INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

ASSIGNMENT

Course Name	:	**ELECTRICAL CIRCUITS**
Course Code	:	**A30204**
Class	:	II B. Tech I Semester
Branch	:	Electrical and Electronics Engineering
Year	:	2015 – 2016
Course Faculty	:	G Hari Krishna, Assistant Professor, M Diva Kumar, Assistant Professor, N Sindhu, Assistant Professor

OBJECTIVES

This course deals with measuring instruments mainly indicating instruments and the associated torques, instrument transformers, power factor meter, frequency meter , synchro scopes, wattmeter, energy meter, potentiometer ,resistance measuring methods, ac bridges, ballistic galvanometer, flux meter, extension range of indicating instruments.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT -1 (INTRODUCTION TO ELECTRICAL CIRCUITS)		
1	a) **State** Ohm's law. b) **Mention** the limitations of Ohm's Law.	Remembering & Applying	1
2	a) **What** is a mesh? b) **Define** super mesh	Remembering	1
3	a) **State** Kirchhoff's voltage law. b) **State** Kirchhoff's Current law.	Remembering	1
4	a) **What** is nodal mesh analysis? b) What is a super node?	Understanding	1
5	a) State two salient points of a series combination of resistance b) State two salient points of a parallel combination of resistance.	Understanding	2
6	a) Define reference node? b) Give the difference between nodal analysis and mesh analysis	Understanding	2
7	Give two applications of both series and parallel combination.	Application	2
8	a) Define an ideal voltage source. b) Define an ideal current source.	Understanding	4
9	a) Explain with relevant diagram dependent sources. b) Explain source transformations.	Understanding	1
10	Explain how voltage source with a source resistance can be converted into an equivalent current source.	Understanding	1
	UNIT – II (SINGLE PHASE A.C CIRCUITS)		

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	Define R.M.S value.	Remembering	1
2	State the advantages of sinusoidal alternating quantity.	Understanding	1
3	State two salient points of a series combination of resistance	Remembering	
4	Mention the Properties of a series RLC circuit.	Remembering	4
5	Give two applications of both series and parallel combination.	Applying	1
6	What is complex power? Explain power triangle?	Remembering	1
7	What are disadvantages of having a poor power factor?	Remembering	1
8	Define i) Sinusoid ii) Form factor iii) Peak factor iv) Power factor	Understanding	1
9	Derive the expression for power in terms of RMS values of voltage, current and cosine of the angle between voltage and current.	Evaluating	1
10	Determine the current flowing through a branch, whose impedance is 4+j6 Ω, when a voltage 220v is applied and also find the power factor and active power?	Analyzing	1
	UNIT – III (LOCUS DIAGRAM, RESONANCE AND MAGNETIC CIRCUITS)		
1	Define quality factor.	Remembering	1
2	Write the characteristics of series resonance	Remembering	1
3	What is resonance?	Understanding	1
4	What is Band width and Selectivity?	Understanding	2
5	Write the characteristics of parallel resonance	Applying	1
6	a) Define Faraday's law of electromagnetic induction. b) Define self-inductance.	Remembering	1
7	a) Define mutual inductance. b) What is DOT convention?	Remembering	1
8	a) State dot rule for coupled coils. b) Define coefficient of coupling.	Understanding	2
9	a) What is magnetization curve? b) Write equation for energy density for a magnetic circuit	Understanding	2
10	a) What are coupled circuits? b) What are coupled coils?	Remembering	2
	UNIT – IV (NETWORK TOPOLOGY)		
1	Define network topology.	Remembering	1
2	Define (a) Graph and (b) Loop.	Remembering	1
3	Define a tree and a co-tree in a graph of a network.	Remembering	1
4	What is Tie set and how is a Tie-set matrix obtained?	Remembering	2
5	What is a planar and coplanar graph?	Understanding	1
6	Write the principal of duality?	Understanding	1
7	Explain graphical method to draw dual network?	Analyzing	1
8	If network consist b branches and n nodes, how many mesh current equations that could be written for the network?	Analyzing	2
9	A connected graph has 9 branches and 4 branch currents which are independent. Find the number of nodes?	Analyzing	3
10	Explain the following terms i) Tree ii)co-tree iii)Branch iv)Node v)Oriented graph	Remembering	2
	UNIT –V		

S. No	Question	Blooms Taxonomy Level	Course Outcome
	(NETWORK THEOREMS)		
1	State and explain Tellegen's theorem	Understanding	1
2	State and explain step by step procedure of the superposition theorem	Understanding	3
3	Explain the procedure of the reciprocity theorem	Remembering	1
4	State and explain the Thevenin's theorem?	Understanding	1
5	Explain the procedure of the Norton's theorem?	Understanding	1
6	State the Maximum power transfer theorem?	Remembering	1
7	Explain the procedure of the Thevenin's voltage and Thevenin's current?	Understanding	1
8	State and explain the compensation theorem?	Understanding	1
9	Explain the limitations of Thevenin's theorem?	Understanding	1
10	State the Milliman's theorem?	Remembering	3

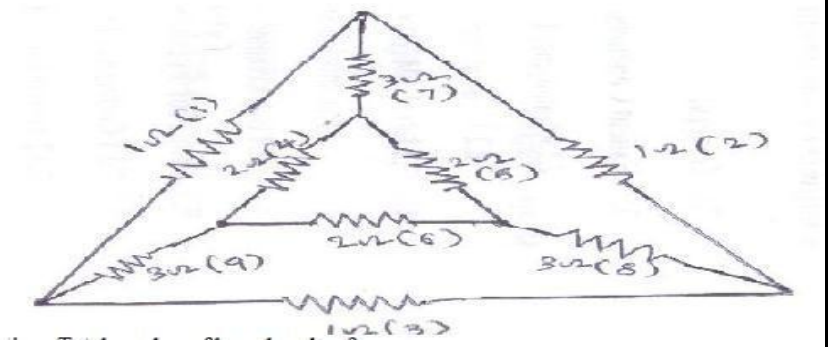
Group – II LONG ASNWERS QUASTIONS

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT -1 **(INTRODUCTION TO ELECTRICAL CIRCUITS)**		
1	a) State and explain Kirchhoff's laws. b) What is meant by independent and dependent sources? Give examples.	Remembering	1
2	A series circuit has R=10Ω, L=50mH, and C=100μF and is supplied with 200V,50Hz. Find (i) Impedance (ii) current (iii) power (iv) power factor (v) voltage drop across the each element.	Analyzing	1
3	Derive the equation for equivalent resistance of number of resistors connected in parallel.	Understanding	2
4	a) Derive an expression for RMs value of an A.C supply. b) Explain Mesh analysis with example?	Applyinng	2
5	A circuit is composed of a resistance 6 Ω and a series capacitive reactance of 8 Ω. A voltage e(t)=141 sin 314t is supplied to the circuit. Find (i) Complex impedance, (ii) Effective value of current, (iii) Power delivered to the circuit, (iv) Capacitance of the capacitor.	Analyzing	1
6	For the mesh-current analysis, explain the rules for constructing mesh impedance matrix and solving the matrix equation [Z]I = V.	Understanding	2
7	Three 100 Ω resistors are connected first in star and then in delta across 415 V, 3-phase supply. Calculate the line and phase currents in each case and also the power taken from the source	Analyzing	3
8	A resistance of 20 Ω and an inductance of 0.2H and a capacitance of 100 μF are connected in series across 220V, 50 Hz main. Determine (i) Impedance (ii) current taken from mains, (iii) Power and power factor of the circuit.	Analyzing	3
9	A series RLC circuit is connected to a 230V, 50hz, 1-phase AC supply. The value of R=5Ω, L=13mH and C=140μF. Find total reactance, impedance, current drawn by the circuit and p.f of the circuit.	Analyzing	2
10	A series circuit having pure resistance of 40 Ω, pure inductance of 50mH and a capacitor is connected across a 400V, 50 Hz ac supply. This LC circuit draws a current of 10A. Calculate 1)Power factor of the circuit, 2) Capacitor value.	Analyzing	2

UNIT –II (SINGLE PHASE A.C CIRCUITS)			
1	Illustrate following terms:	Remembering	1
S. No	**Question**	**Blooms Taxonomy Level**	**Course Outcome**
	i) Impedance ii) Reactance iii) Phase deference iv) Power factor		
2	Define the following i. RMS value ii. Average value iii. Form factor of an alternating quantity	Remembering	1
3	a) Derive the expression for power in 1-φ A.C. Circuits. b) A sinusoidal 50Hz voltage of 200v supplies the three parallel circuits as shown in figure Find the current in each circuit and the total current. Draw the vector diagram.	Analyzing	1,2
4	a)Define power factor. What is its Importance in a.c. Circuits? b) The impedances of a parallel circuit are $Z1=(6+j8)\Omega$ and $Z2=(8-j6)\Omega$. If the applied voltage is 120V, find i. current and power factor of each branch ii. overall current and power factor of the circuit iii. Power Consumed by each impedance. Draw phasor diagram.	Analyzing	1,2
5	Derive the basic equation of an alternating quantity. Hence state its various forms.		1,2
6	A series circuit consisting of a 10Ω resistor, a 100μF capacitor and a 10 mH inductor is driven by a 50 Hz a.c. voltage source of maximum value 100 volts. Calculate the equivalent Impedance, current in the circuit, the power factor and power dissipated in the circuit	Analyzing	1,2
7	a) Show that average power consumed by pure inductor and capacitor is zero. b) A resistance of 16ohms is connected in parallel to an inductance of 20mH and the parallel combination is connected to an ac supply of 230V, 50Hz. Determine the current through the elements and power delivered by the source, draw the phasor diagram.	Analyzing	1,2
8	What is Admittance? Which are its two components? State its unit. How the admittance is expressed in rectangular and polar form?	Understanding	1,2
9	Explain Admittance, Susceptance and Conductance. Draw the admittance triangle	Understanding	1,2
10	Derive the expression for i(t) for RL series circuit when excited by a sinusoidal source.	Analyzing	3
UNIT –III (LOCUS DIAGRAM, RESONANCE AND MAGNETIC CIRCUITS)			
1	A series RLC circuit has Q = 75 and a pass band (between half power frequencies) of 160 Hz. Calculate the resonant frequency and the upper and lower frequencies of the pass band.	Analyzing	1,2

2	Explain and derive the relationships for bandwidth and half power frequencies of RLC series circuit.	Applying	2
3	a) State and explain Faraday's laws of electromagnetic induction b) Determine the quality factor of a coil R = 10 ohm, L = 0.1H and C =	Analyzing	1,2

S. No	Question	Blooms Taxonomy Level	Course Outcome
	10μF		
4	Discuss the characteristics of parallel resonance of a circuit having G,L and C.	Understanding	2
5	What is resonance? Sketch the resonance curves for a series resonant circuit with variable frequency and constant R, L and C.	Remembering	2
6	A Pure resistor, a pure capacitor and a pure inductor are connected in parallel across supply; find the impedance of the circuit as seen by the supply. Also find the resonant frequency.	Applying	1,2
7	For the given circuit constants, find (a) Mutual Inductance (b) Find equivalent inductance for all the combination L1 = 0.02H , L2 = 0.01H and k = 0.5.	Analyzing	1,2
8	Derive an expression for the mutual inductance between two magnetically coupled coils having self-inductances L1 and L2 respectively.	Applying	4
9	a) Compare magnetic and electric circuits. b)Derive from the fundamentals expression for coefficient of coupling	Applying	4
10	When two coils are connected in series, their effective inductance is found to be 10H .When the connections of one coil are reversed , the effective inductance is 6H.If the coefficient of coupling is 0.6, calculate the self inductance of each coil and the mutual inductance.	Analyzing	Iv
	UNIT –IV (NETWORK TOPOLOGY)		
1	For the graph shown below, select a tree and write cut-set matrix	Analyzing	1,2
2	a) Discuss the method of obtaining dual network b) Explain graphical method to draw dual network	Understanding	2
3	For the given network shown. Draw the graph, select a tree with branches 9, 4, 7,5, & 8 and write the tie-set matrix. The number inside the brackets indicates branch numbers.	Analyzing	4

			
4	Write a cut-set matrix for the given resistive network	Analyzing	4

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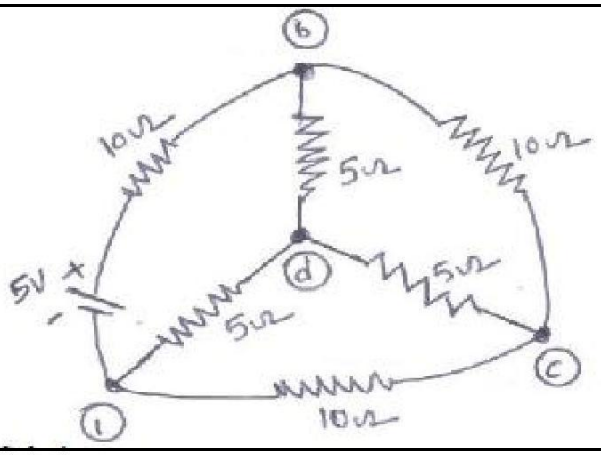
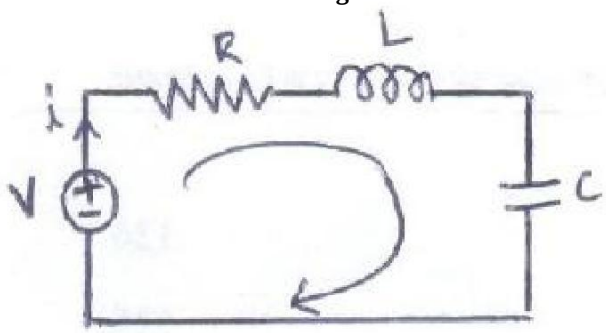
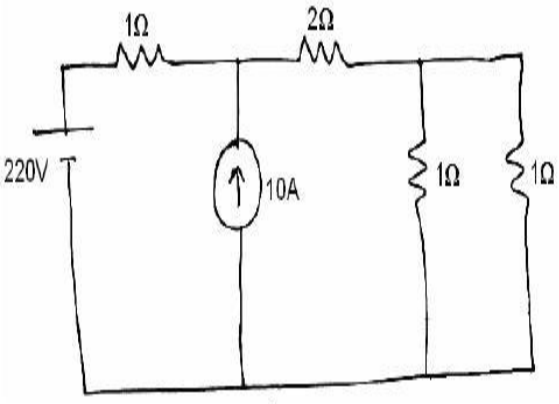
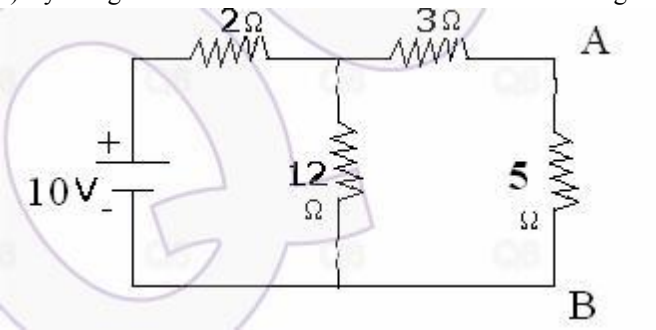
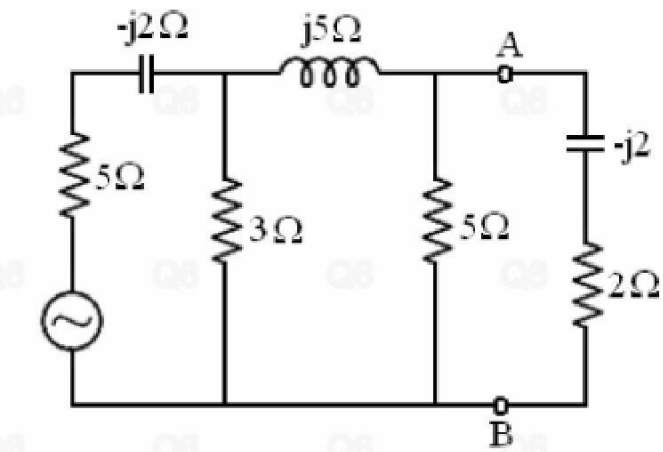
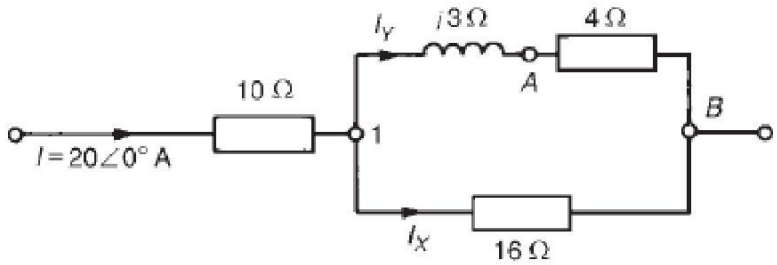
			
5	**Draw the dual of a network for given network shown in figure.** 	Analyzing	4
6	For the network shown in Figure 3, draw the following a) Graph b) Tree c) Dual network	Understanding	1,2
7	Using network topology, solve for node voltages and branch currents for the network. 	Analyzing	3
8	Define and explain the following terms: i) branch ii) tree iii) twig iv) Path v) cutest.	Understanding	1
9	What are meant by the tie-set schedule and the cut-set schedule?	Remembering	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
10	Difference between planar and non-planar graph with suitable examples?	Understanding	2
	UNIT –V **(NETWORK THEOREMS)**		
1	a) State and explain compensation theorem? b) By using Norton's theorem determine the current through 5Ω resistor? 	Analyzing	1
2	a) State and explain superposition theorem b) Determine the current in the (2-2j)Ω impedance connected to the equivalent circuit, replace the cuircuit to the left of terminals 'AB' with a Thevenin's equivalent. 	Analyzing	1,2
3	For the network shown in Figure determine the voltage V_{AB}, by using nodal analysis. 	Analyzing	1,2
4	Find the current through the R_L USING Nodal analysis. Analyzing	Analyzing	2

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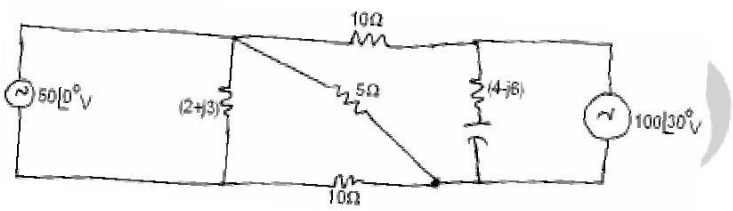
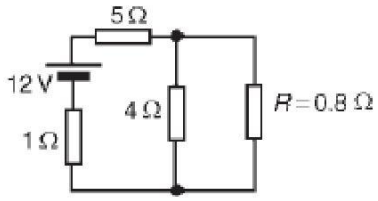
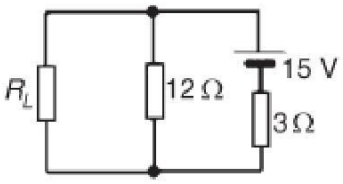
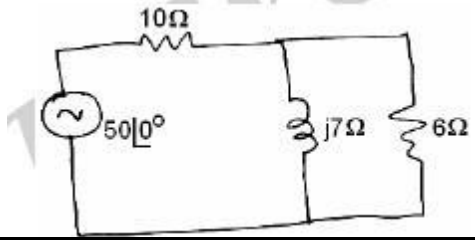
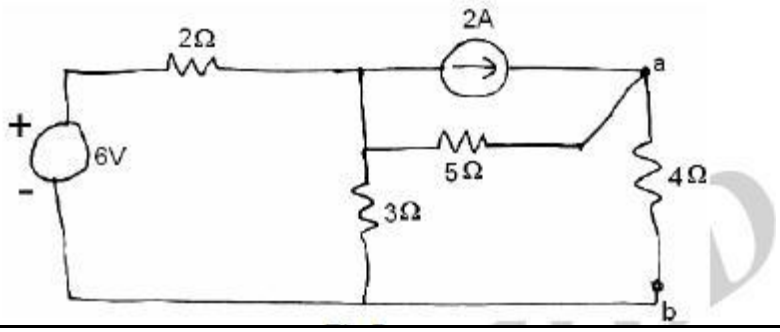
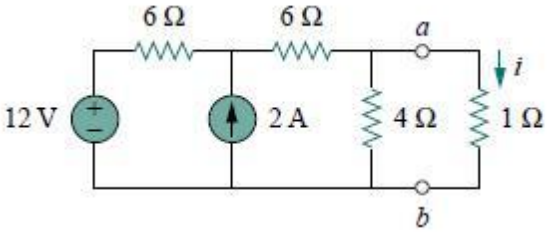
5	Using the principle of superposition theorem find the current in 5Ω resistor. 	Analyzing	2
6	Determine current in the 5Ω resistorusing Thevenin's theorem. 	Analyzing	3
7	Find the value of load resistor R_L shown in fig that gives maximum power dissipation and determine the value of power. 	Analyzing	2
8	The 6Ω resistance is alarted to 8Ω .Find the change in current in 10Ω resistance due to this change using compensation theorem. 	Analyzing	4
9	a) State and explain compensation theorem. b) Find the current through 4Ω resistor using Norton's theorem. 	Analyzing	2

S. No	Question	Blooms Taxonomy Level	Course Outcome
10	Using Thevenin's theorem find the equivalent circuit to the left of the terminals in the circuit,Find current i. 	Analyzing	2

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