INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**ELECTRIC CIRCUITS**			
Course Code	**R15 - A30204**			
Course Structure	**Lectures**	**Tutorials**	**Practicals**	**Credits**
	4	1	-	4
Course Coordinator	Mr K.Sudhakar Reddy, Assistant Professor			
Team of Instructors	Ms Kalyani, 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.

UNIT -1

QUESTION BANK ON SHORT ANSWER QUESTION

Q.NO	QUESTION TO BE ANSWERED	BLOOM'S TAXANOMY	PO'S
1	Define circuit representing its parts.	UNDERSTAND	2,3
2	Define the potential difference.	UNDERSTAND	2,3
3	Define current.	UNDERSTAND	2,3
4	Define resistance.	UNDERSTAND	2,3
5	Write the expression for voltage in terms of C and Q.	REMEMBER	2,3
6	What is the charge of an electron?	REMEMBER	2,3
7	State OHM's law.	REMEMBER	2,3
8	State kirchoff's laws.	REMEMBER	2,3
9	Write the expressions of star-delta transformation.	REMEMBER	2,3
10	Define the power and energy.	UNDERSTAND	2,3
11	What is super mesh?	ANALYZE	2,3
12	What is super node?	ANALYZE	2,3
13	Write the limitations of mesh analysis.	REMEMBER	2,3
14	Write the limitations of nodal analysis.	REMEMBER	2,3
15	Calculate the equivalent resistance of the circuit if applied voltage is 23V and current flowing through circuit is 4A, receving an power 92W.	APPLY	1,2
16	If the charge developed between two plates is 2C and capacitance is 4.5 F, calculate the voltage across the plates.	APPLY	1,2
17	If three capacitors are connected in series which are 2F, 3.2F and 6F	APPLY	1,2

	calculate equivalent capacitance.		
18	If the three inductors are in parallel with 20mH, 25mH and 50mH, calculate the equivalent inductance.	APPLY	1,2
19	Take an series circuit and prove that power delivered is equal to power received.	ANALYZE	2,3
20	Transfom voltage to current and current to voltage using source transformation.	ANALYZE	2,3
21	Across AB terminal an voltage source of 25V is in series with 15 ohms	APPLY	1,2
	resistor , apply source transformation and redraw the circuit across AB terminals.		
22	If three equal value resistors are in delta , find their equivalent values in star connection.	APPLY	A,B
	QUESTION BANK ON DISCRIPTIVE ANSWER QUESTION		
1	Write short notes on voltage-current relations in RLC parameters.	UNDERSTAND	2,3
2	Write short notes on source transformation.	UNDERSTAND	2,3
3	Explain the kirchoff's laws with neat example.	UNDERSTAND	2,3
4	Derive the expressions for star-delta transformations.	UNDERSTAND	2,3
5	Explain the inspection method to write mesh equation for an network.	UNDERSTAND	2,3
6	Explain the inspection method to write nodal equation for an network.	UNDERSTAND	2,3
7	Explain the terms super mesh and super node and apply to electrical network.	UNDERSTAND	2,3
8	Classify types of elements and explain in detail.	ANALYZE	2,3
9	Distinguish between ideal and practical energy sources.	ANALYZE	2,3
10	State ohm's law and give its applicability to electrical network.	REMEMBER,	2,3
11	Explain super mesh analysis with an neat example.	UNDERSTAND	2,3
12	Explain super nodal analysis with an neat example.	UNDERSTAND	2,3
13	Write the conventions to study any electrical circuit.	UNDERSTAND	
14	Define the terms voltage, current, power , energy, node and degree of the node.	REMEMBER	2,3
15	State voltage and current division rules and explain with neat example.	REMEMBER	2,3
	QUESTION BANK ON ANALYTICAL ANSWER QUESTION		
1	Calculate the equivalent resistance , source current for the given circuit. element / From node / To node 30 V source / a / 0 4 ohms / a / b 5 ohms / b / 0 2 ohms / b / c 3 ohms / c / 0 5 ohms / c / d 6 ohms / d / 0	Apply	1,2
2	Apply mesh analysis and find the current flowing through each element. element / From node / To node 20 V source / a / 0 4 ohms / a / b 5 ohms / b / 0 2 ohms / b / c 3 ohms / c / 0 5 ohms / c / d 6 ohms / d / 0	Apply	1,2
3	Apply nodal analysis and find the current flowing through each element. element / From node / To node 30 V source / a / 0 4 ohms / a / b 5 ohms / b / 0 2 ohms / b / c	Apply	1,2

<table>
<tr><td></td><td><table>
<tr><td>3 ohms</td><td>c</td><td>0</td></tr>
<tr><td>5 ohms</td><td>c</td><td>d</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>4</td><td>Find the node voltages and the power absorbed by 7 ohms resistor.<table>
<tr><td>element</td><td>From node</td><td>To node</td></tr>
<tr><td>40 V source</td><td>a</td><td>0</td></tr>
<tr><td>10 ohms</td><td>a</td><td>b</td></tr>
<tr><td>8 ohms</td><td>b</td><td>0</td></tr>
<tr><td>7 ohms</td><td>b</td><td>c</td></tr>
<tr><td>6 ohms</td><td>b</td><td>c</td></tr>
<tr><td>9 ohms</td><td>c</td><td>0</td></tr>
</table></td><td>Apply</td><td>1,2</td></tr>
<tr><td>5</td><td>Use the network reduction technique and response in each element.<table>
<tr><td>element</td><td>From node</td><td>To node</td></tr>
<tr><td>25 V source</td><td>a</td><td>0</td></tr>
<tr><td>6 ohms</td><td>a</td><td>b</td></tr>
<tr><td>8 ohms</td><td>b</td><td>0</td></tr>
<tr><td>2 ohms</td><td>b</td><td>c</td></tr>
<tr><td>3 ohms</td><td>b</td><td>c</td></tr>
<tr><td>5 ohms</td><td>c</td><td>0</td></tr>
</table></td><td>Apply</td><td>1,2</td></tr>
<tr><td>6</td><td>In an circuit brach 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. calculate equivalent resistance, source current and voltage drop across DA.</td><td>Apply</td><td>1,2</td></tr>
<tr><td>7</td><td>Find the mesh currents for the given circuit along with voltage across and power consumed by 3 ohms resistor.<table>
<tr><td>element</td><td>From node</td><td>To node</td></tr>
<tr><td>30 V source</td><td>a</td><td>0</td></tr>
<tr><td>4 ohms</td><td>a</td><td>b</td></tr>
<tr><td>5 ohms</td><td>b</td><td>c</td></tr>
<tr><td>2 ohms</td><td>b</td><td>d</td></tr>
<tr><td>3 ohms</td><td>c</td><td>d</td></tr>
<tr><td>5 ohms</td><td>c</td><td>0</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table></td><td>Apply</td><td>1,2</td></tr>
<tr><td>8</td><td>Find the node voltages for the given circuit and current flowing through 3 ohms resistors.<table>
<tr><td>element</td><td>From node</td><td>To node</td></tr>
<tr><td>30 V source</td><td>a</td><td>0</td></tr>
<tr><td>4 ohms</td><td>a</td><td>b</td></tr>
<tr><td>5 ohms</td><td>b</td><td>c</td></tr>
<tr><td>2 ohms</td><td>b</td><td>d</td></tr>
<tr><td>3 ohms</td><td>c</td><td>d</td></tr>
<tr><td>5 ohms</td><td>c</td><td>0</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table></td><td>Apply</td><td>1,2</td></tr>
<tr><td>9</td><td>Using inspection method find the current in each mesh and power loss in each element.<table>
<tr><td>element</td><td>From node</td><td>To node</td></tr>
<tr><td>30 V source</td><td>a</td><td>0</td></tr>
<tr><td>4 ohms</td><td>a</td><td>b</td></tr>
<tr><td>5 ohms</td><td>b</td><td>c</td></tr>
<tr><td>2 ohms</td><td>b</td><td>d</td></tr>
<tr><td>3 ohms</td><td>c</td><td>d</td></tr>
<tr><td>5 ohms</td><td>c</td><td>0</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table></td><td>Apply</td><td>1,2</td></tr>
<tr><td>10</td><td>Using inspection method find the node voltages and power loss in each element.</td><td>Apply</td><td></td></tr>
</table>

	element	From node	To node		
	30 V source	a	0		
	4 ohms	a	b		
	5 ohms	b	c		
	2 ohms	b	d		
	3 ohms	c	d		
	5 ohms	c	0		
	6 ohms	d	0		
11	In an circuit brach AB = 1 OHMS, BC = 2 OHMS, CD = 1 OHMS , BD = 8 ohms and DA = 5 OHMS and an source of 100V in series with 5 OHMS connected across A and C. calculate equivalent resistance, source current and voltage drop across DA.			Apply	1,2
12	In an circuit brach AB = 11 OHMS, BC = 20 OHMS, CD = 12 OHMS , BD = 8 ohms and DA = 15 OHMS and an source of 100V in series with 5 OHMS connected across A and C. find the mesh currents.			Apply	1,2
13	Consider an coil allowing an current of $i(t) = 4t^2$, find voltage induced, power absorbed and energy stored by inductor, if its inductance is 5H.			Apply	
14	Consider an capacitor allowing an current of $v(t) = 4t^2 + 2t + 1$, find current flowing, power absorbed and energy stored by capacitor, if its capacitance is 5H.			Apply	1,2
15	Calculate, equivalent resistance, source current, voltage drop and power dissipated in each resistor.			APPLY	1,2
	element	From node	To node		
	20 V source	a	0		
	4 ohms	a	b		
	5 ohms	b	0		
	2 ohms	b	c		
	3 ohms	c	0		

UNIT -2			
QUESTION BANK ON SHORT ANSWER QUESTION			
Q.NO	**QUESTION TO BE ANSWERED**	**BLOOM'S TAXANOMY**	**PO'S**
1	Define the alternating quantity.	UNDERSTAND	2,3
2	Give the difference between periodic and non-periodic wave form.	ANALYZE	2,3
3	Define the peak, peak to peak, average , RMS value also peak and form factor of sine function.	UNDERSTAND	2,3
4	Represent the alternating current and voltage in terms of sine function.	REMEMBER	2,3
5	What is reactance? Explain in detail.	UNDERSTAND	2,3
6	What is impedance? Explain in detail.	UNDERSTAND	2,3
7	What is admittance? Explain in detail.	UNDERSTAND	2,3
8	If two impedances of (2 + 3j)ohms and (4 + 5j)ohms are in series find the total impedance, source current and power absorbed by 3 ohms if voltage applied is 50V Ac.	APPLY	1,2
9	Draw the impedance triangle and explain in detail.	UNDERSTAND	2,3
10	Draw the power triangle and explain in detail.	UNDERSTAND	2,3
11	An AC circuit consists of 20 ohms resistance and an inductor in series , find the value of inductance if total impedance is (20 + 25j) ohms.	APPLY	1,2
12	Write the expressions for voltage wave forms if wave form B lags wave	APPLY	1,2

	form A by 30 degrees from reference axis.		
13	For the given alternating voltage find peak, peak to peak, average, RMS values. V(t) = 25 sinwt.	APPLY	**A,B**
14	why form factor is defined for half cycle of sine wave?	ANALYZE	**2,3**
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.	APPLY	1,2
16	If the voltage applied is (3 + 7j)V and current flowing through circuit is (4 + 8j)A , calculate complex power and circuit constants.	APPLY	1,2
17	If the voltage applied is 50V with 45 degrees and current flowing through circuit is 15A with 15 degrees , calculate complex power and circuit constants.	APPLY	1,2
18	Define the power factor of the circuit and give its importance.	UNDERSTAND	1,2
19	In an ac circuit two parallel impedances are in series across AB terminals , where AB terminals are fed by 100V 0 degrees. Calculate total impedance, power factor and source current. Z1 = (0.8 + j)ohms Z2 = (1 + 2j)ohms Z3 = (2 + 5j)ohms	APPLY	1,2
20	In an ac circuit two parallel impedances are in series across AB terminals , where AB terminals are fed by 100V 0 degrees. Calculate total impedance, admittance and current flowing through each element Z1 = (0.8 + j)ohms Z2 = (1 + 2j)ohms Z3 = (2 + 5j)ohms.	APPLY	1,2
QUESTION BANK ON DISCRIPTIVE ANSWER QUESTION			
1	Define the terms peak,, peak to peak, average, RMS values and peak and form factor of sine wave.	REMEMBER	2,3
2	Derive the expression for average and RMS values of sine wave.	UNDERSTAND	2,3
3	Explain the concept of reactance and impedance offered by RLC parameters.	UNDERSTAND	2,3
4	Explain the concept of susceptance and admittance offered by RLC parameters.	ANALYZE	2,3
5	Explain all types of relations between two wave forms and write the relevant expressions.	ANALYZE	2,3
6	Explain the concept of active, reactive and apparent power and draw the power triangle.	UNDERSTAND	2,3
7	Co-relate the impedance triangle with power triangle and explain In detail.	ANALYZE	2,3
8	Explain the steady state analysis of series RL circuit .	UNDERSTAND	2,3
9	Explain the steady state analysis of series RC circuit .	UNDERSTAND	2,3
10	Explain the steady state analysis of series RLC circuit .	UNDERSTAND	2,3
11	Explain the terms phase, phase difference and phasor diagram with neat example.	UNDERSTAND	2,3
12	Compare current in DC and AC circuits.	ANALYZE	2,3
13	Explain the nature of power factor in inductive and capacitive circuits.	UNDERSTAND	2,3

14	Derive the expression for true power in ac circuits.	UNDERSTAND	2,3
15	Derive the expressions for reactance and admittance of inductor and capacitor.	UNDERSTAND	2,3
	QUESTION BANK ON ANALYTICAL ANSWER QUESTION		
1	In an AC circuit source applied is 500sin100t across series combination of 10 ohms and 10F, calculate source current flowing through circuit, form impedance and power triangle.	Apply	1,2
2	In an ac circuit two parallel impedances are in series across AB terminals , where AB terminals are fed by 150V 0 degrees. Calculate total impedance, power factor source current and voltage drop across Z2 Z1= (1 + j)ohms Z2= (3 + 5j)ohms Z3= (2 + 5j)ohms	Apply	1,2
3	In an ac circuit two parallel impedances are in series across AB terminals , where AB terminals are fed by 200V 0 degrees. Calculate total impedance, admittance and current flowing through each element Z1= (8 + j)ohms Z2= (1 + 6j)ohms Z3= (3 + 5j)ohms.	Apply	1,2
4	If the voltage applied is (10+ 8j)V and current flowing through circuit is (3 + 5)A , calculate complex power and circuit constants.	Apply	1,2
5	In an ac circuit two parallel impedances are in series across AB terminals , where AB terminals are fed by 200V 50 degrees. Calculate total impedance, admittance ,power, power factor and current flowing through each element Z1= (2 + j)ohms Z2= (3 + 5j)ohms Z3= (3 + 5j)ohms.And load impedance of Z4 = (6 + 7j).	Apply	1,2
6	In an AC circuit source applied is 500sin100t across series combination of 10 ohms and 10F, calculate total impedance, phase angle between voltage and current in circuit and power factor of the circuit.	Apply	1,2
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. Calculate total impedance, power factor, source current and voltage drop across Z2 Z1= (2 + j)ohms Z2= (4 + 5j)ohms Z3= (1 + 5j)ohms	Apply	1,2
8	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 200V 0 degrees. Calculate total impedance, power factor, source current and voltage drop across Z3 Z1= (8 + j)ohms Z2= (1 + 6j)ohms Z3= (3 + 5j)ohms.	Apply	1,2
9	If the voltage applied is (10- 8j)V and current flowing through circuit is (3 – 5j)A , calculate complex power and circuit constants.	Apply	1,2
10	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 200V 50 degrees. Calculate total impedance, admittance ,power, power factor and current flowing through each element Z1= (1+ j)ohms	Apply	1,2

	Z2= (3 + 2j)ohms Z3= (3 + 2j)ohms.And load impedance of Z4 = (6 + 6j).		
11	In an AC circuit source applied is 50sin200t across series combination of 10 ohms and 10F, calculate source current flowing through circuit, form impedance and power triangle.	Apply	1,2
12	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. Calculate total impedance, power factor source current and voltage drop across Z3 Z1= (1 + j)ohms Z2= (3 + 5j)ohms Z3= (2 + 5j)ohms	Apply	1,2
13	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals , where AB terminals are fed by 200V 0 degrees. Calculate total impedance, admittance and current flowing through each element Z2 Z1= (8 + j)ohms Z2= (6 + 6j)ohms Z3= (3 + 5j)ohms.	Apply	1,2
14	If the voltage applied is (5+ 5j)V and current flowing through circuit is (3 – 5j)A , calculate complex power and circuit constants.	Apply	1,2
15	In an ac circuit two parallel impedances are connected in series with Z1 across AB terminals, where AB terminals are fed by 200V 50 degrees. Calculate total impedance, admittance ,power, power factor and current flowing through Z4 Z1= (2 + j)ohms Z2= (3 + 5j)ohms Z3= (3 + 5j)ohms.And load impedance of Z4 = (6 + 7j).	Apply	1,2

UNIT -3

QUESTION BANK ON SHORT ANSWER QUESTION

Q.NO	QUESTION TO BE ANSWERED	BLOOM'S TAXANOMY	PO'S
1	What is locus diagram and give its importance?	UNDERSTAND	2,3
2	Define electrical resonance.	UNDERSTAND	2,3
3	Give the condition for circuit to be under resonance.	ANALYZE	2,3
4	Define series and parallel resonance.	UNDERSTAND	2,3
5	What is the importance of cut-off frequency.	ANALYZE	2,3
6	Write the expression for bandwidth in terms of resonant frequency and quality factor.	REMEMBER	2,3
7	Define quality factor and write Q-factor of inductor and capacitor.	UNDERSTAND	2,3
8	Write the expression for resonant frequency of series and parallel RLC circuit.	REMEMBER	2,3
9	In an series RLC circuit R = 1K ohms , L = 10mH and C = 0.01 µF, calculate resonant frequency, cut –off frequencies, bandwidth and quality factor.	APPLY	1,2
10	Plot the locus diagram of series RL circuit with R as variable once and then XL as variable.	ANALYZE	2,3
11	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 50 Hz.	APPLY	1,2
12	What are the properties of coil?	UNDERSTAND	2,3

13	State faraday's law of electro-magnetic induction.	REMEMBER	2,3
14	Write the expression for co-efficient of coupling and Define perfect coupling.	REMEMBER	2,3
15	Define reluctance and write the expression their suggest Core to be chosen for magnetic circuit.	UNDERSTAND	2,3
16	Explain the dot convention for coil to write voltag Equation.	ANALYZE	2,3
17	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, calculate the mutual inductance and write all combinations of L1 and L2.	APPLY	1,2
18	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, calculate equivalent inductance.	APPLY	1,2
19	Write flux density in terms of field intensiy.	REMEMBER	2,3
20	Calculate equivalent inductance if three coils are coupled with 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.	APPLY	1,2
	QUESTION BANK ON DISCRIPTIVE ANSWER QUESTION		
1	Draw and explain the locus diagram of series RL circit with R as variable.	UNDERSTAND	2,3
2	Draw and explain the locus diagram of series RL circit with XL as variable.	UNDERSTAND	2,3
3	Draw and explain the locus diagram of series RLC circit with R as variable.	UNDERSTAND	2,3
4	Define series resonance.Explain the voltage plots in series RLC circuit with resonance phenomenon.	ANALYZE	2,3
5	Define cut-off frequencies and bandwidth .Derive the expressions for cut-off frequencies and bandwidth of series RLC circuit.	REMEMBER	2,3
6	Define Q-factor. Derive the expressions for Q-factor of inductor and capacitor element in series RLC circuit.	REMEMBER	2,3
7	Explain the concept of DOT convention and state right hand thumb rule for coupled coils.	ANALYZE	2,3
8	Derive the expression for co-efficient of coupling.	REMEMBER	2,3
9	Explain the concept of composite magnetic circuit.	UNDERSTAND	2,3
10	Explain the concept of more than two coils coupled.	UNDERSTAND	2,3
11	Derive the expression total inductance for two coils coupled with each other and connected in parallel with dot convention both the currents entering the dot.	UNDERSTAND	2,3
12	Drive the expression for quality factor in series and parallel RLC circuits.	UNDERSTAND	2,3
13	Drive the expression for bandwidth in series RLC circuits.	UNDERSTAND	2,3

14	Drive the expression for bandwidth in parallel RLC circuits.	UNDERSTAND	2,3
15	Explain the impedance and admittance curves in series and parallel RLC circuits respectively.	UNDERSTAND	2,3
QUESTION BANK ON ANALYTICAL ANSWER QUESTION			
1	Draw the locus diagram of series R-L circuits with R variable.	APPLY	1,2
2	Draw the locus diagram of series R-C, with R variable circuits.	APPLY	1,2
3	Draw the locus diagram of series R-L with L variable circuits.	APPLY	1,2
4	A constant voltage at a frequency of 1MHz is applied to an inductor in series with a variable capacitor when the capacitor is set to 500PF, the current has the max value while it is reduced to one half when capacitor is of 600PF. Find resistance, inductance and Q factor of inductor.	APPLY	1,2
5	A series RLC circuit is connected across a variable frequency supply and has R = 12 ohms, L = 1mH and C = 1000PF. Calculate resonant frequency, Q factor and cut of frequencies.	APPLY	1,2
6	A voltage V = 10 sin wt Is applied to series RLC circuit. Under resonance condition the max voltage across capacitor is found to be 500V, bandwidth is 400 rad/sec and the impedance at resonance is 100 ohms. Find the resonant frequency and circuit constants.	APPLY	1,2
7	An iron ring 10cm dia and 15cm2 in cross section is wound with 250 turns of wire for a flux density of 1.5 wb/cm2 and permeability 500. Find the exciting current the inductance and stored energy. Find corresponding quantities when there is a 2mm air gap.	APPLY	1,2
8	Draw the locus diagram of series R-C, with C variable circuits.	APPLY	1,2
9	A series RLC circuit is connected across a variable frequency supply and has R = 1000 ohms, L = 1mH and C = 0.01 microF. Calculate resonantfrequency, Q factor, bandwidth and cut of frequencies.	APPLY	1,2
10	A series RLC circuit is connected across a supply of and has R = 2 ohms, L = 1mH and C = 0.4 microF. Calculate resonant frequency, Q factor, bandwidth and cut of frequencies, current at resonant frequency and cut-off frequencies.	APPLY	1,2
11	Series RLC circuit has L = 50μH , C = 2000 pF and R = 50 Ω a . Calculate Q factor of the circuit b . Find the new value of C required for resonance at the same frequency if the inductance is doubled . c . Find the new value of Q factor	APPLY	1,2
12	A constant voltage at frequency of 1 MHz is applied to a coil in series with a variable capacitor . a. when the capacitor is set at 500 pF, the current in the circuit is maximum. b. When the capacitor is set at 600 pF, the current is half the maxi. value . Find Resistance , Inductance , and Q factor of the coil .	APPLY	1,2
13	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 which has a constant output of 9 volts at all frequencies. Calculate: a. The resonant frequency, b. The current at resonance,	APPLY	1,2

	c. The voltage across the inductor d. capacitor at resonance, e. The quality factor f. The bandwidth of the circuit.		
14	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	APPLY	1,2

UNIT -4

QUESTION BANK ON SHORT ANSWER QUESTION

Q.NO	QUESTION TO BE ANSWERED	BLOOM'S TAXANOMY	PO'S
1	What is network topology and write their applications?	ANALYZE	2,3
2	Define tree and co-tree.	REMEMBER	2,3
3	Write the expression for number of links.	REMEMBER	2,3
4	Write the importance and properties of incidence matrix.	ANALYZE	2,3
5	For 8 element 5 node graph , determine number of links.	APPLY	1,2
6	Explain the steps to form tie-set matrix.	ANALYZE	2,3
7	Explain the steps to form cut-set matrix.	ANALYZE	2,3
8	Draw the graph of wheat stone bridge and find incidence matrix.	UNDERSTAND	2,3
9	Draw the graph of wheat stone bridge and find tie-set matrix.	UNDERSTAND	2,3
10	Draw the graph of wheat stone bridge and find cut-set matrix.	UNDERSTAND	2,3
11	Define the duality and the dual elements.	UNDERSTAND	2,3
12	what is the importance of tie-set matrix with electrical networks.	ANALYZE	2,3
13	what is the importance of cut-set matrix with electrical networks.	ANALYZE	2,3
14	How many fundamental cutest and tie-set are possible for a graph.	APPLY	2,3
15	Take any original network and draw the dual network for that original network.	ANALYZE	2,3

QUESTION BANK ON DISCRIPTIVE ANSWER QUESTION

1	What is network topology and its importance with electrical networks?	UNDERSTAND	2,3
2	Give the rules, properties of incidence matrix an explain with an example.	UNDERSTAND	2,3
3	Give the rules, properties of tie-set matrix an explain with an example.	UNDERSTAND	2,3
4	Give the rules, properties of cut-set matrix an explain with an example.	UNDERSTAND	2,3
5	Drive the relation between link currents and branch currents and write mesh equations.	REMEMBER	2,3
6	Drive the relation between twig voltages and branch voltages and write current equations.	REMEMBER	2,3
7	Define duality and explain how to form dual network for original network.	UNDERSTAND	2,3
8	Take any graph and draw all possible trees and explain condition to form tree.	APPLY	2,3
9	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	2,3

10	Get the difference between basic and _augmented tie-set and cut-set.	ANALYZE	2,3
11	Explain the dual elements and dual network with neat example.	UNDERSTAND	2,3
12	Explain incidence, tie-set and cut-set matrices wth neat example.	UNDERSTAND	2,3
13	Compare incidence, tie-set and cut-set matrices.	ANALYSE	2,3
14	Explain the loop-set matrix in detail.	UNDERSTAND	2,3
15	Write the conditions for formation of incidence, tie-set and cut-set matrices along their propertie.		
	QUESTION BANK ON ANALYTICAL ANSWER QUESTION		
1	Draw the wheat stone bridge with any combination of R and L elements and replace that with its dual network.	APPLY	1,2
2	Form the cut-set matrix form the graph -1 1 0 0 0 1 0 -1 0 1 0 0 1 -1 -1 0 0 1 0 0 0 0 0 0 0 1 0 1 and also form nodal equations.	APPLY	1,2
3	Form the given tie-set matrix form the graph 1 0 0 0 -1 0 0 1 0 0 1 0 0 1 -1 0 1 0 0 1 -1 0 1 0 0 1 1 0 1 0 -1 0 and also write mesh equations.	APPLY	1,2
4	In an network between AB R1, BC R2, CA L1, AD C1, BD R3 and DC C2 are connected draw the graph for circuit and form tie-set matrix and form equations.	APPLY	1,2
5	In an network between AB R1, BC L2, CA L1, AD C1, BD C3 and DC C2 are connected draw the graph for circuit and form cut-set matrix and form equations.	APPLY	1,2
6	In an network between AB 2 ohms, BC 2 H, CA 5F, AD 8F, BD 10 ohms and DC 5F form the dual network for the original one.	APPLY	1,2
7	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. form incidence matrix and write degree of each node.	APPLY	1,2
8	Form an graph with 5 nodes and 8 elements then define all the values for that graph.	APPLY	1,2
9	<table><tr><th>Element</th><th>From node</th><th>To node</th></tr><tr><td>1</td><td>a</td><td>0</td></tr><tr><td>2</td><td>a</td><td>b</td></tr><tr><td>3</td><td>b</td><td>c</td></tr><tr><td>4</td><td>b</td><td>0</td></tr><tr><td>5</td><td>c</td><td>0</td></tr><tr><td>6</td><td>a</td><td>c</td></tr><tr><td>7</td><td>c</td><td>0</td></tr></table>In an graph branches are connected as below: Draw the graph, possible trees, degree of all nodes, number of twigs, number of links.	APPLY	1,2

10	<table><tr><th>Element</th><th>From node</th><th>To node</th></tr><tr><td>1</td><td>a</td><td>0</td></tr><tr><td>2</td><td>a</td><td>b</td></tr><tr><td>3</td><td>b</td><td>c</td></tr><tr><td>4</td><td>b</td><td>0</td></tr><tr><td>5</td><td>c</td><td>0</td></tr><tr><td>6</td><td>a</td><td>c</td></tr><tr><td>7</td><td>c</td><td>0</td></tr></table> In an graph branches are connected as above: Form incidence matrix and tie-set matrix.	APPLY	1,2
11	<table><tr><th>Element</th><th>From node</th><th>To node</th></tr><tr><td>1</td><td>a</td><td>0</td></tr><tr><td>2</td><td>a</td><td>b</td></tr><tr><td>3</td><td>b</td><td>c</td></tr><tr><td>4</td><td>b</td><td>0</td></tr><tr><td>5</td><td>c</td><td>0</td></tr><tr><td>6</td><td>a</td><td>c</td></tr><tr><td>7</td><td>c</td><td>0</td></tr></table> In an graph branches are connected as above: Form tie-set and cut-set matrix.	APPLY	1,2
12	<table><tr><th>Element</th><th>From node</th><th>To node</th></tr><tr><td>1</td><td>a</td><td>b</td></tr><tr><td>2</td><td>b</td><td>c</td></tr><tr><td>3</td><td>c</td><td>d</td></tr><tr><td>4</td><td>d</td><td>a</td></tr><tr><td>5</td><td>a</td><td>b</td></tr><tr><td>6</td><td>b</td><td>c</td></tr><tr><td>7</td><td>c</td><td>d</td></tr><tr><td>8</td><td>d</td><td>a</td></tr></table> Draw the graph, possible trees, degree of all nodes, number of twigs, number of links.	APPLY	1,2
13	<table><tr><th>Element</th><th>From node</th><th>To node</th></tr><tr><td>1</td><td>a</td><td>b</td></tr><tr><td>2</td><td>b</td><td>c</td></tr><tr><td>3</td><td>c</td><td>d</td></tr><tr><td>4</td><td>d</td><td>a</td></tr><tr><td>5</td><td>a</td><td>b</td></tr><tr><td>6</td><td>b</td><td>c</td></tr><tr><td>7</td><td>c</td><td>d</td></tr><tr><td>8</td><td>d</td><td>a</td></tr></table> Draw the graph, form incidence and tir-set matrix.	APPLY	1,2
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UNIT -5			
QUESTION BANK ON SHORT ANSWER QUESTION			
Q.NO	**QUESTION TO BE ANSWERED**	**BLOOM'S TAXANOMY**	**PO'S**
1	State theveninn's theorem	REMEMBER	2,3
2	State nortan's theorem	REMEMBER	2,3
3	State super-position theorem	REMEMBER	2,3
4	State reciprocity theorem	REMEMBER	2,3
5	State compensation theorem	REMEMBER	2,3
6	State milliman's theorem	REMEMBER	2,3
7	What is the importance of thevenin's theorem?	UNDERSTAND	2,3
8	What is the importance of nortan's theorem?	UNDERSTAND	2,3
9	What is the importance of super-position theorem?	UNDERSTAND	2,3
10	What is the importance of milliman's theorem?	UNDERSTAND	2,3
11	What is the importance of compensation theorem?	UNDERSTAND	2,3
12	Give the application of reciprocity theorem.	ANALYZE	2,3
13	If the thevenin's equivalent consists of 25v with 10 ohms drawthe nortan's equivalent.	APPLY	1,2
14	If 25v , 15v and 10v are connected across ab terminals , what is voltage measured across ab terminals?	APPLY	1,2
15	Can be super-position theorem used to find power in an element? Justify your answer.	ANALYZE	1,2
16	The nortan's equivalent circuit consists of 10A in parallel with 8 ohms , find the load resistance for which maximum power transfer takes place.	APPLY	
17	If two branches are in parallel with 15V in series with 5 ohms and 5V in series with 1 ohm across AB terminals , find the current and power absorbed by 5 ohms resistor if it is connected across AB terminals.	APPLY	1,2 1,2
QUESTION BANK ON DISCRIPTIVE ANSWER QUESTION			
1	State and prove tellegen's theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
2	State and prove thevenin's theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
3	State and prove nortan's theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
4	State and prove super-position theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
5	State and prove reciprocity theorem with an example for DC excitation.	REMEMBER AND	2,3

		UNDERSTAND	
6	State and prove compensation theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
7	State and prove milliman's thoerem theorem with an example for DC excitation.	REMEMBER AND UNDERSTAND	2,3
8	State and prove thevenin's theorem with an example for AC excitation.	REMEMBER AND UNDERSTAND	2,3
9	State and prove super-position theorem with an example for ACexcitation.	REMEMBER AND UNDERSTAND	2,3
10	State and prove nortan's theorem with an example for AC excitation.	REMEMBER AND UNDERSTAND	2,3
11	Prove the condition for maximum power transfer with DC excitation and explain	UNDERSTAND	2,3
12	Prove the condition for maximum power transfer with AC excitation and explain	UNDERSTAND	2,3
13	State and explain the milliman's theorem .(DC)	UNDERSTAND	2,3
14	State and explain the milliman's theorem .(AC)	UNDERSTAND	2,3
15	Explain the thevenin's equivalent and norton's equivalent circuit with their importance.		
QUESTION BANK ON ANALYTICAL ANSWER QUESTION			
1	Two parallel branches are connected across AB terminals , they 10V in series with 2 ohms and 20V in series with 5 ohms, use the necessary theorem and find the power absorbed by load resistor with maximum power across AB	APPLY	1,2
2	In an series circuit the source impedance is (3 + 8j) ohms with 100V supply calculate load impedance to absorb maximum power and form the nortan's equivalent circuit.	APPLY	1,2
3	In an network consisting of AB terminals , firstly a branch across AB 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 find voltage drop across 7 ohms resistor.	APPLY	1,2
4	In an network consisting of AB terminals , firstly a branch across AB is defined as 100V in series with (3 + 4j) ohms , second branch 7 ohms and third branch 50V in series with (2 + 3j)ohms. Apply thevenin's theorem to find current flowing through 7 ohms	APPLY	1,2
5	In an circuit brach 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.	APPLY	1,2
6	In an series circuit Z1 = (10 + 10j) ohms, Z2 = (5 + 3j)ohms with 100V 45 degrees supply. Apply compensation theorem and find the response in Z2.	APPLY	1,2
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. Find the for what resistance of load maximum power is transfer, maximum power value, current and voltage drops in each case.	APPLY	1,2

<table>
<tr><td>8</td><td>Find the current flowing through 3 ohms resistor using thevenin’s theorem. If the circuit is as below.
<table><tr><td>element</td><td>From node</td><td>To node</td></tr><tr><td>20 V source</td><td>a</td><td>0</td></tr><tr><td>4 ohms</td><td>a</td><td>b</td></tr><tr><td>5 ohms</td><td>b</td><td>0</td></tr><tr><td>2 ohms</td><td>b</td><td>c</td></tr><tr><td>3 ohms</td><td>c</td><td>0</td></tr></table></td><td>APPLY</td><td>1,2</td></tr>
<tr><td>9</td><td>Find the current flowing through 3 ohms resistor using norton’s theorem theorem. If the circuit is as below.
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<tr><td>10</td><td>Find the current flowing through 4 ohms resistor using super position theorem theorem. If the circuit is as below.
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<tr><td>11</td><td>State milliman’s theorem and find current through 5 ohms using milliman’s theorem for following circuit.
<table><tr><td>element</td><td>From node</td><td>To node</td></tr><tr><td>20 V source</td><td>a</td><td>0</td></tr><tr><td>4 ohms</td><td>a</td><td>b</td></tr><tr><td>5 ohms</td><td>b</td><td>0</td></tr><tr><td>2 ohms</td><td>b</td><td>c</td></tr><tr><td>10V source</td><td>c</td><td>0</td></tr></table></td><td>APPLY</td><td>1,2</td></tr>
<tr><td>12</td><td>Find the current flowing through (2+3j)ohms impedance using thevenin’s theorem.
If the circuit is as below.
<table><tr><td>element</td><td>From node</td><td>To node</td></tr><tr><td>20 V with 0 degrees phase source</td><td>a</td><td>0</td></tr><tr><td>(1+3j)) ohms</td><td>a</td><td>b</td></tr><tr><td>(2+2j) ohms</td><td>b</td><td>0</td></tr><tr><td>(3+2j))ohms</td><td>b</td><td>c</td></tr><tr><td>(2+3j) ohms</td><td>c</td><td>0</td></tr></table></td><td>APPLY</td><td>1,2</td></tr>
<tr><td>13</td><td>Find the current flowing through (2+3j)ohms impedance using norton’s theorem.
If the circuit is as below.
<table><tr><td>Element</td><td>From node</td><td>To node</td></tr><tr><td>20 V with 0 degrees phase source</td><td>a</td><td>0</td></tr><tr><td>(1+3j)) ohms</td><td>a</td><td>b</td></tr><tr><td>(2+2j) ohms</td><td>b</td><td>0</td></tr><tr><td>(3+2j))ohms</td><td>b</td><td>c</td></tr><tr><td>(2+3j) ohms</td><td>c</td><td>0</td></tr></table></td><td>APPLY</td><td>1,2</td></tr>
</table>

<table>
<tr>
<td>14</td>
<td>Find the current flowing through (2+2j)ohms impedance using super-position theorem.
If the circuit is as below.
<table>
<tr><th>element</th><th>From node</th><th>To node</th></tr>
<tr><td>20 V with 0 degrees phase source</td><td>a</td><td>0</td></tr>
<tr><td>(1+3j)) ohms</td><td>a</td><td>b</td></tr>
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<tr><td>(3+2j))ohms</td><td>b</td><td>c</td></tr>
<tr><td>10V with 0 degrees phase</td><td>c</td><td>0</td></tr>
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</td>
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</tr>
<tr>
<td>15</td>
<td>State milliman’s theorem and Find the current flowing through (2+2j)ohms impedance using s .
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HOD, ELECTRONICS AND COMMUNICATION ENGINEERING.