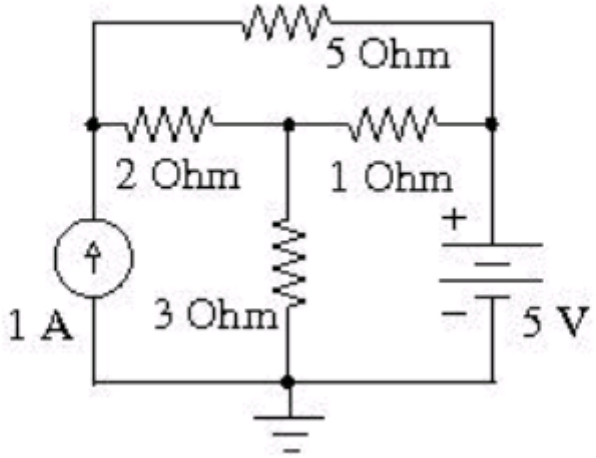
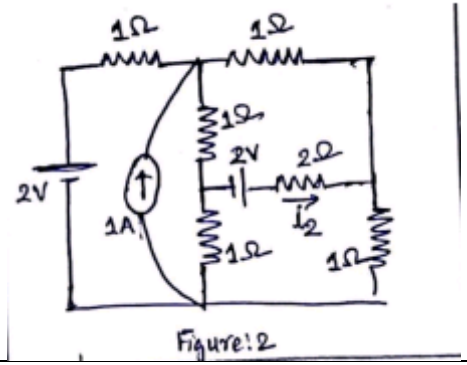
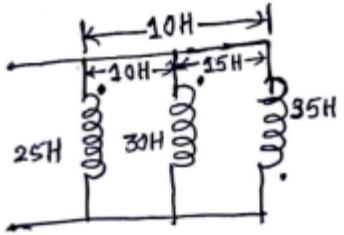
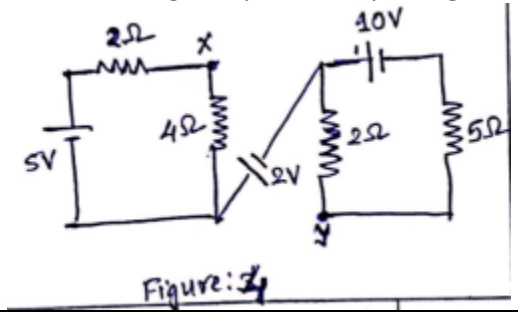
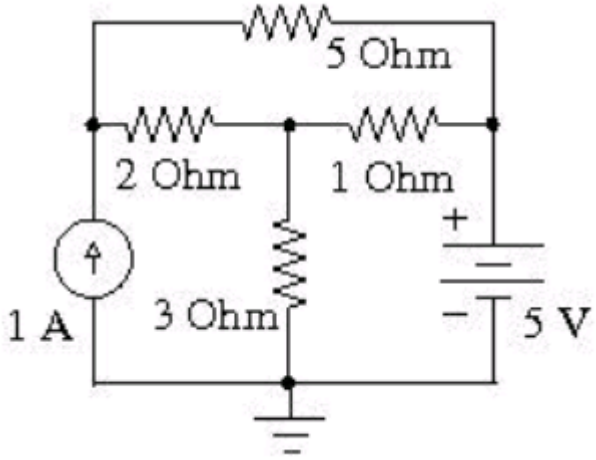
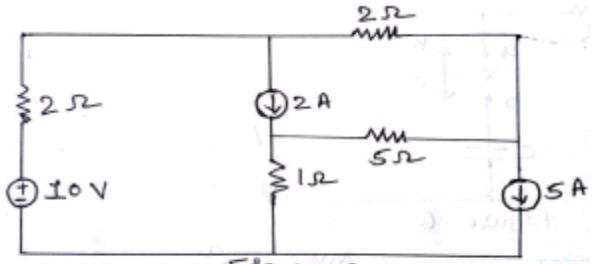
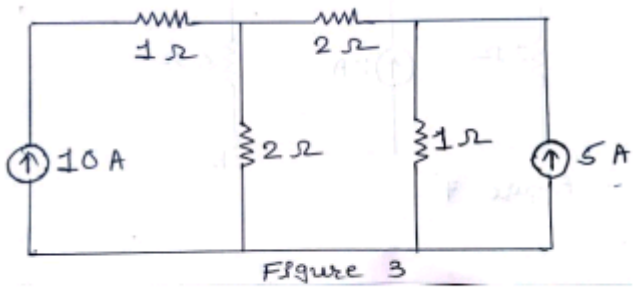
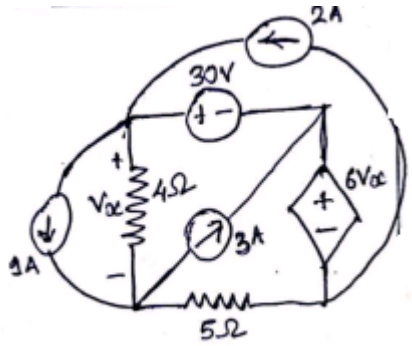
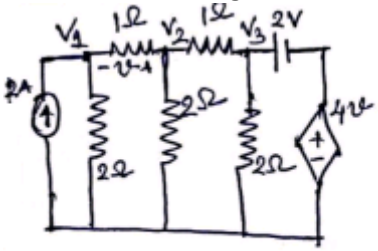
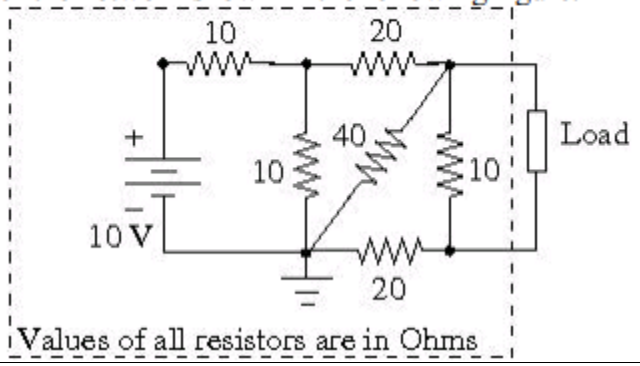
1	CIRCUIT VARIABLES AND CIRCUIT ELEMENTS AND SOURCES				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Mention the relations between voltage and current for the following passive elements. (1) Resistor (2) Capacitor.	**3**			
2.	Draw the characteristics and differentiate between ideal current source and actual current source.	**4**			
3.	Find the current passing through the 2 Ohm resistor using Mesh analysis for the circuit shown in the following figure. 	7			
4.	Explain the characteristic of an ideal current source.		**3**		
5.	Write the voltage current relationships of pure inductor and pure capacitor.		4		
6.	Explain characteristic of an ideal current source.			**4**	

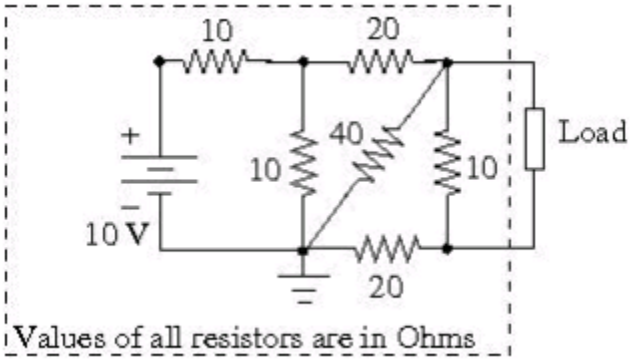
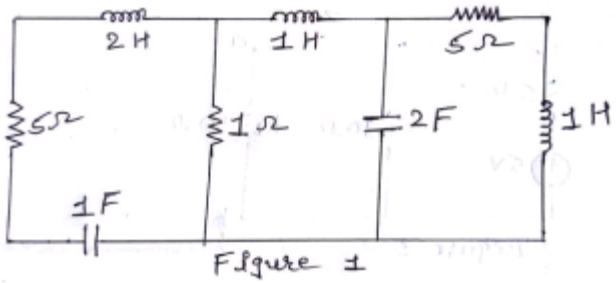
7.	Define following terms: (a) Linear and Nonlinear Networks (b) Lumped and Distributed Networks				**3**
8.	In the network of figure:2 , determine the $i2$ using Source Transformation method.  Figure:2				**7**
9.	Determine the inductance between the terminals for a 3 coil shown in figure:3.  Figure:3				**3**
10.	Find the voltage drop across x-y for figure:4  Figure:4				**4**

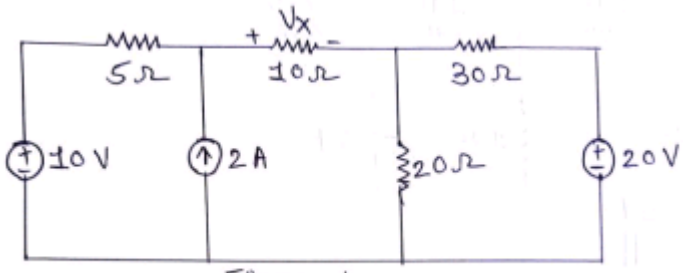
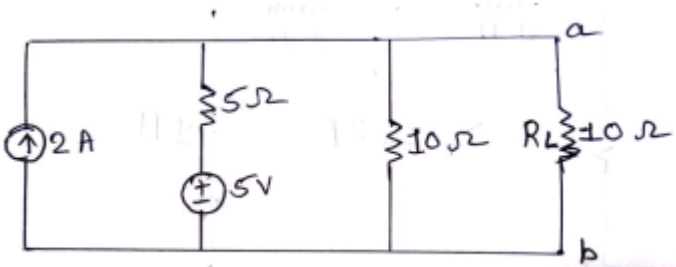
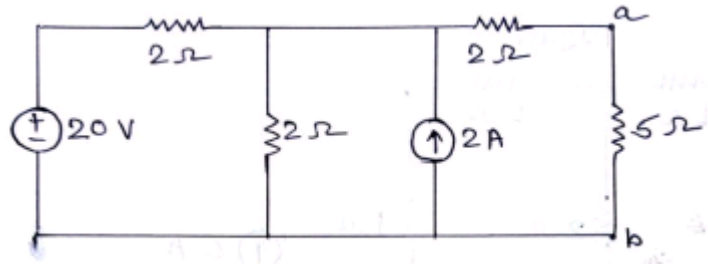
2	NODAL ANALYSIS AND MESH ANALYSIS OF RESISTIVE CIRCUITS				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Explain the principle of source transformation to obtain equivalent voltage source from a current source.	**3**			
2.	Briefly describe the nodal analysis with a small example.	**4**			
3.	Find the current passing through 3 Ohm resistor in the following circuit using nodal analysis. 	7			
4.	Briefly explain the mesh analysis.		3		

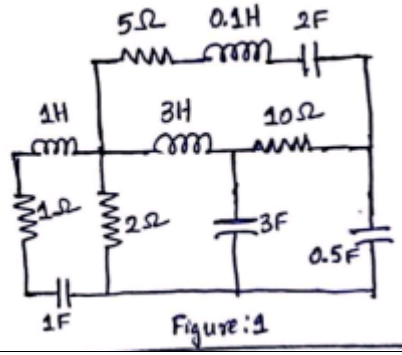
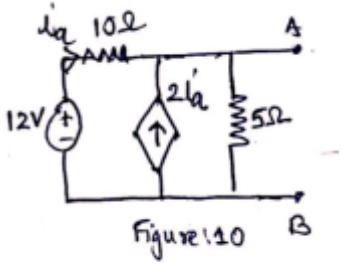
5.	Differentiate between mesh analysis and nodal analysis		4		
6.	Explain principle of source transformation to obtain equivalent current source from a voltage source.			3	
7.	Find the value of all currents and voltage across 5Ω resister for the network shown in figure 2 using mesh analysis.  Figure 2			7	
8.	Apply nodal analysis for the network shown in figure 3 and find current across 2Ω resister connected between two nodes.  Figure 3			**7**	
9.	Find the value of Vx in the circuit of figure:5, using mesh analysis.\				**7**

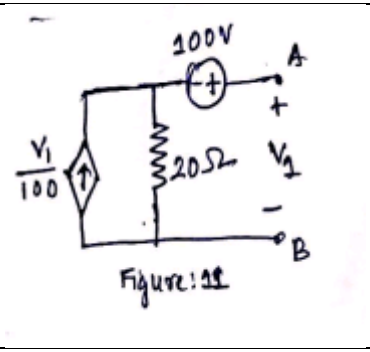
	 Figure: 05				
10.	In the network of figure:6, determine the node voltages $V1$,$V2$,$V3$ using node analysis.  Figure: 6				**7**

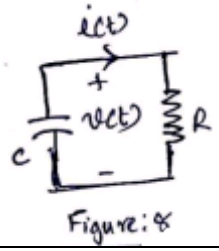
3	**CIRCUIT THEOREMS AND THEIR APPLICATION IN ELECTRIC NETWORKS**				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Obtain the value of Norton's equivalent current and Norton's equivalent resistance for the network shown in the following figure.  	**7**			
2.	Briefly describe Millman's theorem.	**3**			
3.	Obtain the value of Thevenin's equivalent voltage and Thevenin's equivalent resistance for the network shown in the following figure.		7		

					
4.	Briefly describe superposition theorem.		3		
5.	Explain the reciprocity theorem.		4		
6.	Draw the dual of network shown in figure  Figure 1			4	
7.	State and explain maximum power transfer theorem.			3	
8.	Find voltage VX in the network shown in figure 4 using superposition theorem.			**7**	

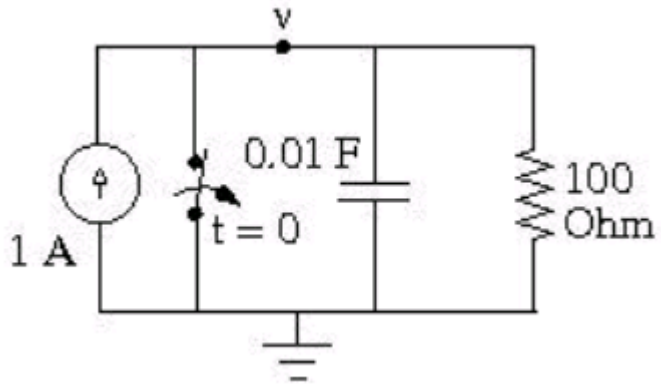
	 Figure 4				
9.	State and explain Millman's theorem.			**3**	
10.	Find Thevenin's equivalent circuit for the network shown in figure 5. Also find power dissipated in RL.  Figure 5			7	
11.	State and explain Superposition theorem.			3	
12.	Find Norton's equivalent circuit for the network shown in figure 7. Obtain current through 5Ω resistor.  Figure 7			7	

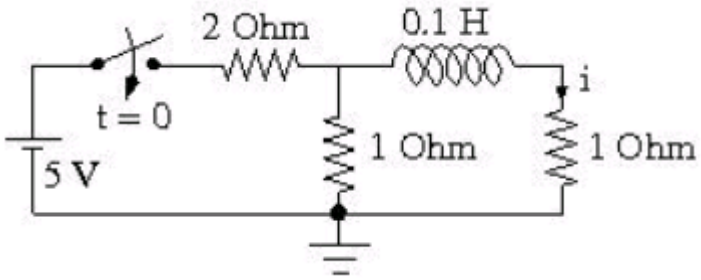
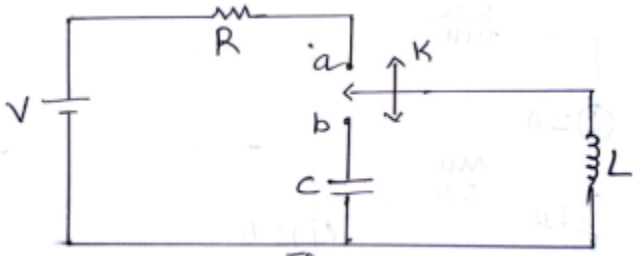
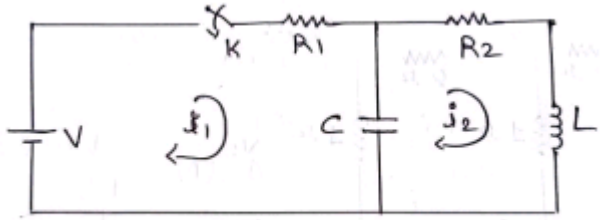
13.	Construct the exact dual of the network of figure:1.  Figure:1				**4**
14.	State and explain superposition's theorem.				**3**
15.	State and explain Maximum Power Theorem.				**3**
16.	Find the Norton's equivalent circuit across terminals AB of the circuit shown in figure:10.  Figure:10				**7**
17.	Find the Thevenin's equivalent network across the terminals A and B for figure:11.				**7**

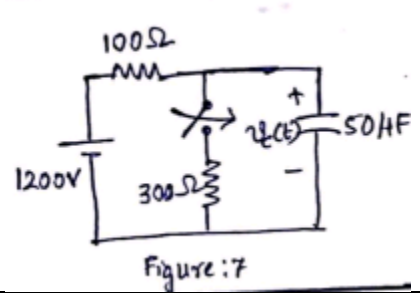
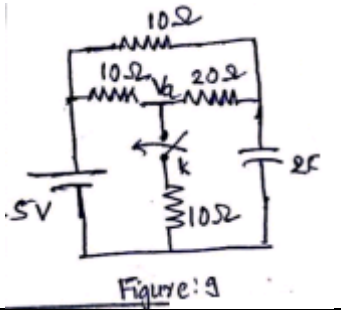
	 Figure: 11				

4	TIME DOMAIN RESPONSEOF FIRST ORDER RL AND RC CIRCUITS				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Derive the equation of inductor current and draw its waveform for a series R-L circuit connected to a step input voltage.	**4**			
2.	What do you mean by a first order system? Give two examples of first order systems. Explain the procedure to obtain the transient response of a first order system.	**7**			
3.	Explain the time response of R-L-C series circuit with step input. Assume critically damped system.		4		
4.	How the following elements will behave at t = 0 and t = ∞. Draw the equivalent network as well. (a) Inductor (b) Capacitor.				4
5.	In the circuit shown in figure:8, voltage and current expressions are $v(t)$ = 100e −1000$tV, t \geq 0$ and $i(t)$ = 5e −1000$tmA, t \geq 0$. Find (a) R, C and Time Constant (τ). (b) Initial energy stored in capacitor.  Figure: 8				4
6.	Explain and derive the step response to R-L series circuit using Laplace Transformation method				4

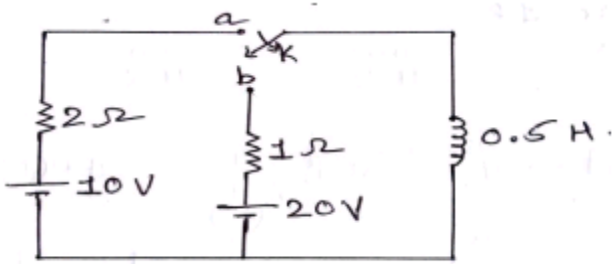
5	TIME DOMAIN RESPONSE OF SECOND ORDER LINEAR CIRCUITS				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	With suitable example explain how the Laplace transform is useful in obtaining the transient response of a second order system.	**7**			
2.	Take suitable example of a first order system and explain the procedure to obtain its transient response.		7		
3.	What is time constant? What is its significance?				3

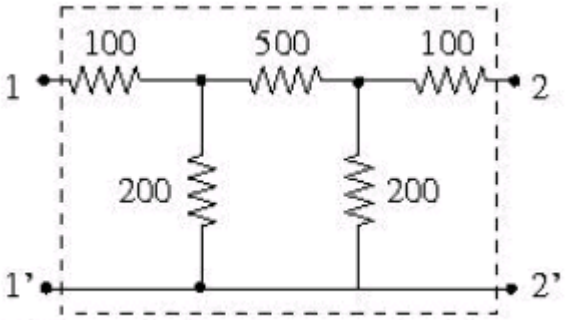
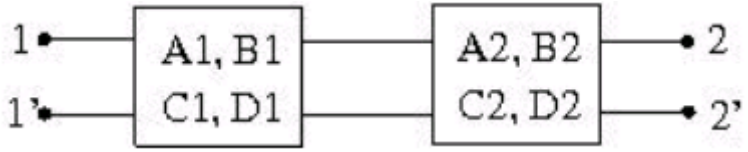
6	**INITIAL CONDITIONS**				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Find out the values of 'v' ; 'dv/dt' and 'd 2 v/dt2 ' just after switching (at time t = 0+) in the circuit shown in the following figure. 	**7**			
2.	Describe the steps to evaluate the initial conditions of a network.	**3**			
3.	Find out the values of 'i ' ; 'di/dt' and 'd 2 i/dt2 ' just after switching (at time t = 0+) in the circuit shown in the following figure.		**7**		

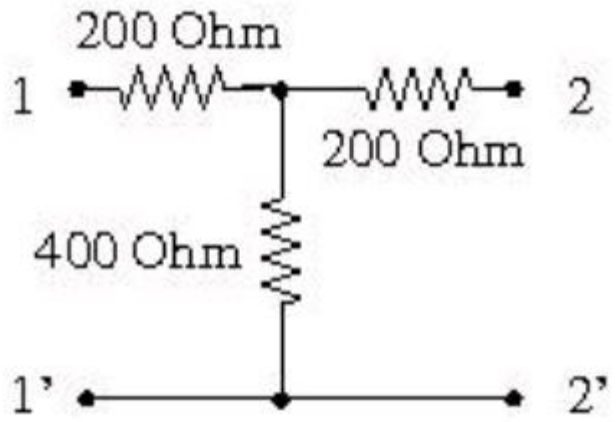
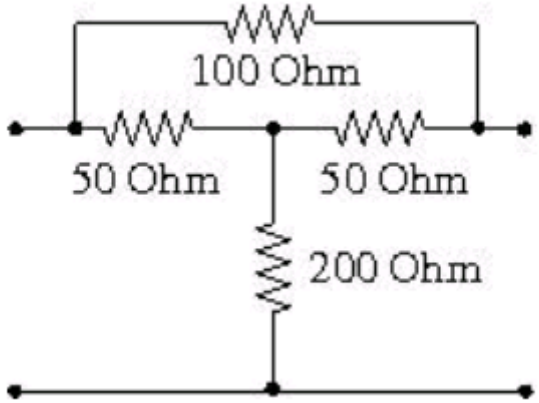
					
4.	Briefly describe the rules for initial conditions calculation of various circuit elements.		**7**		
5.	In the network shown in figure 6, switch k is moved from position a to position b at t=0. Find current i(t) using Laplace transformation method.  Figure 6			**4**	
6.	State and explain initial value theorem.			3	
7.	In the network shown in figure 8, find i1, i2, di1/dt and di2/dt at t= 0+ assuming all initial conditions as zero.  Figure 8			4	

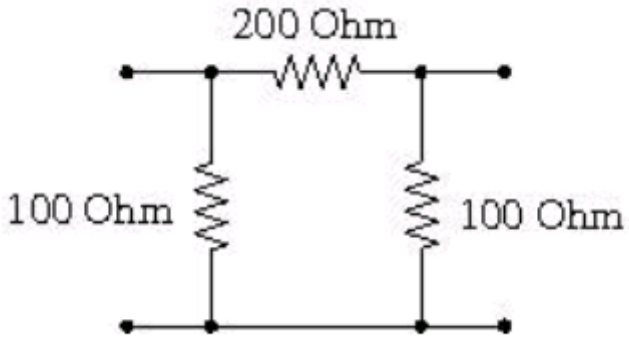
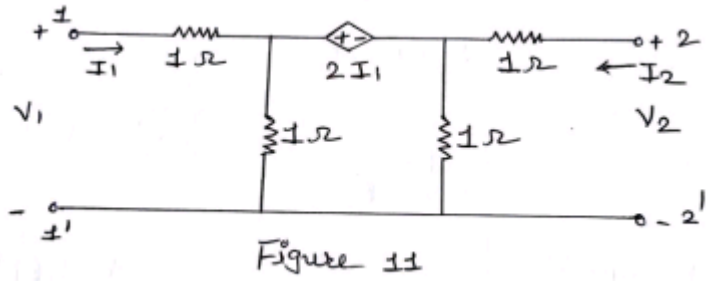
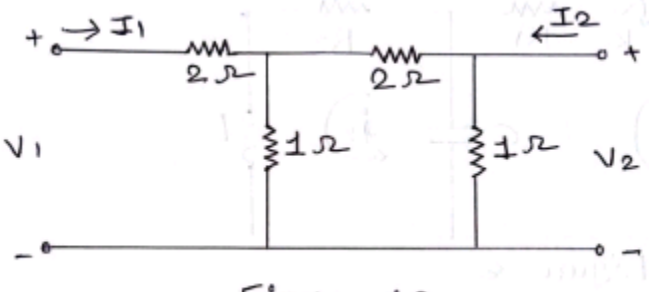
8.	A series RLC circuit having with zero inductor current and zero capacitor voltage is excited by 20 V dc source. Find i(0+) and di/dt (0+). Take R= 10Ω, C= 10μF, L= 2H. (A switch K is also connected in series with RLC.)			7	
9.	For the network shown in figure:7, the switch k is open for a long time and closed at t = 0. Determine $vc(t)$.  Figure :7				**7**
10.	In a network of figure:9, a steady state is reached with the switch k open. At t=0, the switch is closed. Determine the values of va (0 −) and va (0 +).  Figure: 9				**7**

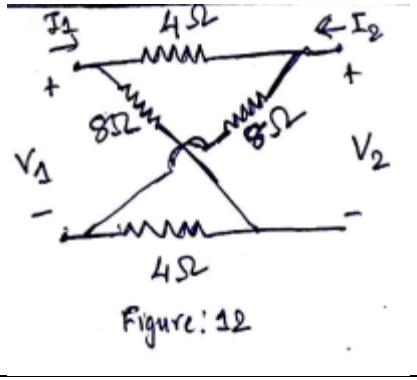
7	**LAPLACE TRANSFORM ANALYSIS AND CIRCUIT APPLICATIONS**				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	**(a)** Find out the poles of the system described in the immediately next question i.e. Q-3(b). **03** **(b)** Write the circuit equations for a series RC circuit connected to a DC supply. Using Laplace transform, obtain the transfer function between capacitor voltage and supply voltage. **04**	**7**			
2.	Write the circuit equations for a series RL circuit connected to a DC supply. Using Laplace transform, obtain the transfer function between Inductor current and supply voltage.		3		
3.	Find the poles of the system described in previous question i.e. Q-2 (above question mentioned)		**4**		
4.	Briefly describe the application of Laplace transform for transfer function approach in circuit analysis.		7		
5.	What is impulse function? Find the impulse response for the network function H(S)=5/(S2+S+1)			**4**	
6.	Derive Laplace Transform of $f(t) = tu(t)$.				**3**
7.	State the procedure to obtain solution of a network using Laplace Transform method. State advantages of Laplace method over classical method.				**4**

8	**LAPLACE TRANSFORM ANALYSIS AND TRANSFER FUNCTION APPLICATIONS**				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Explain the procedure to obtain sinusoidal steady state response of a circuit.	**7**			
2.	In the network shown in figure 9, switch K is moved from a to b at t= 0, steady state having previously been attained. Determine current i(t).  Figure 9			7	
3.	Using Laplace transformation, solve the following differential equation. $d\ 2\ i\ dt\ 2 + 4\ di\ dt + 8i = 8u(t)$. Given that $i(0+) = 3$ and $di\ dt\ (0+) = -4$.				4

9	**TWO PORT NETWORKS**				
Sr. No.	**Questions**	**Dec - 15**	**NOV - 16**	**NOV- 17**	**MAY - 18**
1.	Find out the Z-parameters of the two port network shown in the following figure.  Values of all resistors are in Ohms	**7**			
2.	Find out the equivalent ABCD parameters of the cascade combination of two networks as shown in the following figure.  	**3**			
3.	Find out the Y-parameters of the network shown in the following figure.	**4**			

					
4.	Find out the Z-parameters of the two port network shown in the following figure. 		7		
5.	Briefly describe ABCD parameters and inverse ABCD parameters for a symmetric two port network.		3		
6.	Find out the Y-parameters of the network shown in the following figure.		4		

					
7.	Give relationship between y parameters and h parameters.			4	
8.	Find Z-parameters for the network shown in figure 11.  Figure 11			7	
9.	Obtain ABCD parameters for the network shown in figure 12.  Figure 12			7	

10.	Write equations of Short circuit Admittance and Open Circuit Impedance parameters of a two port network.				**3**
11.	Derive formulae to convert given y – parameters into h - parameters.				**4**
12.	For the network of figure: 12, find the z and y parameters.  Figure: 12				**7**