INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Electrical and Electronics Engineering

TUTORIAL QUESTION BANK

Course Name	**:**	**ELECTRICAL CIRCUITS**
Course Code	**:**	**AEE002**
Class	**:**	**B. Tech II Semester**
Branch	**:**	**Electrical and Electronics Engineering**
Year	**:**	**2017 – 2018**
Course Coordinator	**:**	Ms. S Swathi, Assistant Professor, EEE
Course Instructors	**:**	Ms. D Shobha Rani, Professor, EEE Mr. T Anil Kumar, Assistant Professor, EEE Mr. K Raju, Associate Professor, EEE Mr. T Vigneysh, Assistant Professor, EEE Ms. S Swathi, Assistant Professor, EEE Mr.GHarikrishna, Assistant Professor, EEE

I. COURSE OBJECTIVES:

The course should enable the students to:

I	Understand the basic parameters, formation of circuit and network.
II	Apply different network reduction techniques to solve complex electrical networks..
III	Use network topology technique to solve complex electrical networks.
IV	Analyze single phase AC circuits and their behaviour.
V	Summarize the conditions for electrical resonance.
VI	Explain the importance of magnetic circuits and their behaviour in electrical engineering.
VII	Examine complex electrical networks using network theorems.

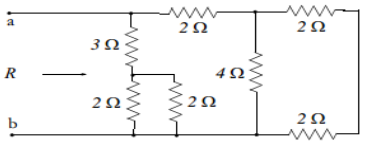
II. COURSE LEARNING OUTCOMES:

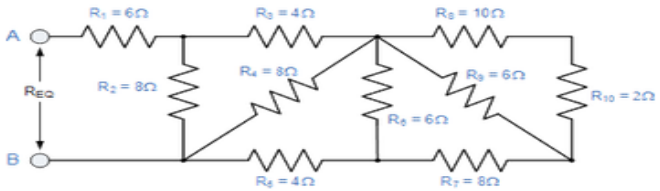
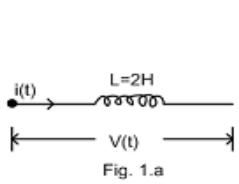
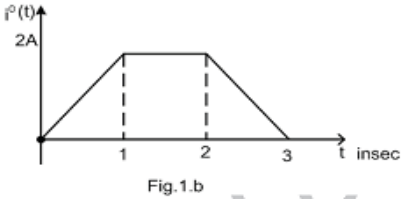
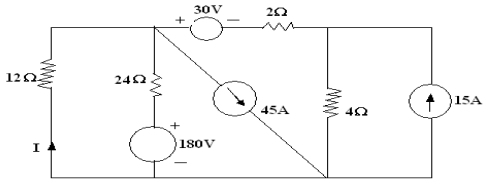
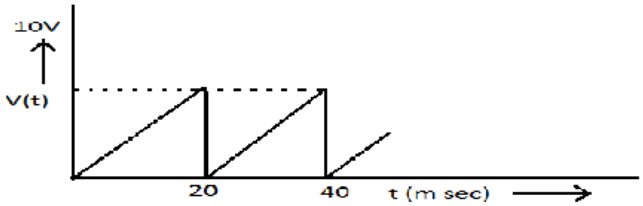
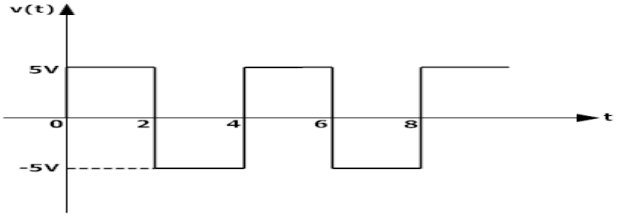
Students, who complete the course, will have demonstrated the ability to do the following:

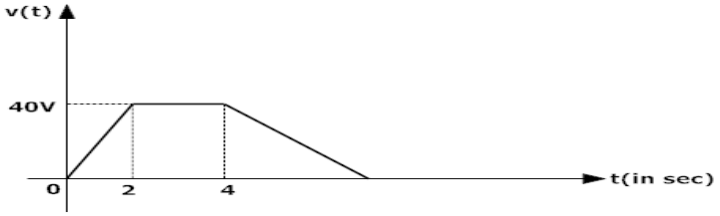
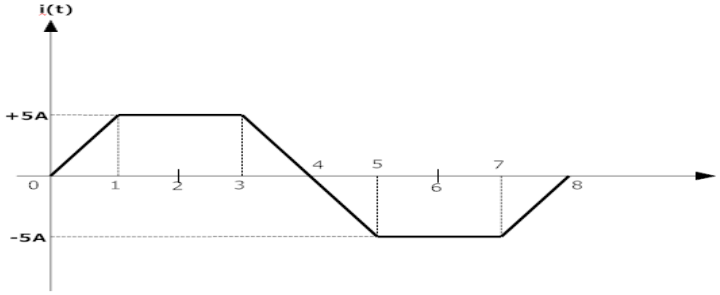
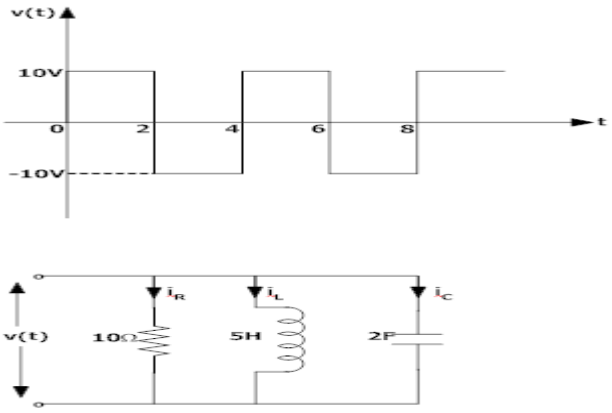
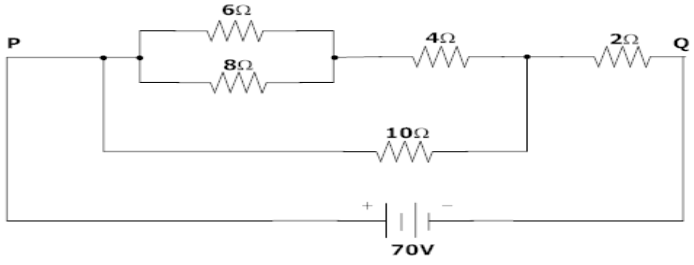
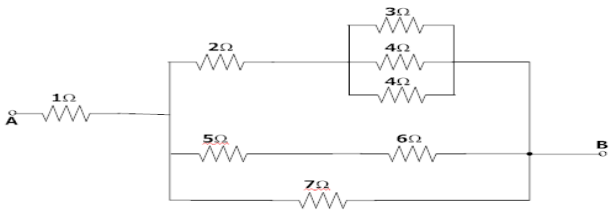
CEE002.01	Define the various nomenclature used to study the characteristics of DC networks.
CEE002.02	Understand the concept of circuit, classification of elements and types of energy sources.
CEE002.03	State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current.
CEE002.04	Apply the network reduction techniques directly and indirectly to calculate quantities associated with electrical circuit
CEE002.05	Define the variousnomenclature related with network topology and give the importance of dual network.
CEE002.06	Formulate incidence, tie-set and cut-set matrix which are used to solve the behavior of complex electrical circuits.
CEE002.07	Identify the alternating quantities with it instantaneous, average and root mean square values.

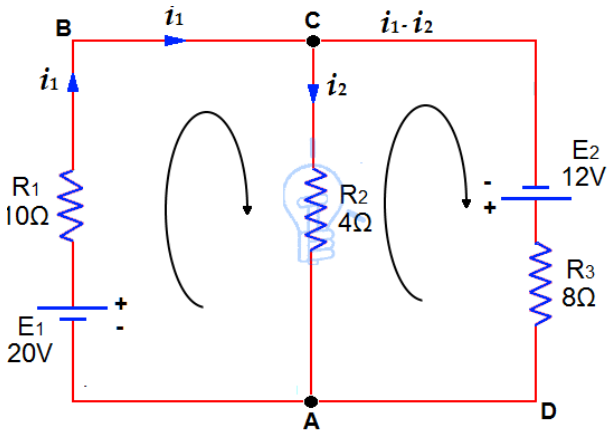
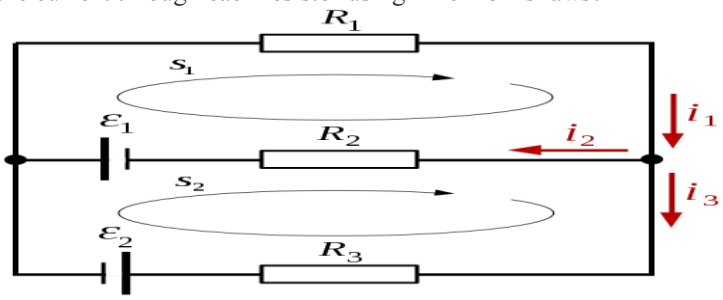
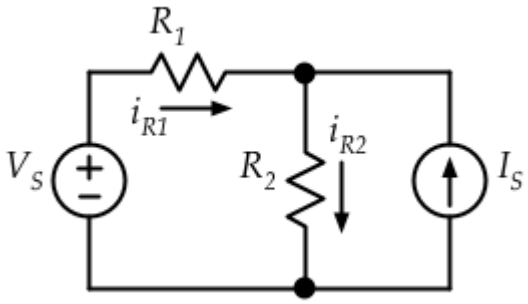
CEE002.08	Demonstrate the impression of reactance, susceptance, impedance and admittance in estimating power of AC circuits.
CEE002.09	Analyze the steady state behaviour of series and parallel RL, RC and RLC circuit with sinusoidal excitation.
CEE002.10	Design the series and parallel RLC for the required bandwidth, resonant frequency and quality factor.
CEE002.11	State the faraday's laws of electromagnetic induction used in construction of magnetic circuit.
CEE002.12	Determine magnetic flux, reluctance, self and mutual inductance in the single coil and coupled coils magnetic circuits.
CEE002.13	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC and AC excitations.
CEE002.14	Summarize the procedure of Thevenin's, norton's and milliman's theorems to reduce complex network into simple equivalent network.
CEE002.15	Explain the steps of compensation, zero current and voltage shift theorem to predictconstraints of electrical networks.
CEE002.16	Apply the network reduction techniques, concept of graph theory, resonance and faraday's laws to solve real constraints of electrical and magnetic circuits.
CEE002.17	Explore the knowledge and skills of employability to succeed in national and international level competitive examinations.

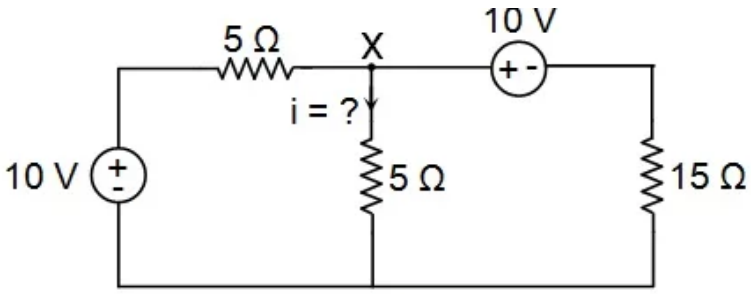
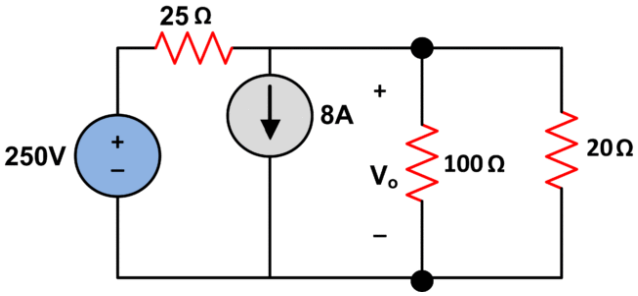
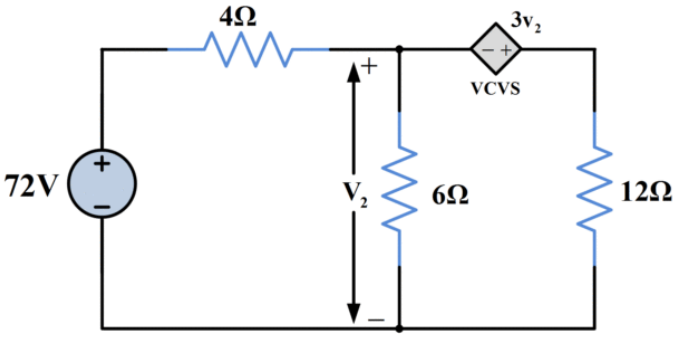
S. No	Question	Bloom's Taxonomy	Course Learning Outcome
UNIT -I			
INTRODUCTION TO ELECTRICAL CIRCUITS			
Part – A (Short Answer Questions)			
1	Draw the basic electric circuit with proper labelling and write importance of each part.	Remember	CEE002.02
2	Define the potential difference.	Remember	CEE002.01
3	Define current.	Remember	CEE002.01
4	Explain the property of resistance for any substance.	Remember	CEE002.02
5	Write the expression for voltage in terms of C and Q.	Remember	CEE002.01
6	Give the charge of electron in coulombs.	Understand	CEE002.01
7	State Ohm's law.	Remember	CEE002.03
8	State Kirchhoff's laws.	Remember	CEE002.03
9	Calculate equivalent resistance of the circuit, if applied voltage is 23V and current flowing through circuit is 4A, receiving an power of 92W.	Understand	CEE002.03
10	If the charge developed between two plates is 2C and capacitance is 4.5 F, determine voltage applied to the plates.	Understand	CEE002.01
11	If three capacitors are connected in series which are 2F, 3F and 6F. Calculate equivalent capacitance.	Understand	CEE002.03
12	If three inductors are in parallel with 20mH, 25mH and 50mH, determine the equivalent inductance.	Understand	CEE002.03
13	Deduce current source from voltage source using source transformation.	Understand	CEE002.03

14	Deduce voltage source from currentsource using source transformation.	Understand	CEE002.03
15	Across AB terminal, an voltage source of 25V is in series with 15 ohms resistor, apply source transformation and redraw the circuit across AB terminals.	Understand	CEE002.03
16	Compare between practical sources and ideal sources.	Remember	CEE002.02
17	Explain with relevant diagrams of dependent sources.	Understand	CEE002.02
18	State two salient points of a series combination of resistors.	Remember	CEE002.03
19	Define an ideal voltage source and current source.	Remember	CEE002.02
20	Write the expression of energy stored in a inductor and capacitor.	Remember	CEE002.02
21	State two salient points of parallel connections of resistors.	Remember	CEE002.03
22	Write the properties ofinductor.	Remember	CEE002.02
23	Write the properties of capacitor.	Remember	CEE002.02
PART - B (LONG ANSWER QUESTIONS)			
1	Differentiate resistor, inductor and capacitor elements using their voltage-current characteristics.	Remember	CEE002.02
2	Derive the necessary condition for source transformation and deduce one type of source from the other.	Remember	CEE002.03
3	Explain the laws used to study behaviour of the series and parallel circuits with neat examples.	Understand	CEE002.03
4	Classify types of electric circuit elements depending on their characteristics and explain in detail.	Understand	CEE002.02
5	Distinguish between ideal and practical energy sources.	Understand	CEE002.02
6	State ohm's law and give its applicability to electrical network. Explain convention current direction and voltage across an element.	understand	CEE002.03
7	Write the conventions to study any electrical circuit.	Understand	CEE002.02
8	Define the terms voltage, current, power, energy, node and degree of the node.	Remember	CEE002.01
9	Deduce voltage, current division rules for series, parallel circuits respectively and explain with neat example.	Understand	CEE002.03
10	Predict in detail the equivalent inductance of series and parallel connections of inductor elements.	Understand	CEE002.03
11	Estimate the equivalent capacitance of series and parallel connections of capacitor elements.	Understand	CEE002.03
12	Estimate the equivalent capacitance of series and parallel connections of resistor elements.	Understand	CEE002.03
PART - C (ANALYTICAL QUESTIONS)			
1	Calculate the equivalent resistance for the given circuit with step by step explanation. 	Understand	CEE002.03

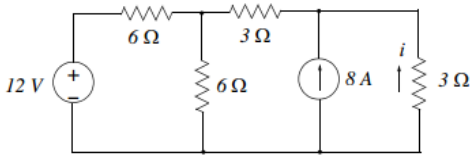
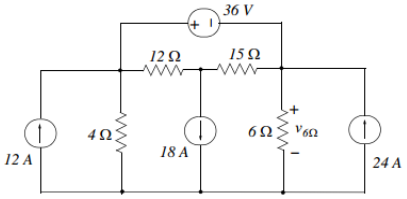
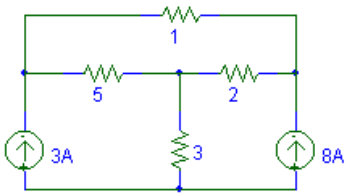
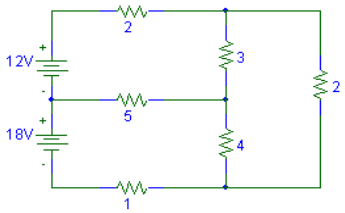
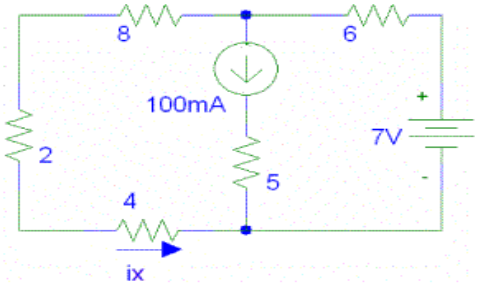
2	Calculate equivalent resistance of circuit shown in figure below 	Understand	CEE002.03
3	If three capacitors are 10F, 12F and 5F capacitance, Calculate the equivalent capacitance for series and parallel connection.	Understand	CEE002.03
4	Consider an coil allowing an current of $i(t) = 4t^2$ for 1 ms, derive the voltage induced, power absorbed and energy stored by inductor, if its inductance is 5H.	Understand	CEE002.03
5	Consider an capacitor allowing an current of $v(t) = 4t^2 + 2t + 1$, deduce the expression for current flowing, power absorbed and energy stored by capacitor, if its capacitance is 5H.	Understand	CEE002.03
6	An inductor shown in fig1 (a) is supplied with a current wave from given in fig1(b) Draw the wave forms for voltage and energy in the inductor  Fig. 1.a  Fig.1.b	Understand	CEE002.03
7	Reduce the network shown in fig (2) to a single loop network by source transformation, to obtain the current in the 12Ω resistor.  Fig (2)	Understand	CEE002.03
8	A saw tooth voltage as shown in figure is applied to a capacitor of C= 30micro Farad. Determine the capacitor current. 	Understand	CEE002.03
9	If three inductors are connected in parallel having 100mH, 25mH and 35mH inductance respectively, calculate the equivalent inductance.	Understand	CEE002.03
10	The following voltage waveform is applied to an inductor of 2H.draw the waveform for current through an inductor 	Understand	CEE002.03

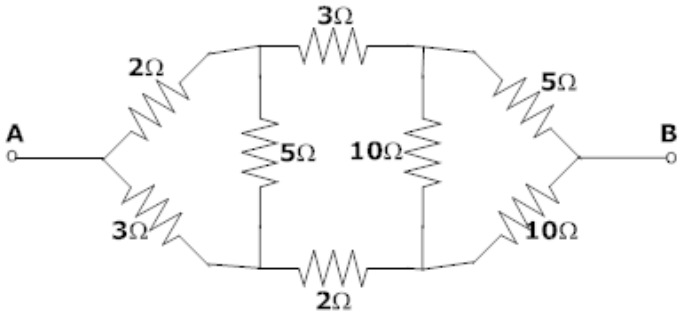
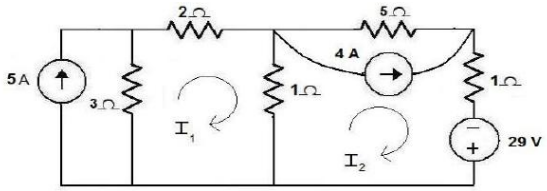
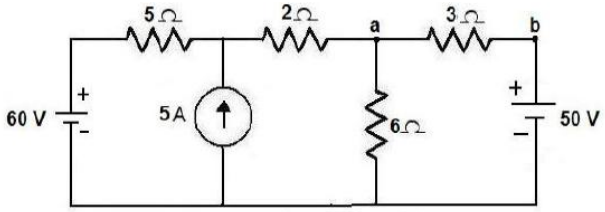
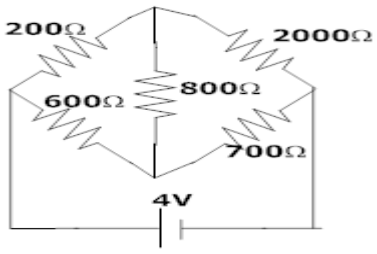
11	A 0.5μF capacitor has a voltage wave form v(t) as shown in figure. Plot i(t) as a function of time. 	Understand	CEE002.03
12	The following current waveform i(t) is passed through a series RL circuit with R=2Ω and L=2mH. Find the voltage across each element and sketch them. 	Understand	CEE002.03
13	For given parallel RLC circuit shown in the figure Draw the waveforms for i_R,i_L,i_C for the circuit when it is excited by a voltage source as shown in the figure 	Understand	CEE002.03
14	Find the equivalent resistance of the circuit shown in the figure below and also calculate the source current, voltage drop across each element. 	Understand	CEE002.03
15	Determine equivalent resistance for the circuit shown in the figure 	Understand	CEE002.03

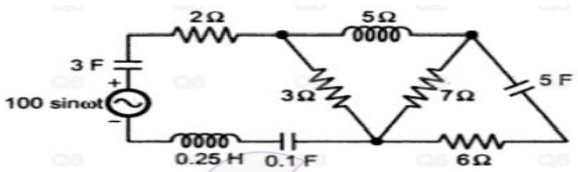
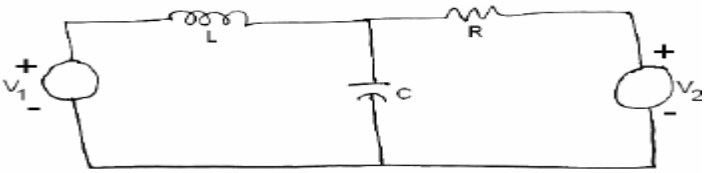
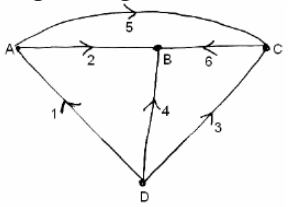
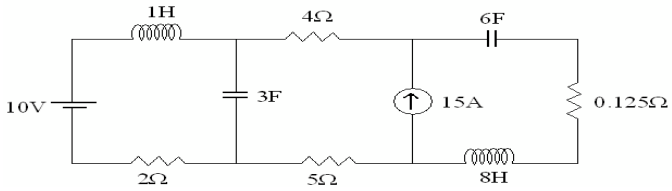
16	Resistors of R_1= 10Ω, R_2 = 4Ω and R3 = 8Ω are connected up to two batteries (of negligible resistance) as shown. Find the current through each resistor using Kirchhoff's laws? 	Understand	CEE002.03
17	Resistors of R_1= 100Ω, R_2 = 200Ω and R3 = 300Ω are connected up to two batteries (of negligible resistance) with ϵ_1=3V, ϵ2=4V as shown. Find the current through each resistor using Kirchhoff's laws? 	Understand	CEE002.03
18	For the circuit shown, use the source transformation method to calculatei_{R1}.For the circuit, R_1 = 20 kΩ, R_2 = 5 kΩ, V_S = 15 V, and I_S = -5 mA. 	Understand	CEE002.03

19	Find the current flowing through 5 ohm using source transformation technique? 	Understand	CEE002.03
20	Find V_o using source Transformation 	Understand	CEE002.03
21	Find v_2 in the following circuit using source transformation. 	Understand	CEE002.03
UNIT - II			
ANALYSIS OF ELECTRICAL CIRCUITS			
Part – A (Short Answer Questions)			
1	Write the expressions of star to delta transformation.	Remember	CEE002.04
2	Write the expressions of delta to star transformation.	Remember	CEE002.04
3	Define super mesh.	Remember	CEE002.04
4	Give the condition for super node.	Understand	CEE002.04
5	Write the limitations of mesh analysis.	Remember	CEE002.04

6	Write the limitations of nodal analysis.	Remember	CEE002.04
7	If three equal value resistors are in delta, determine their equivalent values in star connection.	Understand	CEE002.04
8	Define reference node.	Remember	CEE002.04
9	Give the difference between nodal analysis and mesh analysis	Understand	CEE002.04
10	If three equal value resistors are in star, calculate their equivalent values in delta connection.	Understand	CEE002.04
11	If three equal value resistors with R=3ohms are in delta, determine their equivalent values in star connection.	Understand	CEE002.04
12	Define network topology and write its importance in electrical circuits.	Remember	CEE002.05
13	Define tree and co-tree.	Remember	CEE002.05
14	Write the expression for number of links.	Remember	CEE002.05
15	Give the importance and properties of incidence matrix.	Remember	CEE002.06
16	For 8 element 5 node graph , determine number of links.	Understand	CEE002.06
17	Define basic tie-set and give the condition to form basic tie-set.	Remember	CEE002.06
18	Define basic tie-set and give the condition to form basic cut-set.	Remember	CEE002.06
19	Define the duality and the dual elements.	Remember	CEE002.04
20	Give the importance of tie-set matrix with electrical networks.	Understand	CEE002.06
21	If three equal value resistors with R=3ohm are in star , determine their equivalent values in delta connection	Understand	CEE002.04
PART - B (LONG ANSWER QUESTIONS)			
1	Discuss the method used to determine loop currents for multiple loop network with an neat example.	Understand	CEE002.04
2	Summarize the procedure to calculate node voltages of an electrical network using nodal analysis.	Understand	CEE002.04
3	Discuss the method used to determine loop currents for multiple loop network with ideal current source between any two meshes.	Understand	CEE002.04
4	Summarize the procedure to calculate node voltages of an electrical network with ideal voltage source between any two nodes.	Understand	CEE002.04
5	Explain the inspection method to write mesh equation for an network.	Understand	CEE002.04
6	Explain the inspection method to write nodal equation for an network.	Understand	CEE002.04
7	Derive the expressions of star-delta transformations to determine the equivalent resistance of complex network.	Understand	CEE002.04
8	Define terms graph, oriented and non-oriented graph, planar and non-planar graph, tree and co-tree, branches and links, nodes and degree of the node.	Remember	CEE002.05
9	Explain the formation of incidence matrix with an example.	Understand	CEE002.06
10	Demonstrate the formation of matrix using tie-sets for the determination of relation between link currents and branch currents.	Understand	CEE002.06
11	Describe the method for the formation of matrix used to give relation between branch and twig voltages.	Understand	CEE002.06
12	Explain the dual elements and dual network with neat example.	Understand	CEE002.04
13	Determine the branch currents in terms of link currents using tie-set matrix with an example.	Understand	CEE002.06

14	Determine the branch voltages in terms of twig voltages using cut-set matrix with an example.	Understand	CEE002.06
15	Take any graph and draw all possible trees, basic tie-sets and basic cut-sets.	Understand	CEE002.06
	Part - C (Analytical Questions)		
1	Apply mesh analysis and calculate the current flowing through 3 Ohms element. 	Understand	CEE002.04
2	Apply nodal analysis and determine the current flowing through each element. 	Understand	CEE002.04
3	Determine the node voltages and power absorbed by 5 ohms resistor. 	Understand	CEE002.04
4	Using inspection method, compute the current in each mesh and power loss in each element. 	Understand	CEE002.04
5	Using inspection method, calculate the node voltages and power loss in eachelement. 	Understand	CEE002.04

6	Calculate the voltage to be applied across AB in order to drive current of 5A In the circuit by using star-delta transformation. 	Understand	CEE002.04
7	Determine the node voltages using nodal analysis for given circuit shown below. 	Understand	CEE002.04
8	Determine the current through branch a-b using mesh analysis shown in figure below. 	Understand	CEE002.04
9	Determine the current through 800 ohm resistor in the network shown in figure. 	Understand	CEE002.04
10	Draw the graph from incident matrix and write tie-set matrix 1 0 0 0 -1 -1 -1 -1 0 0 0 0 1 -1 0 0 1 0 1 1	Understand	CEE002.06
11	Draw the graph from incident matrix and write cutset matrix 1 0 0 0 -1 -1 -1 -1 0 0 0 0 1 -1 0 0 1 0 1 1	Understand	CEE002.06

12	Draw the following i) Graph ii) Tree iii) Dual network of figure shown below 	Understand	CEE002.06
13	Explain the principal of duality and draw the dual network for the . 	Understand	CEE002.04
14	Determine the brach voltages using cut-set marix. 	Understand	CEE002.06
15	Develop the fundamental tie-set matrix for the circuit shown in 	Understand	CEE002.06

UNIT – III

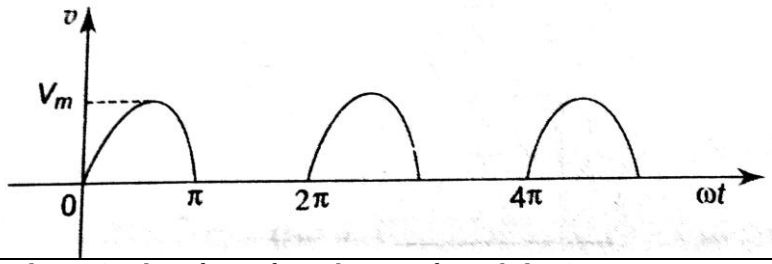
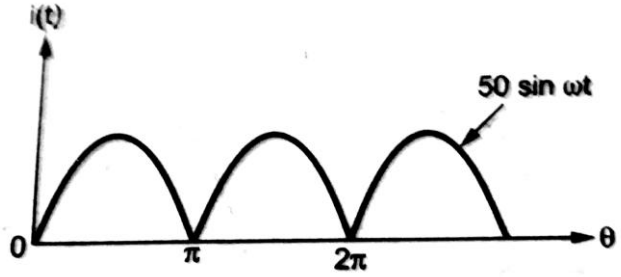
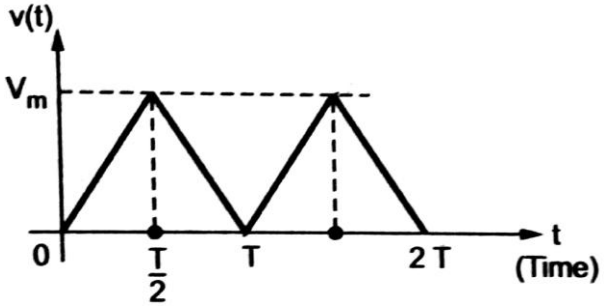
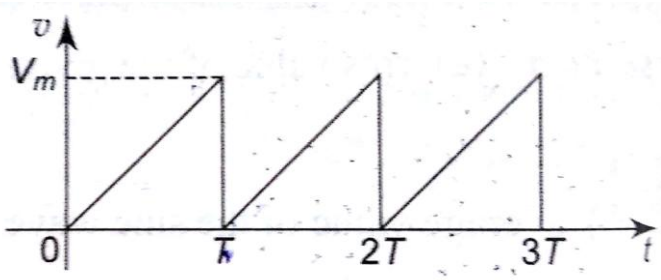
SINGLE PHASE AC CIRCUITS

Part - A (Short Answer Questions)

1	Define the alternating quantity.	Remember	CEE002.07
2	Give the difference between periodic and non-periodic wave form.	Understand	CEE002.07
3	Define the peak, peak to peak, average, RMS value also peak and form factor of sine function.	Remember	CEE002.07
4	Represent the alternating current and voltage in terms of sine function.	Remember	CEE002.07
5	Write the expression for reactance offered by inductor and capacitor.	Remember	CEE002.08
6	Give the net impedance offered by commercial inductor and capacitor.	Understand	CEE002.08
7	Define the term admittance of circuit.	Remember	CEE002.08
8	If two impedances of (2 + 3j)ohms and (4+5j)ohms are in series, calculate the total impedance, and source current	Understand	CEE002.08

9	Draw the impedance triangle and explain in detail.	Remember	CEE002.08
10	Draw the power triangle and explain in detail.	Remember	CEE002.08
11	An AC circuit consists of 20 ohms resistance and an inductor in series, determine the value of inductance if total impedance is (20 + 25j) ohms.	Understand	CEE002.08
12	Write the expressions for voltage wave forms if wave form B lags wave form A by 30 degrees from reference axis.	Understand	CEE002.07
13	For the given alternating voltage, compute peak, peak to peak, average, RMS values.V(t) = 25 sinwt.	Understand	CEE002.07
14	Explain Why average value is defined for half cycle of sine wave.	Understand	CEE002.07
15	In an AC circuit source applied is 100 sin100t across series combination of 4 ohms and 13 F, calculate source current flowing through circuit.	Understand	CEE002.08
16	If the voltage applied is (3 + 7j) V and current flowing through circuit is (4 + 8j)A , calculate complex power and write individual units.	Understand	CEE002.08
17	If the voltage applied is 50V with 45 degrees and current flowing through circuit is 15A with 15 degrees, determine complex power.	Understand	CEE002.08
18	Define the power factor of the circuit and give its importance.	Remember	CEE002.08
19	A 1kHz sinusoidal voltage is applied to an RL circuit, what is the frequency of the resulting current?	Understand	CEE002.08
20	A series RL circuit has resistance of 33kΩ and inductive reactance of 50kΩ, what is the impedance and phase angle?	Understand	CEE002.08
21	In a series RL circuit, V_R=2V, V_L=3V, what is the magnitude of total voltage?	Understand	CEE002.08
22	In a series RC circuit, V_R=5V, V_C=10V, what is the magnitude of total voltage?	Understand	CEE002.08
23	A series RC circuit has resistance of 10kΩ and capacitive reactance of 50kΩ, what is the impedance and phase angle?	Understand	CEE002.08
24	A series RC circuit has resistance of 5kΩ and capacitive reactance of 25kΩ, what is the impedance and phase angle?	Understand	CEE002.08
25	A series RL circuit has resistance of 20kΩ and inductive reactance of 70kΩ, what is the impedance and phase angle?	Understand	CEE002.08
26	In a series RL circuit, V_R=10V, V_L=25V, what is the magnitude of total voltage?	Understand	CEE002.08
27	A 5kHz sinusoidal voltage is applied to an RL circuit, what is the frequency of the resulting current?	Understand	CEE002.08
28	In a series RC circuit, V_R=10V, V_C=75V, what is the magnitude of total voltage?	Understand	CEE002.08
PART – B (LONG ANSWER QUESTIONS)			
1	Define the terms peak, peak to peak, average, RMS values, peak factor and form factor of sine wave.	Remember	CEE002.07
2	Derive the expression for average and RMS values of sine wave.	Understand	CEE002.07
3	Discuss the concept of reactance and impedance offered by R,L,C parameters.	Understand	CEE002.08
4	Explain the concept of susceptance and admittance offered by R,L,C parameters.	Understand	CEE002.08
5	Compute all types of relations between two wave forms and write the relevant expressions.	Understand	CEE002.07
6	Explain the concept of active, reactive, apparent power and draw power triangle.	Understand	CEE002.08

7	Co-relate the impedance triangle with power triangle and explain In detail.	Understand	CEE002.08
8	Explain the terms phase, phase difference and phasor diagram with neat example.	Understand	CEE002.08
9	Summarize the features of electrical network with DC and AC excitation.	Understand	CEE002.08
10	Explain the nature of power factor in inductive and capacitive circuits.	Understand	CEE002.08
11	Derive the expression for true power in ac circuits.	Understand	CEE002.08
12	Derive the expressions for reactance and impedance of inductor and capacitor.	Understand	CEE002.08
13	Determine the voltage, current and power in series RL circuit using sinusoidal excitation.	Understand	CEE002.09
14	Predict the voltage, current and power in series RC circuit using sinusoidal excitation.	Understand	CEE002.09
15	Estimate the voltage, current and power in series RLC circuit using sinusoidal excitation.	Understand	CEE002.09
16	For a series RL circuit having R=1kΩ, L=50mH and Vs=10V, 10KHz. find impedance Z, Current I, phase angle, voltage across the resistor $V_{R,}$ voltage across the inductor V_L.	Understand	CEE002.08
17	Determine the source voltage and phase angle, if voltage across resistance V_R=70V, voltage across inductance V_L = 20V.	Understand	CEE002.08
18	For the series RLC circuit with R=10Ω, L=0.5H, C=10μF and Vs=50V, 50Hz. Determine impedance Z, current, phase angle, voltage across each elements.	Understand	CEE002.08
19	For a series RL circuit having R=5kΩ, L=10mH and Vs=20V, 10KHz. find impedance Z, Current I, phase angle, voltage across the resistor $V_{R,}$ voltage across the inductor V_L.	Understand	CEE002.08
20	Determine the source voltage and phase angle, if voltage across resistance V_R=70V, voltage across capacitance V_C = 30V.	Understand	CEE002.08
21	For the series RLC circuit with R=100Ω, L=50mH, C=50μF and Vs=100V, 50Hz. Determine impedance Z, current, phase angle, voltage across each elements.	Understand	CEE002.08
22	For a series RC circuit having R=1kΩ, C=50μF and Vs=10V, 10KHz. find impedance Z, Current I, phase angle, voltage across the resistor $V_{R,}$ voltage across the capacitor V_C.	Understand	CEE002.08
23	For a parallel RL circuit having R=5kΩ, L=10mH and Vs=20V, 10KHz. find impedance Z, line Current.	Understand	CEE002.08
24	For a parallel RC circuit having R=10kΩ, C=100μF and Vs=50V, 10KHz. find impedance Z, line Current.	Understand	CEE002.08
25	For a series RC circuit having R=5kΩ, C=100μF and Vs=25V, 10KHz. find impedance Z, Current I, phase angle, voltage across the resistor $V_{R,}$ voltage across the capacitor V_C.	Understand	CEE002.08
PART - C (ANALYTICAL QUESTIONS)			

1	Obtain average value of sinusoidal waveform shown in figure? 		
2	Find R.M.S value of waveform shown in figure below? 		
3	Find the Form factor for the figure shown below? 		
4	Find the R.M.S value of the waveform shown in figure below? 		
5	In an AC circuit source applied is 500sin100t across series combination of 8 ohms and 15H, determine total impedance, phase angle between voltage and current in circuit and power factor of the circuit.	Understand	CEE002.08
6	In an AC circuit source applied is 500sin100t across series combination of 7 ohms and 8F, calculate source current flowing through circuit, total impedance and draw the power triangle.	Understand	CEE002.08

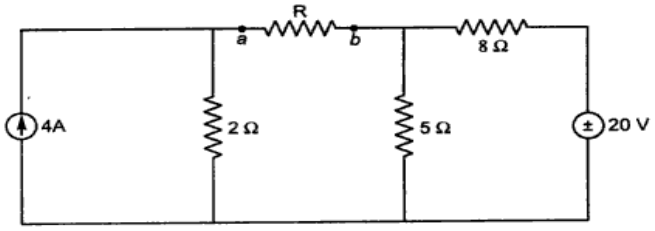
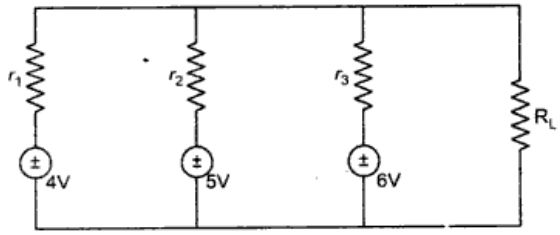
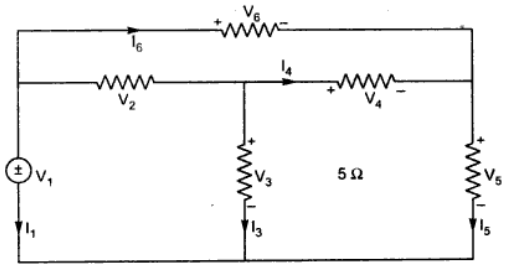
7	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 150V 0 degrees. Compute total impedance, power factor, source current and voltage drop across Z2 Z1= (2 + j)ohms Z2= (4 + 5j)ohms Z3= (1 + 5j)ohms	Understand	CEE002.08
8	In an AC circuit source applied is 200sin60t across series combination of 12 ohms and 25H, determine total impedance, phase angle between voltage and current in circuit and power factor of the circuit.	Understand	CEE002.08
9	In an AC circuit source applied is 10sin50t across series combination of 16 ohms and 50μF, determine total impedance, phase angle between voltage and current in circuit and power factor of the circuit.	Understand	CEE002.08
10	In an AC circuit source applied is 100sin50t across series combination of 16 ohms and 30H, determine total impedance, phase angle between voltage and current in circuit and power factor of the circuit.	Understand	CEE002.08
11	If the voltage applied is (10+ 8j)V and current flowing through circuit is (3 + 5)A , calculate complex power and circuit constants.	Understand	CEE002.08
12	In an ac circuit two parallel impedances are in connected across AB terminals, where AB terminals are fed by 150V , 0 degrees with series impedance of Z3.. Compute total impedance, power factor, source current and voltage drop across Z2 Z1= (1 + j)ohms Z2= (3 + 5j)ohms Z3= (2 + 5j)ohms	Understand	CEE002.08
13	In an ac circuit two parallel impedances are connected across AB terminals , where AB terminals are fed by 200V 50 degrees with series impedance of Z3 . Calculate total impedance, admittance ,power factor, power factor of each branch and current flowing through each element Z1= (2 + j)ohms Z2= (3 + 5j)ohms Z3= (3 + 5j)ohms.	Understand	CEE002.08
14	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 200V 0degrees. Determine total impedance, power factor, source current, power factor of each branch and voltage drop across Z3 Z1= (8 + j)ohms Z2= (1 + 6j)ohms Z3= (3 + 5j)ohms.	Understand	CEE002.08
15	If the voltage applied is (10- 8j) V and current flowing through circuit is (3 – 5j) A, Determine complex power and circuit constants.	Understand	CEE002.08
16	The voltage of a circuit is $\upsilon = 200 \sin (wt + 30^0)$ and the current is $i = 50 \sin(wt + 60^0)$. Determine i) The average power, reactive power and apparent power. ii) The circuit elements if $w = 100\pi$ rad /sec.	Understand	CEE002.08
17	A series RC circuit with R=2kΩ and C=0.1μF. Determine total impedance Z, current I, phase angle.	Understand	CEE002.07

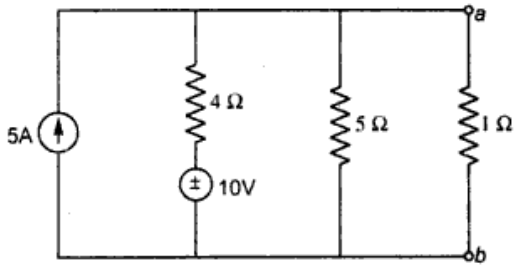
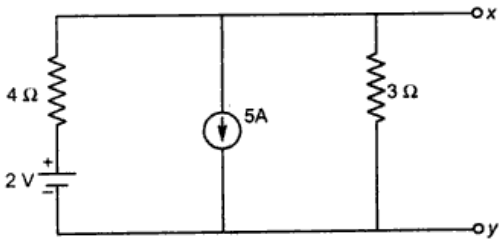
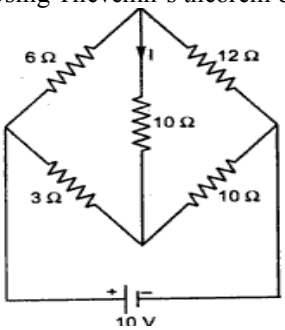
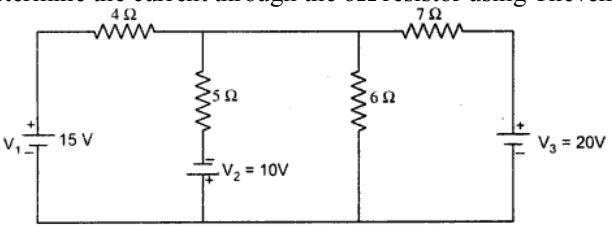
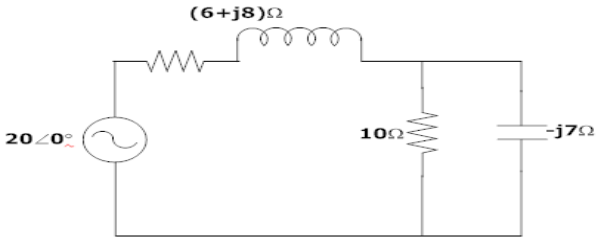
18	A series circuit consisting of a 10Ω resistor, a 100μF capacitor and a 10 mH inductor is driven by a50 Hz a.c. voltage source of maximum value 100 volts. Calculate the equivalent Impedance, current through circuit, power factor and power dissipated.	Understand	CEE002.09
19	A series RC circuit with R=5kΩ and C=0.2μF. Determine total impedance Z, current I, phase angle, voltage across the resistance V_R and voltage across the capacitance V_C.	Understand	CEE002.09
20	Determine impedance and phase angle of series RLC circuit with R=10Ω, L=0.2mH and C=0.5μF.	Understand	CEE002.09
21	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 200V 0degrees. Determine total impedance, power factor, source current, power factor of each branch and voltage drop across Z3. Z1= (8 + 2j)ohms Z2= (2 + 6j)ohms Z3= (6 + 10j)ohms.	Understand	CEE002.09
22	For a series RL circuit with R=2kΩ and L=30mH. Determine total impedance Z, current I, phase angle voltage across the resistance V_R and voltage across the inductor V_L.	Understand	CEE002.09
23	A series RC circuit with R=25kΩ and C=25μF. Determine total impedance Z, current I, phase angle.	Understand	CEE002.09
UNIT – IV			
RESONANCE AND MAGNETIC CIRCUITS			
PART – A (SHORT ANSWER QUESTIONS)			
1	Define electrical resonance.	Remember	CEE002.10
2	Give the condition for circuit to be under resonance.	Understand	CEE002.10
3	Define series and parallel resonance.	Understand	CEE002.10
4	Give the importance cut-off frequency.	Understand	CEE002.10
5	Write the expression for bandwidth in terms of resonant frequency and quality factor.	Remember	CEE002.10
6	Define quality factor .Write Q-factor of inductor and capacitor.	Remember	CEE002.10
7	Write the expression for resonant frequency of series and parallel RLC circuit.	Remember	CEE002.10
8	In an series RLC circuit R = 1K ohms, L = 10mH and C = 0.01 μF, Determine resonant frequency, bandwidth and quality factor.	Understand	CEE002.10
9	In an series RLC circuit, R = 10 ohms, XL = 25 ohms, calculate the C value if circuit is under resonance at 40Hz and then determine impedance of the circuit at 50Hz.	Understand	CEE002.10
10	Define reluctance.	Remember	CEE002.12
11	State faraday's law of electro-magnetic induction.	Remember	CEE002.11
12	Write the expression for co-efficient of coupling and Define perfect coupling.	Remember	CEE002.12

13	Define reluctance and write the expression their suggest Core to be chosen for magnetic circuit.	Remember	CEE002.12
14	Write the condition from dot convention to form voltage equation.	Remember	CEE002.12
15	Two coils of are connected in series , when they are aiding with each other total inductance is 25H and when they are opposing each other is 15H, Determine the mutual inductance.	Understand	CEE002.12
16	Two coils of are connected in parallel , when they are aiding with each other if self inductance of each coil is 10H and mutual inductance is 1H, compute equivalent inductance.	Understand	CEE002.12
17	Write flux density in terms of field intensity.	Remember	CEE002.11
18	Determine equivalent inductance if three series coils are coupled with each other, coil 1 has 8H self inductance with current entering the dot, coil 2 has self inductance of 5 H with current entering the dot and self inductance of coil3 is 8H with current leaving the dot, Mutual inductances are, between 1 & 2 = 2H, 2 & 3 = 3H and 3 & 1 = 4H.	Understand	CEE002.12
PART – B (LONG ANSWER QUESTIONS)			
1	Define series resonance. Explain the voltage plots in series RLC circuit with resonance phenomenon.	Understand	CEE002.10
2	Define cut-off frequency and bandwidth .Derive the expression for bandwidth of series RLC circuit.	Remember	CEE002.10
3	Give the importance of Q-factor. Derive the expressions for Q-factor of inductor and capacitor element in series RLC circuit.	Remember	CEE002.10
4	Explain the concept of DOT convention and state right hand thumb rule for coupled coils.	Understand	CEE002.12
5	Derive the expression for co-efficient of coupling helps in identifying how strongly two coils are coupled.	Remember	CEE002.12
6	Predict the amount of magnetic flux developed in the composite magnetic circuit.	Understand	CEE002.12
7	Explain the concept of more than two coils coupled and derive the expressions for voltage induced, equivalent inductance.	Understand	CEE002.12
8	Derive the expression for total inductance of two coils coupled with each other and connected in parallel with dot convention both the currents entering the dot.	Understand	CEE002.12
9	Estimate the expression for quality factor in parallel RLC circuits.	Understand	CEE002.10
10	Decide the range of frequencies using series RLC circuits within which desired signal can be transmitted.	Understand	CEE002.10
11	Estimate the range of frequencies using parallel RLC circuits within which desired signal can be transmitted.	Understand	CEE002.10
12	Explain the impedance and admittance curves in series and parallel RLC circuits respectively.	Understand	CEE002.10
PART - C (ANALYTICAL QUESTIONS)			
1	A series RLC circuit with 8 ohms resistance should be designed to have a band width of 50Hz , Determine value of L and so that the circuit resonates at 250Hz	Understand	CEE002.10
2	A series RLC circuit is connected across a variable frequency supply and has R = 12 ohms, L = 1mH and C = 1000PF. Compute resonant frequency, Q factor and cut of frequencies.	Understand	CEE002.10

3	A voltage V = 10 sin wt is applied to series RLC circuit. Under resonance condition the maximum voltage across capacitor is found to be 500V, bandwidth is 400 rad/sec and the impedance at resonance is 100 ohms. Calculate the resonant frequency and circuit constants.	Understand	CEE002.10
4	An iron ring 10cm diameter and 15cm2 in cross section is wound with 250 turns of wire for a flux density of 1.5 wb/cm^2 and permeability 500. Estimate the exciting current to the inductance and field intensity.	Understand	CEE002.12
5	A series RLC circuit is connected across a variable frequency supply and has R = 1000 ohms, L = 1mH and C = 0.01μF. Determine resonant frequency, Q factor, bandwidth and cut of frequencies.	Understand	CEE002.10
6	A series RLC circuit is connected across a supply of 50sin100thas R = 2 ohms, L = 1mH and C = 0.4. Calculate resonant frequency, Q factor, bandwidth and cut of frequencies and current at resonant frequency.	Understand	CEE002.10
7	Series RLC circuit has L = 50μH , C = 2000 pF and R = 50 Ω a. Determine Q factor of the circuit b. The new value of C required for resonance atthe same frequency if the inductance is doubled. c. the new value of Q factor	Understand	CEE002.10
8	Given series RLC Circuit R=10ohms L=1mH c=1μF is connected across sinusoidal source of 20V with variable frequencyDetermine resonant frequency, Q factor under resonance and half power frequencies	Understand	CEE002.10
9	Series resonance network consisting of a resistor of 30Ω, a capacitor of 2uF and an inductor of 20mH is connected across a sinusoidal supply voltage 100sin 50t compute : a. The resonant frequency, b. The current at resonance, c. The voltage across the inductor and capacitor at resonance d. The quality factor e. The bandwidth of the circuit.	Understand	CEE002.10
10	A series circuit consists of a resistance of 4Ω, an inductance of 500mH and a variable capacitance connected across a 100V,50Hz supply. Calculate : a. The capacitance require to give series resonance b. The voltages generated across both the inductor and the capacitor under resonance.	Understand	CEE002.10
UNIT – V			
NETWORK THEOREMS			
PART - A (SHORT ANSWER QUESTIONS)			
1	State Tellegen's theorem.	Remember	CEE002.13
2	State Theveninn's theorem.	Remember	CEE002.14
3	State Norton's theorem.	Remember	CEE002.14
4	State super-position theorem.	Remember	CEE002.13
5	State reciprocity theorem.	Remember	CEE002.13
6	State compensation theorem.	Remember	CEE002.15
7	State Milliman's theorem.	Remember	CEE002.14
8	State maximum power transfer theorem	Remember	CEE002.13
9	Give the application of maximum power transfer theorem	Remember	CEE002.13

10	Write the importance of Thevenin's theorem.	Understand	CEE002.14
11	Give the importance of Nortan's theorem.	Understand	CEE002.14
12	Write the importance of super-position theorem.	Understand	CEE002.13
13	Give the importance of Milliman's theorem.	Understand	CEE002.14
14	Write the importance of compensation theorem.	Understand	CEE002.15
15	Give the application of reciprocity theorem	Understand	CEE002.13
16	If the Thevenin's equivalent consists of 25v with 10 ohms draw the Nortan's equivalent.	Understand	CEE002.14
17	If 25v, 15v and 10v are connected across AB terminals, Determine voltage measured across AB terminals.	Understand	CEE002.14
18	List the limitations of super-position theorem.	Understand	CEE002.13
19	The Nortan's equivalent circuit consists of 10A in parallel with 8 ohms, determine the load resistance for which maximum power transfer takes place.	Understand	CEE002.14
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	CEE002.13
PART - B (LONG ANSWER QUESTIONS)			
1	State and prove tellegen's theorem with an example for DC excitation.	Understand	CEE002.13
2	State and verifyThevenin's theorem with an example for DCexcitation.	Understand	CEE002.14
3	State and verifyNortan's theorem with an example for DC excitation.	Understand	CEE002.14
4	State and prove super-position theorem with an example for DCexcitation.	Understand	CEE002.13
5	State and prove reciprocity theorem with an example for DCexcitation.	Understand	CEE002.13
6	State and explain compensation theorem with an example for DCexcitation.	Understand	CEE002.15
7	State and prove Milliman'sthoerem theorem with an example for DCexcitation.	Understand	CEE002.14
8	State and verifyThevenin's theorem with an example for ACexcitation.	Understand	CEE002.14
9	State and prove super-position theorem with an example forACexcitation.	Understand	CEE002.13
10	State and verify Nortan's theorem with an example for AC excitation.	Understand	CEE002.14
11	Derive the condition for maximum power transfer with DC excitation and verify with an example.	Understand	CEE002.13
12	Derive the condition for maximum power transfer with AC excitation and verify with an example.	Understand	CEE002.13
13	State and explain the milliman's theorem with AC excitation.	Understand	CEE002.14
14	Explain the Thevenin's equivalent and norton's equivalent circuit with their importance.	Understand	CEE002.14
PART - C (ANALYTICAL QUESTIONS)			

1	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	CEE002.13
2	In an series circuit the source impedance is (3 + 8j) ohms with 100V supply Design load impedance to absorb maximum power and form the Nortan's equivalent circuit.	Understand	CEE002.13
3	In an network consisting three parallel branches, firstacross 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 ohms resistor.	Understand	CEE002.14
4	In an network consisting of three parallel branches, first is defined as 100V in series with (3 + 4j) ohms, second branch 7ohms and third branch 50V in series with (2 + 3j)ohms. Apply Milliman's theorem to Determine current flowing through 7 ohms	Understand	CEE002.14
5	In an 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	CEE002.13
6	In an series circuit Z1 = (10 + 10j) ohms, Z2 = (5 + 3j) ohms with 100V 45 degrees supply. Apply compensation theorem and determine the response in Z2.	Understand	CEE002.15
7	In an series circuits source resistance is 45 ohms and load resistor is R_L with 20V DC supply. If R_L is variable of resistances 10, 20, 30, 40, 45, 50, 60, 70 ohms respectively. Determine for what resistance of load maximum power is transfer, maximum power value, current and voltage drops in each case.	Understand	CEE002.13
8	Determine the value of resistance R so the maximum power transfer takes place from the rest of the network to R in fig. 	Understand	CEE002.13
9	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	CEE002.14
10	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	CEE002.13

11	Determine power loss in 1Ω resistor by Thevenin's theorem. 	Understand	CEE002.14
12	Draw the Norton's equivalent circuit across x-y for the network shown in below. 	Understand	CEE002.14
13	Using Thevenin's theorem determine the current I in the network. 	Understand	CEE002.14
14	Determine the current through the 6Ω resistor using Thevenin's theorem. 	Understand	CEE002.14
15	Verify Tellegen's theorem. 	Understand	CEE002.13

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