DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NETWORK ANALYSIS AND TRANSMISSION LINES

Index:

1) Department vision & mission:

VISION OF THE DEPARTMENT:

To promote excellence in technical education and scientific research in electronics and communication engineering for the benefit of society.

MISSION OF THE DEPARTMENT

M1: To impart excellent technical education with state of art facilities inculcating values and lifelong learning attitude.

M2: To develop core competence in our students imbibing professional ethics and team spirit.

M3: To encourage research benefiting society through higher learning.

2) List of PEOs, Pos and PSOs:

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Establish themselves as successful professionals in their career and higher education in the field of Electronics & Communication Engineering and allied domains through rigorous quality education.

PEO 2: Develop Professionalism, Ethical values, Excellent Leadership qualities, Communication Skills and teamwork in their Professional front and adapt to current trends by engaging in lifelong learning

PEO 3: Apply the acquired knowledge & skills to develop novel technology and products for solving real life problems those are economically feasible and socially relevant

PEO 4: To prepare the graduates for developing administrative acumen, to adapt diversified and multidisciplinary platforms to compete globally

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Ability to apply concepts of Electronics & Communication Engineering to associated research areas of electronics, communication, signal processing, VLSI, embedded systems, IoT and allied technologies.

PSO2: Ability to design, analyze and simulate a variety of Electronics & Communication functional elements using hardware and software tools along with analytic skills.

Program Outcomes (POs):

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

3) Mapping of course out comes with POs:

Course Code.CO No	Course Outcomes (CO's)	Blooms Level's
At the end of the course student will be able to		
1	Gain the knowledge on basic RLC circuit's behavior.	**BL3**
2	Analyze the Steady state and transient analysis of RLC Circuits.	**BL4**
3	Know the characteristics of two port network parameters.	**BL1**
4	Analyze the transmission line parameters and configurations.	**BL4**

CO-PO Matrix:

Course Outcomes (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	3	-		-	-	-	-	-	-	-
2	3	3	3	2	2	-	-	-	-	-	3	-
3	3	3	3	2	2	-	-	-	-	-	-	2
4	3	3	3	2	3	-	-	-	-	-	3	2

Course Outcome (CO)-Program Specific Outcome (PSO) Matrix:

Course Outcomes (CO's)	PSO1	PSO2
1	3	3
2	3	3
3	3	3
4	3	3

4. Syllabus copy

II YEAR B.TECH ECE-II SEM L/T/P C
3/ 1/- 3

NETWORK ANALYSIS AND TRANSMISSION LINES

UNIT-I

Network Topology, Terminology, Basic cutest and tie set matrices for planar networks, Illustrative Problems, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT-II

Steady state and transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2' order series and cases parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped, quality factor and bandwidth for series and parallel resonance, resonance curves

UNIT-III

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions — using transformed (S) variables, Poles and Zeros.

UNIT-IV

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristics Impedence, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion - Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading.

UNIT-V

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuits Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines - Impedance Transformations, Smith Chart - Configuration and Applications, Single Stub Matching.

5. Individual time table

	1	2	3	4	5	6	7
MON	**C**		**ECA LAB-D**			**D**	
TUE		**C**			**D**	**ECA LAB-C**	
WED							
THURS	**ECA LAB-D**		**ECA LAB-C**		**C**		**D**
FRI	**D**		**C**				
SAT		**D**			**C**		

6. Session plan

Name of the topic	Sub topics	No. of classes	Text books	Remarks
UNIT I				
Network Topology	Network Topology, Terminology	LS1,LS2	T1,R1, R3	2
	Basic cutest and tie set matrices for planar networks, Illustrative Problems,	LS3,LS4,LS5	T1,R2, R3	3
Magnetic and Coupled Circuits	Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept	LS6,LS7,LS8	T1,T2, R3	3
	Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer	LS9,LS10,LS11	T1,T2, R1	3
		No. of classes required		**11**
UNIT II				
Steady state and transient analysis	Steady state and transient analysis of RC, RL and RLC Circuits	LS12,LS13,LS14	T1,R1 , R3	3
	Circuits with switches, step response	LS15,LS16	T1, R1,R3	2

	2' order series and parallel RLC Circuits	LS17,LS18	T1, R1,R3	2
	Damping factor, over damped, under damped, critically damped cases,	LS19,LS20,LS21	T2,R1,R2	3
	Quality factor and bandwidth for series and parallel resonance, resonance curves	LS22,LS23,LS24	T1,R1,R3	3
No. of classes required				**13**
UNIT III				
Two port network parameters	Two port network parameters, Z, Y, ABCD, h and g parameters,	LS25,LS26,LS27, LS28,LS29,LS30	T1,T2,R2	6
	Characteristic impedance, Image transfer constant, image and iterative impedance	LS31,LS32,LS33	T2,R1,R3	3
Attenuators	network function, driving point and transfer functions — using transformed (S) variables, Poles and Zeros, Attenuators.	LS34,LS35, LS36,LS37	T2,R1,R2	4
	No. of classes required			**13**
UNIT IV				
	Transmission Line Equations	LS38,LS39,LS40	T2,R3,R4	3
	Constants	LS41,LS42,LS43	T2,R3,R4	3
	Conditions for Distortion and Distortion less transmission lines	LS44,LS45,LS46	T2,R3	3
	Types of Loading	LS47,LS48	T2,R3,R4	2
No. of classes required				**11**
UNIT V				
	Types of Transmission Lines-	LS49,LS50,LS51	T2,R3,R4	3

Impedance transformations	SC,OC and λ/4, λ/2, λ/8 Lines			
	Parameters-VSWR and Reflection constants	LS52,LS53,LS54	T2,R3,R4	3
Smith Chart	Smith chart	LS55,LS56,LS57	T2,R3	3
	Stub Matching	LS58,LS59	T2,R4	2
No. of classes required				**11**
Total No. of Classes				**59**

7. Session execution log

S.NO	Units	No. of Lectures Taken	Covered/ Not Covered
1	**Unit I**	17	Covered
2	**Unit II**	13	Covered
3	**Unit III**	13	Covered
4	**Unit IV**	10	Covered
5	**Unit V**	12	Covered

8. Assignment Questions and innovative assignments

NATL ASSIGNMENT -1&2

natl assignment 1&2.rar

NATL-INNOVATIVE

1. The table below defines the activities within a small project.

Activity	Start node	End node	Completion time (weeks)
1	1	2	2

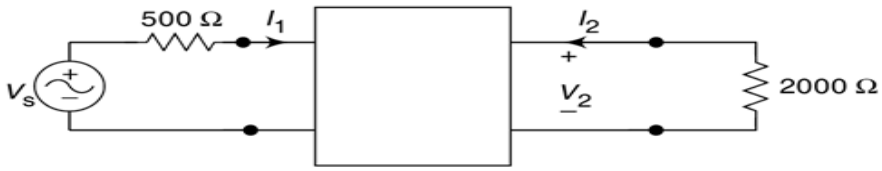
2	1	3	3
3	1	4	2
4	2	5	3
5	3	6	7
6	4	6	5
7	5	7	4
8	6	7	9
9	7	8	3

In addition to the above information we have that activity 7 cannot start until activity 5 has been completed.

- Draw the network diagram.
- Calculate the minimum overall project completion time.
- Calculate the float time for each activity and hence identify the activities which are critical.

2.

The *h*-parameters of a two-port network shown in figure are $h_{11} = 1000\Omega$, $h_{12} = 0.003$, $h_{21} = 100$, and $h_{22} = 50 \times 10^{-6}$ mho. Find V_2 and *z*-parameters of the network if $V_s = 10^{-2} \angle 0^\circ \ (V)$.



3. The impedance parameters of a two-port network are $z_{11} = 25\ \Omega$, $z_{12} = 50\ \Omega$, $z_{21} = 75\ \Omega$, and $z_{22} = 75\ \Omega$. Find the port currents I_1 and I_2 when a 15-V voltage source is connected at port 1 and port 2 is short circuited.

4. Design an ideal high pass filter

5. Analyze the response of RLC series circuit using Multi-Sim

9. Sample assignment script

(Attached Separately)

10. mid exam question papers

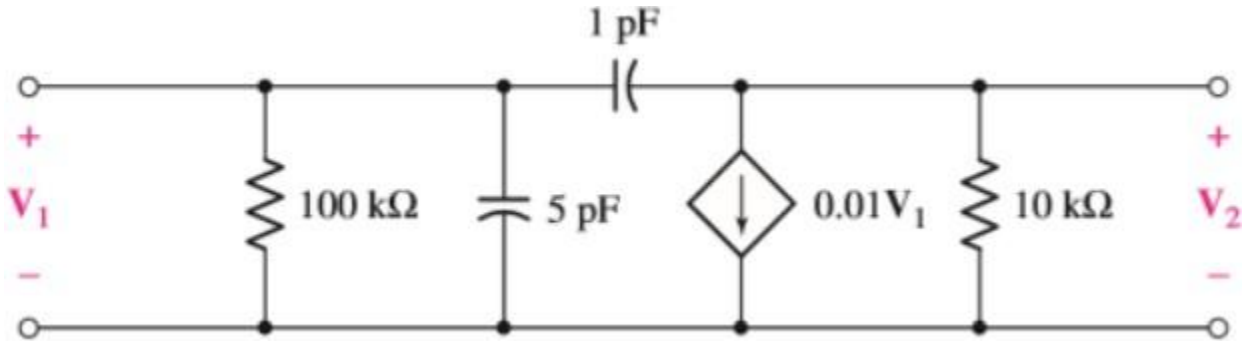
Branch: ECE **Marks: 25 M**

Answer All Questions In Part-A& Part-B

I. Answer all the below questions each question carry two marks 5*2=10

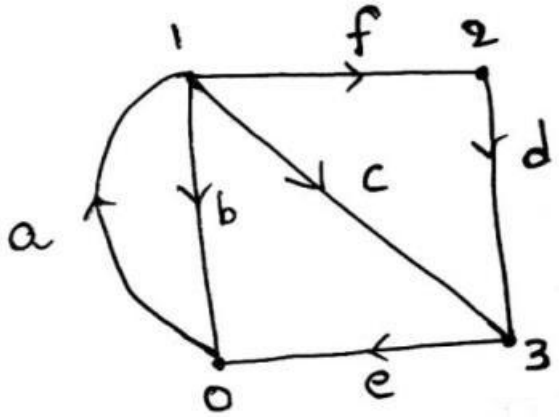
PART-A

1Q. Find driving point impedances and admittances at ω =10^8 rad/s for the transistorhigh-frequency equivalent circuit shown in

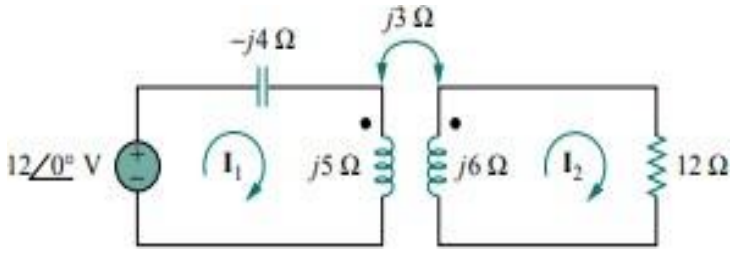


2Q. Obtain the voltage across a capacitor in a series RC circuit driven by a DC source?

3Q. For the graph shown in figure, write the incidence matrix, Tie-Set matrix and Cut-set matrix.



4Q. Calculate the current I_1 and I_2 shown in the fig using crommers rule only.



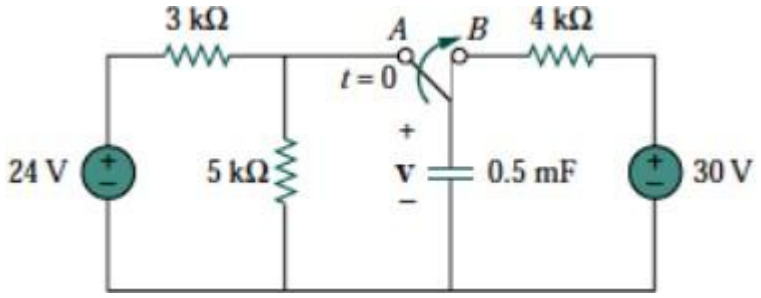
.

5Q. The Z-parameters of a two- port network is Z_{11}=15Ω, Z_{12}=Z_{21}=6Ω and Z_{22}=24Ω. Calculate short circuitparameters.

II. Answer any three questions from the following 3*5=15

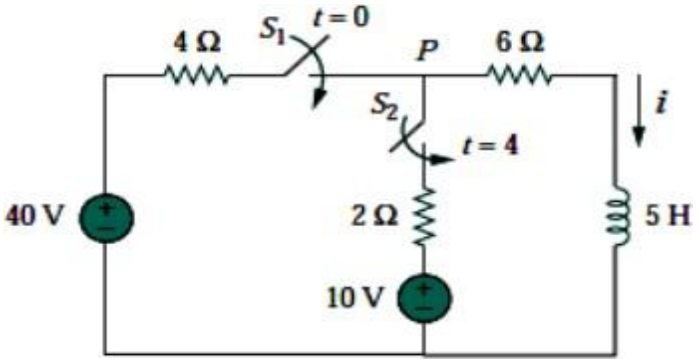
PART – B

6Q. The switch in figure has been in position A for a long time. At $t = 0$, the switchmoves to B. Determine v(t) for $t > 0$ and calculate its value at $t =$ 1 s and 4 s.



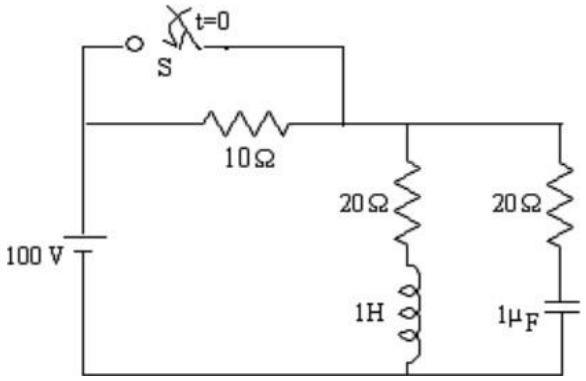
7Q. A coil of 2000 turns is wound uniformly over a nonmagnetic ring of mean circumference of 80cm andcross-sectional area of 0.6sq. cm. If the current through the coil is 2A, Calculate i) Magnetic field, ii) Reluctance

8Q. At t = 0, switch 1 in Figure is closed, and switch 2 is closed 4 s later. Find i(t) for t > 0. Calculate i for t = 2 s and t = 5 s.



9Q. Define resonance, bandwidth and Q-factor with relevant formulae

10Q. Find v(t) for all time ‘t’ and determine the nature of the given circuit.



11Q. Two coupled coils with $L_1 = 0.02H$, $L_2 = 0.01H$ and K =0.5 are connected in four different ways likeSeries aiding, series opposition, parallel aiding and parallel opposition, find the equivalent inductances.

MID -2 QP

CMR ENGINEERING COLLEGE
UGC AUTONOMOUS
(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)
Kandlakoya (V), Medchal (M), Medchal - Malkajgiri (D)-501401

II.B.TECH- II-SEM (R20)-I MID EXAMINATIONS-JULY 2023
Subject: Network Analysis and Transmission Lines **Time: 10:00 TO 11:30 A.M**
Branch: ECE **Marks: 25 M**

Answer All Questions In Part-A& Part-B

I. Answer all the below questions each question carry two marks 5*2=10

PART-A

1. Explain about λ/ 2, λ/ 4 , λ/ 8 wave lines? **CO.5 [BTL-1]**
2. Explain in detail about propagation constant of transmission wave? **CO.4 [BTL-]**
3. Define loading. Explain different types of loading? **CO.5 [BTL-]**
4. Define Reflection and derive the relation between reflection coefficient and VSWR. **CO.2 [BTL-]**
5. Define lossless, low loss and distortion less transmission line? **CO.4 [BTL-]**

PART B **3 x5=15**

6. A 30m long loss less transmission line with Z0=50 Ω is operating at 2MHz is terminated at a load of Z_L = 60+j40 Ω,if u = 0.6c on the line

Determine

i.Reflection coefficient
ii.Standing wave ratio
iii.Input impedance

CO.1 [BTL-4]

(OR)

7. What is single stub matching? Mention its Types. Derive the Expression for length and location of stub to achieve impedance matching. **CO.1 [BTL-2]**

8. Explain about input impedance relations for various cases of transmission lines.? **CO.1 [BTL-2]**

(OR)

9. A transmission line operating at 500MHz has Characetestic impedance (zo)=80 Ω, attenuation constant(α) =0.04Np/m and phase constant(β) = 1.5 rad/m.Deternine R,L,G,C.

CO.1 [BTL-2]

10.A 30 m long lossless transmission line with characteristic impedance (zo) of 50 ohm is terminated by a load impedance (Z_L) = (60 + j40) ohm. The operating wavelength is 90m. Find the input impedance, length of the transmissionlineandSWRusingsmitchart.

CO.1 [BTL-2]

(OR)

11. Derive an expression for attenuation constant, phase constant and velocity of signal transmission in terms of R, L, G and C. **CO.1 [BTL-4]**

11. Scheme of Evaluation:

PART	S.NO	QUESTIONS	MARKS	TOTAL
A	1	Formula Calculations	1 1	2
	2	Circuit diagram Derivation Result/Answer	0.5 1 0.5	2
	3	Cut set matrix Tie set matrix	1 1	2
	4	Calculation Result/answer	1 1	2
	5	Y parameter equations Answer	1 1	2
A	6	Calculations/Procedure Result	2.5 2.5	5
	7	Formula Calculations Answer	1 3 1	5
	8	Calculation Result/answer	2.5 2.5	5
	9	Definitions Formulae	2.5 2.5	5
	10	Calculations Result/answer	2.5 2.5	5
	11	Formulae Calculations /Result	2.5 2.5	5

12. Sample mid answer script

(Attached Separately)

13. Unit-wise course material

(Attached Separately)

14. Material collected from Internet/Websites

1. NPTEL VIDEO LECTURES:

https://nptel.ac.in/courses/117/102/117102060/

2. You Tube Lecturers

https://www.youtube.com/watch?v=0gkVrb9__kM

3. www.mit.edu
4. www.soe.stanford.edu
5. www.grad.gatech.edu
6. www.ieee.org

15. Power point presentations

network-topology PPT.rar

17. Previous question papers

Code No: 123BW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) State Ohm's law and mention its limitations. [2]
b) Explain how voltage source with a source resistance can be converted into an equivalent current source. [3]
c) Mention the disadvantages of low power factor. [2]
d) In a series R-C circuit, R=10Ω and C=25nF. A sinusoidal voltage of 50 mHz is applied and the maximum voltage across the capacitance is 2.5 V. Find the maximum voltage across the series combination. [3]
e) Define mutual inductance and self inductance. [2]
f) Find the total inductance of the three series connected coupled coils shown in the figure 1. [3]

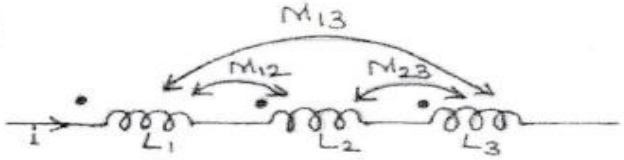


Figure: 1

g) Mention the properties of a tree in a graph. [2]
h) Explain graphical method to draw dual network. [3]
i) State superposition theorem and Reciprocity theorem. [2]
j) Give the proof of Tellegen's theorem. [3]

PART-B

(50 Marks)

2.a) State Kirchoff's voltage and current laws.

b) Find 'i' in the circuit given in figure 2. Check the power balance condition.[3+7]

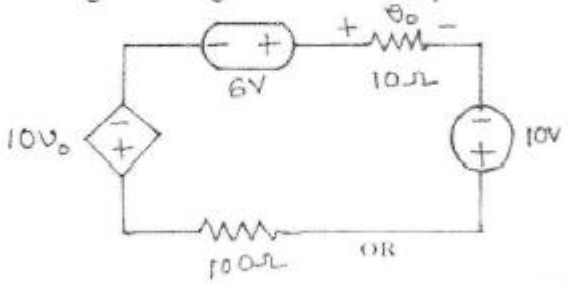


Figure: 2

OR

3.a) Determine the node voltages and the current through the resistors using mesh method for the network given in figure 3.

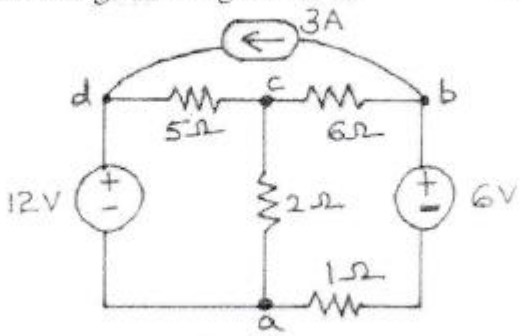


Figure: 3

b) Mention the difference between nodal analysis and mesh analysis. [7+3]

4.a) A series R-L circuit, has resistance of 20Ω and inductance of 0.02H. If the net impedance of the given circuit is $40\angle\Phi^0\Omega$, find Φ and the frequency of the circuit.

b) Define RMS value, Average value and Form factor. [4+6]

OR

5. A voltage $v(t) = 200\sin\omega t$ is applied to a series RLC circuit where R=60Ω, L=0.18mH and C=20μF. Find:
   a) The power supplied by the source
   b) The reactive power supplied by the source
   c) The reactive power of the capacitor
   d) The reactive power of the inductor and
   e) The power factor of the circuit. [10]

6. Derive the equation for quality factor of series resonating circuit and parallel resonating circuit. [10]

OR

7.a) Define quality factor and Bandwidth.

b) In the coupled circuit given in figure 4, find the input impedance as well as the net inductance when L_1=0.2H, L_2=0.5H coefficient of coupling (K) being 0.5. [5+5]

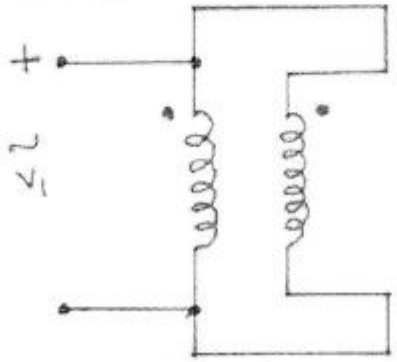


Figure: 4

8.a) Explain the concept of duality.

b) Define a fundamental Tie set and Cut set matrix. Give the procedure for obtaining the same with suitable examples. [3+7]

OR

9.a) The figure 5 represents a graph of a network. Show the tree, twigs and links.

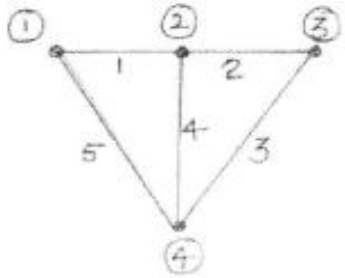


Figure: 5

b) Convert the given current source to voltage source shown in figure 6. [5+5]

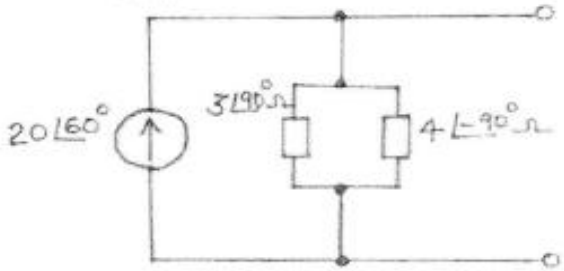


Figure: 6

10.a) State and explain Thevenin's and Norton's theorems.

b) Using Milliman's theorem find the current through R_L and voltage drop in the circuit given in figure 7. [5+5]

R15

Code No: 123BW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

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c) Mention the disadvantages of low power factor. [2]
d) In a series R-C circuit, R=10Ω and C=25nF. A sinusoidal voltage of 50 mHz is applied and the maximum voltage across the capacitance is 2.5 V. Find the maximum voltage across the series combination. [3]
e) Define mutual inductance and self inductance. [2]
f) Find the total inductance of the three series connected coupled coils shown in the figure 1. [3]

PART-B

(50 Marks)

2.a) State Kirchoff's voltage and current laws.
b) Find 'i' in the circuit given in figure 2. Check the power balance condition.[3+7]

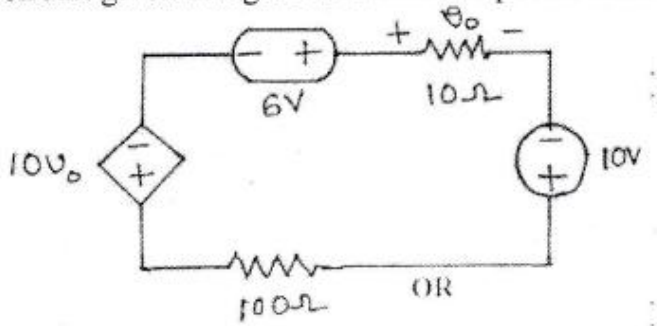

Figure: 2

OR

figure 1.

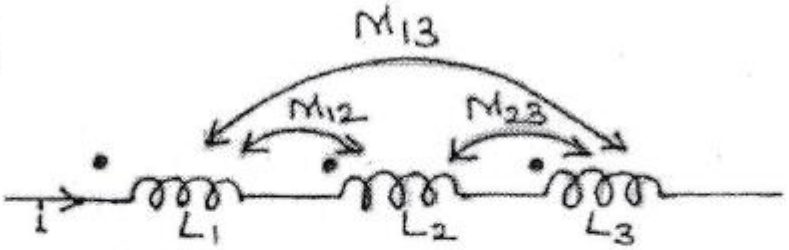

Figure: 1

g) Mention the properties of a tree in a graph. [2]

h) Explain graphical method to draw dual network. [3]

i) State superposition theorem and Reciprocity theorem. [2]

j) Give the proof of Tellegen's theorem. [3]

3.a) Determine the node voltages and the current through the resistors using mesh method for the network given in figure 3.

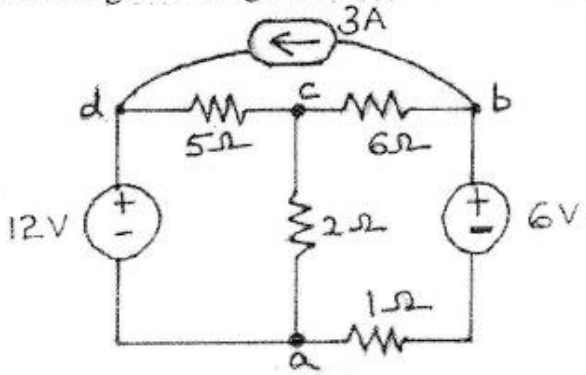

Figure: 3

b) Mention the difference between nodal analysis and mesh analysis. [7+3]

4.a) A series R-L circuit, has resistance of 20Ω and inductance of 0.02H. If the net impedance of the given circuit is $40\angle\Phi^0\Omega$, find Φ and the frequency of the circuit.

b) Define RMS value, Average value and Form factor. [4+6]

OR

5. A voltage $\upsilon(t) = 200\sin\omega t$ is applied to a series RLC circuit where R=60Ω, L=0.18mH and C=20μF. Find:

a) The power supplied by the source

b) The reactive power supplied by the source

c) The reactive power of the capacitor

d) The reactive power of the inductor and

e) The power factor of the circuit. [10]

6. Derive the equation for quality factor of series resonating circuit and parallel resonating circuit. [10]

OR

7.a) Define quality factor and Bandwidth.

b) In the coupled circuit given in figure 4, find the input impedance as well as the net inductance when L_1=0.2H, L_2=0.5H coefficient of coupling (K) being 0.5. [5+5]

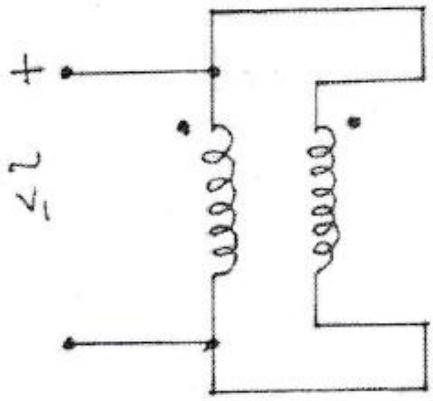

Figure: 4

8.a) Explain the concept of duality.

b) Define a fundamental Tie set and Cut set matrix. Give the procedure for obtaining the same with suitable examples. [3+7]

OR

9.a) The figure 5 represents a graph of a network. Show the tree, twigs and links.

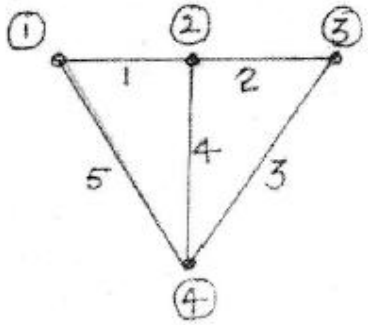

Figure: 5

b) Convert the given current source to voltage source shown in figure 6. [5+5]

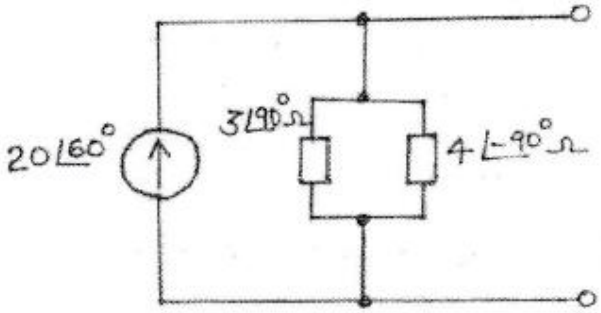

Figure: 6

10.a) State and explain Thevenin's and Norton's theorems.

b) Using Milliman's theorem find the current through R_L and voltage drop in the circuit given in figure 7. [5+5]

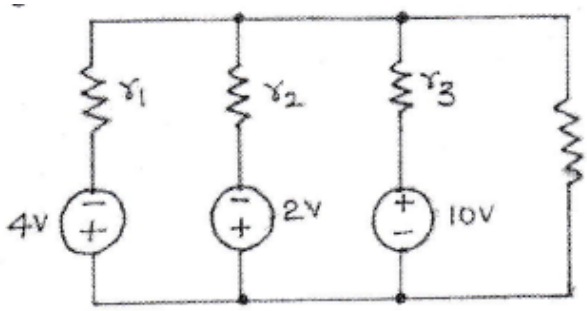

Figure: 7

OR

11.a) State and explain Maximum power transfer theorem and compensation theorem.

b) Find the Norton's equivalent circuit across a-b for the network shown in figure 8. [5+5]

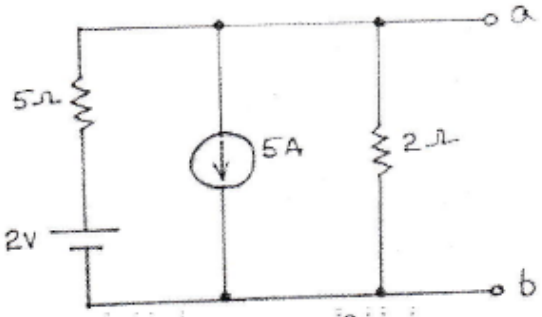

Figure: 8

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R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2016
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

1.a)	Define capacitance. What is V-I relation of capacitance?	[2]
b)	What are the properties of super mesh?	[3]
c)	Define RMS value.	[2]
d)	What is the significance of power factor?	[3]
e)	What is resonance?	[2]
f)	What are the circuit variables of a magnetic circuit?	[3]
g)	Define graph.	[2]
h)	Draw a connected graph and explain.	[3]
i)	Define Norton's current.	[2]
j)	What are the limitations of superposition theorem?	[3]

PART-B

(50 Marks)

.a) Give the detailed classification of independent sources.

b) Using Mesh analysis, find the voltage across 5Ω resistor in the circuit below shown in figure 1. [5+5]

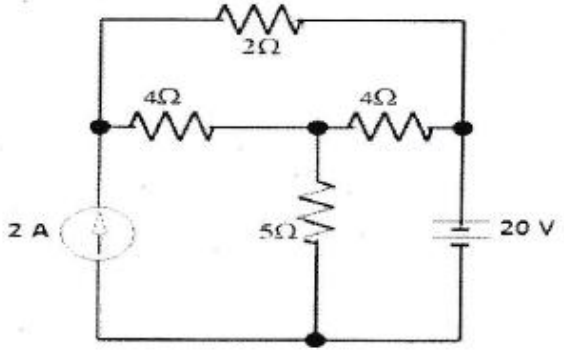

Figure: 1

OR

3.a) With an example explain about Kirchoff's laws.

b) Using Nodal analysis, find the voltage 'V' in the circuit below shown in figure 2. [5+5]

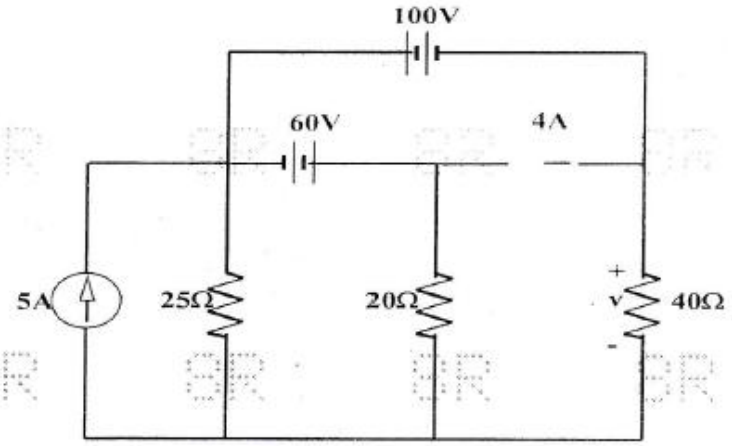

Figure: 2

4.a) Derive the expression for the average value and form factor of a sinusoidal waveform.

b) In the circuit shown below in figure 3, if the power consumed by the 5Ω resistor is 20 W, Find the power factor and reactive power of the circuit w = 100 rad/sec. [5+5]

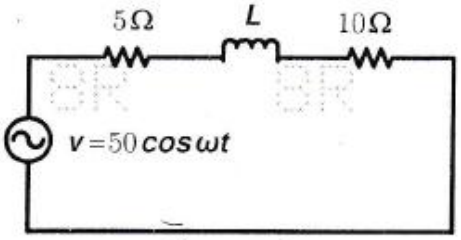

Figure: 3

OR

OR

5.a) Derive the relationships for real and reactive powers in a series RL circuit with sinusoidal excitation.

b) Find the RMS voltage of the signal below in figure 4. [5+5]

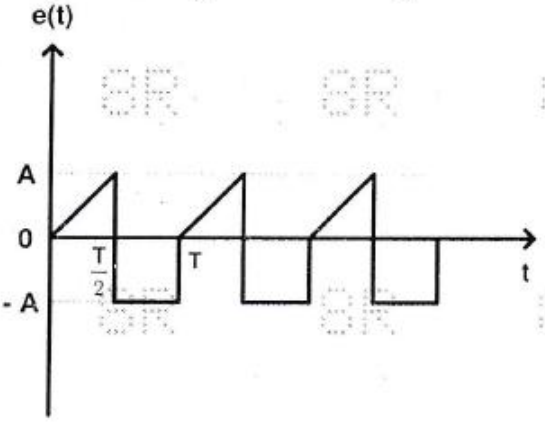

Figure: 4

6.a) Draw the impedance locus diagram of a parallel RC circuit and explain.

b) For the magnetic current shown in figure.5, find the current 'I' in the coil needed to produce a flux of 5.5 mWb in the air gap. The magnetic circuit has a uniform cross sectional area of 5 cm^2. Assume the relative permeability of the magnetic material as 3523, neglect leakage and fringing effect. [5+5]

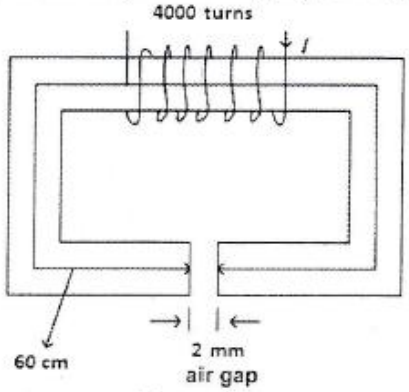

Figure: 5

OR

7.a) Explain in detail about Faraday's law of electromagnetic induction.

b) In a series circuit of L=10mH and C=0.01μF and R=50Ω. Calculate the resonant frequency and also the impedance at the resonant frequency. [5+5]

8.a) What is loop method? Explain the analysis of networks with this method in detail.

b) For the graph shown in figure 6, determine the number of branches, sub graphs, trees and draw them. [5+5]

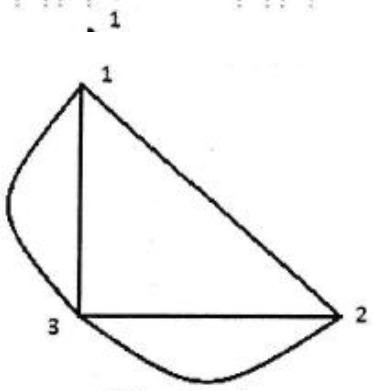

Figure: 6

OR

9.a) Define Duality. Explain with the help of an example.

b) With the help of an example, explain the procedure of formulating the Basic tie set matrix. [5+5]

18. References (Text books/websites/Journals)

TEXT BOOKS:

1. Network Analysis – Van Valkenburg, 3rd Ed., Pearson, 2016.

2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999

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1. Electric Circuits – J. Edminister and M. Nahvi – Schaum's Outlines, Mc Graw Hills Education,1999.

2. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 8th Edition, 1993.

3. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH

4. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan, 2001, (Tech. IndiaPublications), New Delhi.