NETWORK ANALYSIS AND TRANSMISSION LINE

QUESTION BANK

COURSE TITLE: Network Analysis and Transmission Line

COURSE CODE: EC2102PC

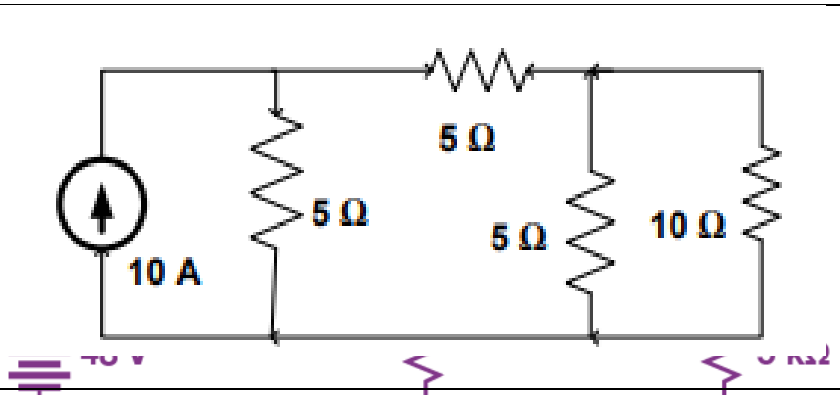
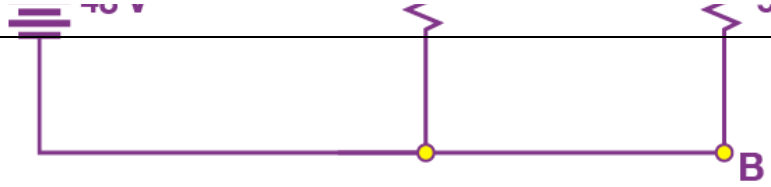
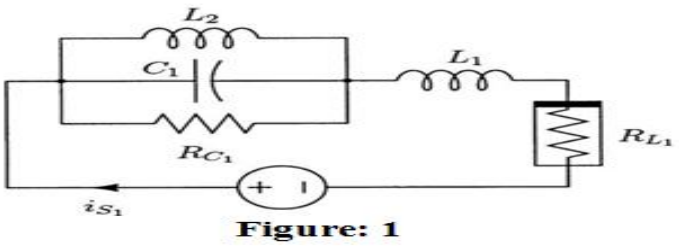
REGULATION: NR-21

UNIT-1

Network Topology

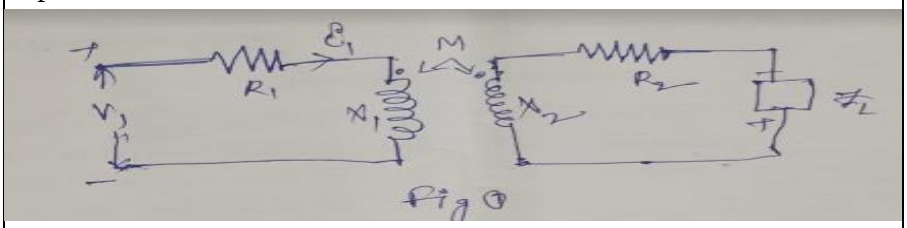
PART- A (SHORT ANSWER QUESTIONS)

Sl.No		Questions	BT	CO	PO
Part –A (Short Answer Questions)					
1		Define tie set and basic tie set matrix.	BT2	CO1	PO1
2		Write short notes on cut set and basic cut set matrix.	BT1	CO1	PO1
3		Define tree, graph, sub graph.	BT2	CO1	PO1
4		What is dot convention?	BT2	CO1	PO1
5		Define incidence matrix.	BT3	CO1	PO2
6		Define magnetic circuits.	BT3	CO1	PO2
7		Two coils are mutually coupled, with L1 = 25 mH, L2 = 60 mH, and k = 0.5. Calculate the maximum possible equivalent inductance if: (a) the two coils are connected in series (b) the coils are connected in parallel.	BT2	CO1	PO2
8		Define Coefficient of Coupling and find the coefficient of coupling for two coils having L_1 = 2 H, L_2 = 8 H and M = 3H?	BT2	CO1	PO1
9		Define self and mutual inductance.	BT2	CO1	PO2
10		Define ideal transformer?	BT3	CO1	PO1
Part– B (Long Answer Questions)					
11		Briefly explain Fundamental Tie set matrix with one example.	BT3	CO1	PO2
12		Briefly explain Fundamental cut set matrix with one example.	BT4	CO1	PO2
13		For the network shown in figure 1 draw the Oriented graph and from the cut set matrix.	BT3	CO1	PO3

					
14		] for p 	BT3 BT2	CO1 CO1	PO2 PO2
15		Draw the oriented graph of network with fundamental cutest matrix as shown in figure find the number of cut set and draw them.	BT3 BT3	CO1 CO1	PO2 PO3
16		Draw the directed graph, tree, cutset matrix and tie set matrix for the network shown infigure 1.  **Figure: 1**	BT2 BT3	CO1 CO1	PO2 PO2
17		Clearly explain the following: (i)Self Inductance (L) (ii)Mutual inductance (M)	BT2 BT2	CO1 CO1	PO2 PO2
18	(a)	Derive the expression for co - efficient of coupling (k).	BT3	CO1	PO2
	(b)	Two coupled coils of L1 = 0.8 H and L2 = 0.2 H have a coupling coefficient k = 0.9. Find the mutual inductance M.	BT3	CO1	PO3
19		For an ideal transformer figure 1 find the impedance assume load	BT3	CO1	PO3

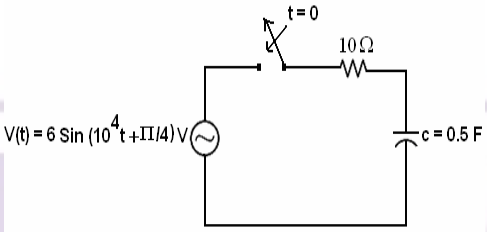
Twigs Links

1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

		impedance to be Z_L  			
20		Define Ideal Transformer? Explain its working	BT3	CO1	PO3

UNIT-2

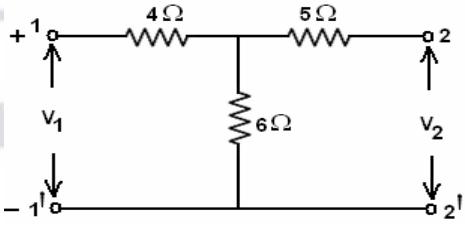
A.C. Circuits

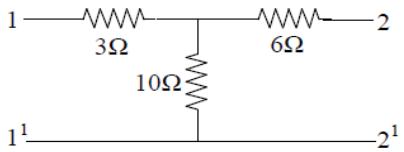
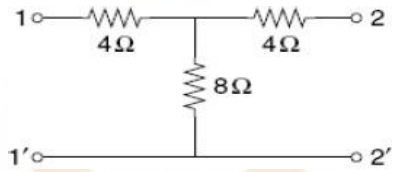
		Questions	BT	CO	PO
Part –A (Short Answer Questions)					
1		Define transient state and steady state.	BT2	CO2	PO2
2		Define square and step response of a circuit.	BT1	CO2	PO1
3		Define root locus.	BT3	CO2	PO2
4		Explain resonance.	BT3	CO2	PO2
5		Derive the relation between voltage and current in a series connected RL Circuits.	BT2	CO2	PO3
6		Explain quality factor and bandwidth.	BT2	CO2	PO1
7		What is the significance of power factor?	BT1	CO2	PO1
8		Define damping factor.	BT3	CO2	PO2
9		Differentiate between under damped and critically damped case.	BT3	CO2	PO2
10		Define resonance curve.	BT2	CO2	PO3
Part– B (Long Answer Questions)					
11		For the circuit shown in Figure determine the particular solution for i(t) throughthe circuit. Assume zero initial conditions. 1. 	BT3	CO2	PO2
			BT3	CO2	PO3
12		Derive the expression for i(t) of RL Series circuit. When DC voltage is applied to it at t=0 by closing the switch. Draw the response curve i(t) vs t. Define time constant of RL circuit.	BT3	CO2	PO2
			BT3	CO2	PO2
13	a)	Derive the expression for i(t) of RLC Series circuit. When DC voltage is applied to it at t=0 by closing the switch. Complete Response i(t)	BT2	CO2	PO2
	b)	A DC voltage of 20 V is applied in a RL circuit where R=5 ohms, L=10 H Find (a)Time constant (b) Maximum value of stored Energy	BT3	CO2	PO3
14	a)	Derive the expression for i(t) and voltage $V_c(t)$ across capacitance of RC Series circuit. When DC voltage is applied to it at t=0 by closing the switch. Draw the response curve i(t) vs t.	BT3	CO2	PO2
			BT2	CO2	PO1

		Explain about time constant of RC circuit.			
15	a)	Derive the expression for the current response in RL series circuit with a sinusoidal response.	BT3	CO2	PO2
	b)	Derive the expression for the current response in RC series circuit with a sinusoidal response.	BT2	CO2	PO2
16	a)	Derive the expression for the current response in RLC series circuit with a sinusoidal response.	BT2	CO2	PO3
	b)	Derive the expression for the current response in RL series circuit with a Step response.	BT2	CO2	PO2
17	a)	Derive the expression for the current response in RC series circuit with a Step response.			
	b)	Derive the expression for the current response in RLC series circuit with a Step response.			
18		A series R C circuit with R = 100 Ω and C = 25 μF has a Sinusoidal excitation V (t) = 250 Sin 500t. Find the total current assuming that the capacitor is initially uncharged			
19		What is damping factor? Derive the expression for over damped, under damped, critically damped cases.			
20.		Derive expression for quality factor and bandwidth for series and parallel resonance.			

UNIT-3

Two Port Network

S.No		Questions	BT	CO	PO
Part –A (Short Answer Questions)					
1		Discuss different types of two port network.	BT1	CO3	PO1
2		Define image transfer constant.	BT1	CO3	PO2
3		Write down the set of equations of a two port network in terms of ABCD parameters.	BT2	CO3	PO2
4		Define characteristic impedance.	BT2	CO3	PO2
5		Define transformed variables.	BT2	CO3	PO2
6		What is attenuator?	BT2	CO3	PO2
7		Define poles and zeros in a transfer function.	BT2	CO3	PO1
8		Define image and iterative impedance.	BT2	CO3	PO2
9		What is a driving point in transfer function?	BT3	CO3	PO2
10		Define impedance matching network.	BT3	CO3	PO3
Part– B (Long Answer Questions)					
11		Define Z and Y parameters of a two port network and determine the relationship between the above parameters.	BT2 BT3	CO3 CO3	PO2 PO3
12	a)	Find Y parameters for the above network shown in Figure 	BT3	CO3	PO2
	b)		BT2	CO3	PO1
13	a)	Express Z parameters in terms of ABCD and Inverse ABCD parameters.	BT3	CO3	PO2
	b)	Express Y parameters in terms of ABCD and Inverse ABCD parameters.	BT3	CO3	PO2

14	a)	Write the Z-parameters of the following networkin Figure:1  Figure:1	BT2	CO3	PO2
	b)	19. Find the Y & h-parameters of the following network  	BT2	CO3	PO2
15		Derive the relation between Z-parameters in terms of Y-parameters and ABCD parameters.	BT2 BT2	CO3 CO3	PO2 PO2
16		Derive the relation between Z-parameters in terms of Y-parameters and ABCD parameters.	BT3 BT3	CO3 CO3	PO2 PO2
17		Discuss in detail about series and parallel connection of two port networks.			
18		Discuss about impedance matching network.			
19.		Explain the concept of two port network functions using transformed variables?			
20.		Explain the concept of poles, zeros, their significance and necessary conditions for driving point functions and transfer functions?			

UNIT-4

Transmission Line

Part –A (Short Answer Questions)					
1		What is group velocity?	BT1	CO4	PO1
2		What is patch loading?	BT2	CO4	PO2
3		What do you understand by loading of transmission lines?	BT2	CO4	PO2
4		Define Characteristic impedance?	BT2	CO4	PO2
5		What is frequency distortion?	BT2	CO4	PO3
6		Calculate the load reflection coefficient of open and short circuited lines?	BT1	CO4	PO2
7		Calculate the characteristic impedance for the following line parameters R = 10.4 ohms /km L = 0.00367 H/km, C = 0.00835μf /km, G = 10.8x10-6 mhos /km	BT2	CO4	PO2
8		Define phase distortion?	BT2	CO4	PO2
9		Write the equation for the input impedance of a TL?	BT1	CO4	PO1
10		Define reflection factor and reflection loss?	BT2	CO4	PO2
Part– B (Long Answer Questions)					
11		Obtain the general solution of Transmission line?	BT2	CO4	PO2
			BT1	CO4	PO2
12		Explain about waveform distortion and distortion less line condition?	BT2	CO4	PO2
			BT2	CO4	PO3
13		Explain in following terms (i) Reflection factor (ii) Reflection loss (iii) Return loss	BT2	CO4	PO2
			BT2	CO4	PO3
14		Discuss in details about inductance loading of telephone cables and derive the attenuation constant and phase constant and velocity of signal transmission (v) for the uniformly loaded cable?	BT1	CO4	PO2
			BT1	CO4	PO2
15		Derive the equation of attenuation constant and phase constant of TL in terms of R, L, C, G?			
16		Explain in details about the reflection on a line not terminated in its characteristic impedance (z0)?			
17		Explain about physical significance of TL?			
18		Derive the equation for transfer impedance?			
19		Derive the expression for input impedance of lossless line?			
20		Explain about telephone cable?			

UNIT-5

Transmission Line-II

S.No	Questions	BT	CO	PO
	Part –A (Short Answer Questions)			
1	Name few applications of half wave line?	BT2	CO5	PO2
2	Find the VSWR and reflection co – efficient of a perfectly matched line with no Reflection from load?	BT2	CO5	PO2
3	Explain the use of quarter wave line for impedance matching?	BT1	CO5	PO3
4	What is the need for stub matching in transmission lines?	BT1	CO5	PO2
5	Why do standing waves exist on TL?	BT2	CO5	PO2
6	What are the advantages of double stub matching over single stub matching?	BT1	CO5	PO2
7	Derive the relationship between standing wave ratio and reflection co – efficient?	BT2	CO5	PO2
8	Explain the use of quarter wave line for impedance matching?	BT2	CO5	PO1
9	Give the applications of smith chart?	BT2	CO5	PO2
10	Give the analytical expression for input impedance of dissipation less line?	BT3	CO5	PO2
	Part– B (Long Answer Questions)			
11	Explain about half wave transformer?	BT2	CO5 CO5	PO3 PO2
12	Discuss application of smith chart?	BT1	CO5	PO2
		BT2	CO5	PO2
13	Explain about voltage and current waveform of dissipation less line?	BT1	CO5	PO2
		BT3	CO5	PO2
14	Derive the expression for the input impedance of the dissipation less line and the expression for the input impedance of a quarter wave line. Also discuss the application of quarter wave line?	BT2	CO5	PO1
		BT1	CO5	PO2
15	Explain single stub matching on a transmission line and derive the expression and the length of the stub used for matching on a line?	BT1	CO5	PO2
		BT1	CO5	PO3
16	Design a single stub match for a load of 150+j225 ohms for a 75 ohms line at 500 MHz using smith chart?	BT3	CO5	PO2
		BT3	CO5	PO2

17		A 30 m long lossless transmission line with characteristic impedance (z_o) of 50 ohm is terminated by a load impedance (Z_L) = 60 + j40 ohm. The operating wavelength is 90m. find the input impedance andSWR using smith chart?			
18		Explain double stub matching on a transmission line and derive the expression and the length of the stub used for matching on a line?			
19		Explain about Lamda/ 8 wave transformer?			
20		Explain about properties of smith chart?			