
UNIT –IV
SINGLE PHASE AC CIRCUITS

1	**a)**	Derive an expression for RMS values of sine wave form.	[L2][CO5][6M]
	b)	Find the rms value for the following waveform 	[L2][CO5][6M]
2	**a)**	Derive an expression for average values of sine wave form	[L4][CO5][6M]
	b)	An alternating current is expressed as I = 14.14 sin 314t. Determine. (i) Maximum current (ii) RMS current (iii) Frequency (iv)Instantaneous current when t = 0.02msec.	[L2][CO5][6M]
3	**a)**	Define power factor and form factor	[L2][CO5][4M]
	b)	Derive an expression for the current and impedance for a series RL circuit excited by a Sinusoidally alternating voltage. Draw the phasor diagrams.	[L2][CO5][8M]
4	**a)**	Define apparent power, active power and reactive power	[L2][CO5][6M]
	b)	Define Admittance and impedance	[L2][CO5][6M]

5	**a)**	Define active power and reactive power	[L4][CO5][6M]
	b)	Explain the phasor relation for R, L & C elements.	[L4][CO5][6M]
6	**a)**	A resistor of 50Ω and inductance of 100mH are connected in series across 200V, 50Hz supply. Determine the following (i) Impedance (ii) current flowing through the circuit (iii) power factor	[L2][CO5][6M]
	b)	Define power factor and apparent power.	[L4][CO5][6M]
7		Derive an expression for the current and impedance for a series RC circuit excited by a Sinusoidally alternating voltage. Draw the phasor diagrams.	[L4][CO5][12M]
8		Derive an expression for the pure resistance, inductance and capacitance	[L4][CO5][12M]
9		Derive an expression for the voltage and impedance for a series RLC circuit excited by a Sinusoidally alternating voltage.	[L4][CO5][12M]
10		A coil of resistance 10Ω and inductance of 0.1H is connected in series with a 150μF capacitor across a 200V, 50Hz. Calculate (i)inductive reactance (ii) capacitive reactance (iii) impedance (iv) current (v) power factor (vi) power in the circuit.	[L4][CO5][12M]

UNIT –V
TWO PORT NETWORK &FILTERS

1	**a)**	Define Two port network and explain about Impedance parameters.	[L2][CO6][6M]
	b)	Find the Z-parameters of the network shown in below figure. 	[L4][CO6][6M]
2	**a)**	Explain about short-circuit parameters.	[L2][CO6][6M]
	b)	Find the Short-circuit parameters for the circuit shown in figure. 	[L2][CO6][6M]
3	**a)**	Determine the y-parameters of the following network.	[L4][CO6][6M]

			
	b)	Find the transmission parameters for the circuit shown in figure. 	[L2][CO6][6M]
4	**a)**	Explain about ABCD-parameters	[L2][CO6][6M]
	b)	Find the transmission parameters for the circuit shown in figure. 	[L2][CO6][6M]
5	**a)**	Explain about h-parameters in terms of y-parameters	[L2][CO6][6M]
	b)	Find the h-parameters of the network shown in figure. 	[L2][CO6][6M]
6	**a)**	Define filters and explain classifications of filters.	[L2][CO6][6M]
	b)	Draw the characteristics curve for LPF and HPF.	[L2][CO6][6M]
7		Explain about Constant-K low-pass filter in detail.	[L2][CO6][12M]
8	**a)**	List the advantage of constant K filter.	[L2][CO6][4M]

	b)	Design a High –pass filter having a cut-off frequency of 1kHz with a load resistance of 600Ω.	[L2][CO6][8M]
9		Explain about Constant-K High-pass filter in detail.	[L2][CO6][12M]
10	**a)**	Explain about Constant-K band -pass filter in detail	[L2][CO6][8M]
	b)	Design a Band-elimination filter having design impedance of 600Ω and cut-off frequencies f_1= 2kHz and f_2= 6 kHz.	[L2][CO6][4M]

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