Total number of printed pages:5 **D/3rd/DIE301**

2022

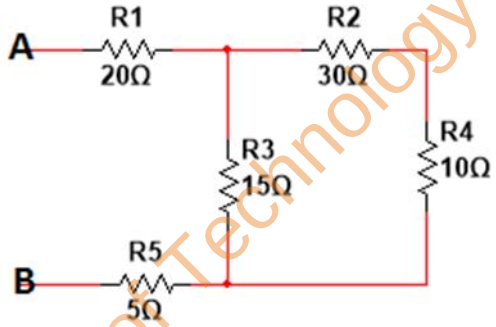
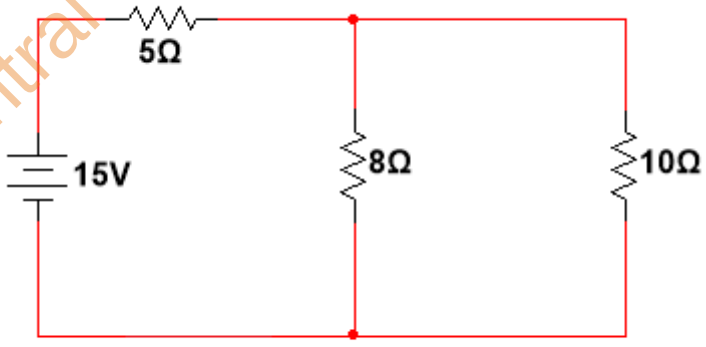
ELECTRICAL CIRCUITS AND NETWORKS

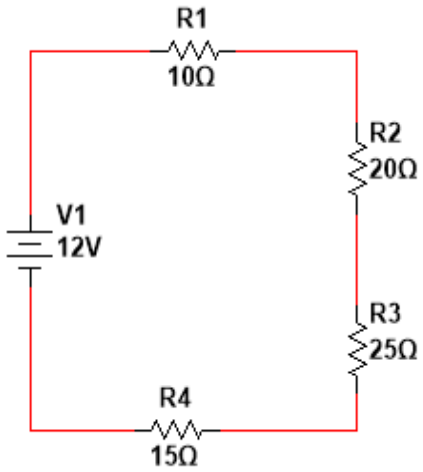
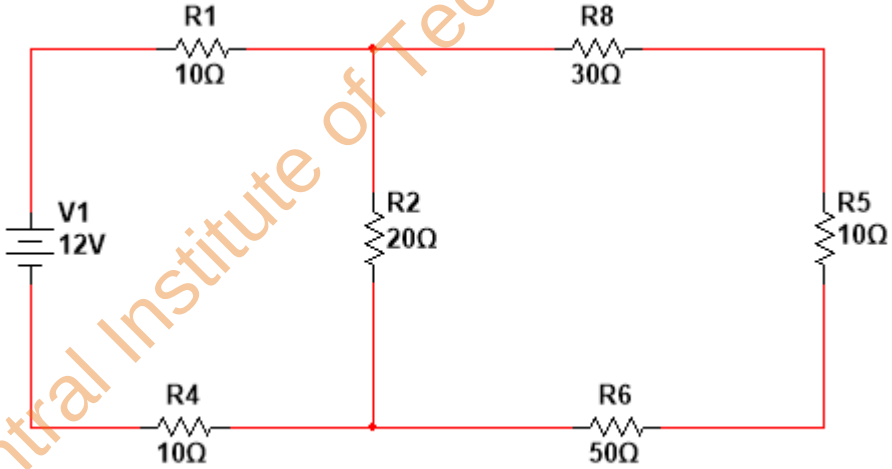
Full Marks : 100

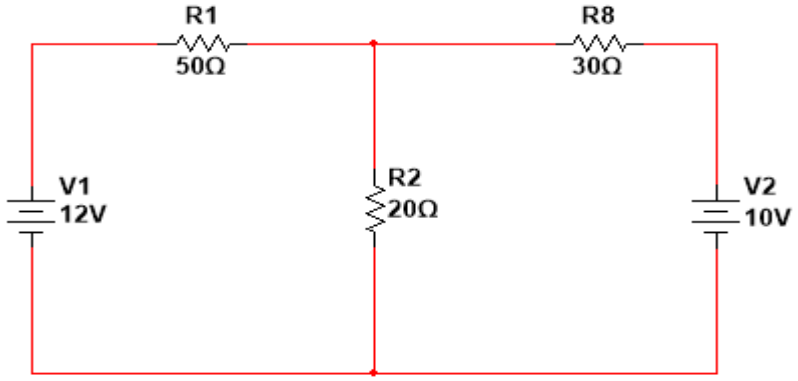
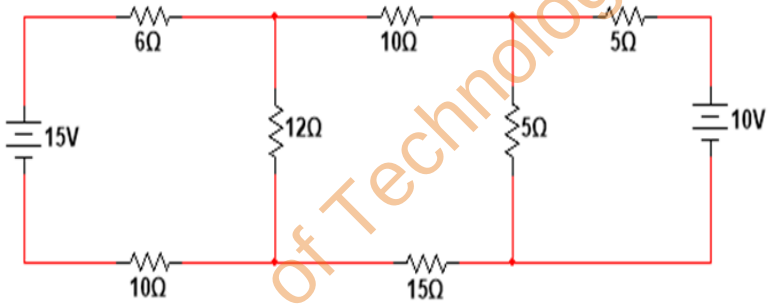
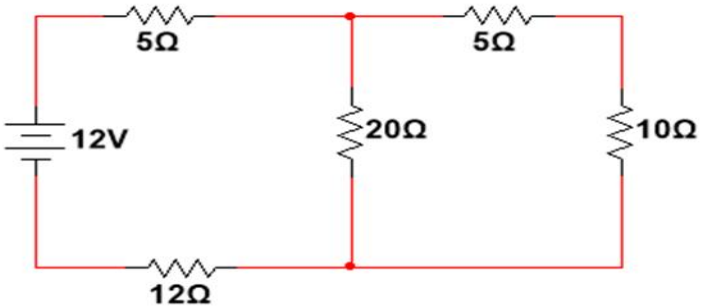
Time : Three hours

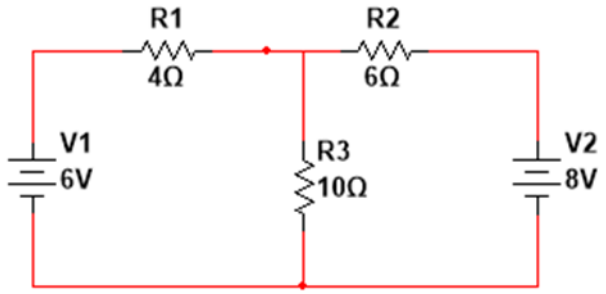
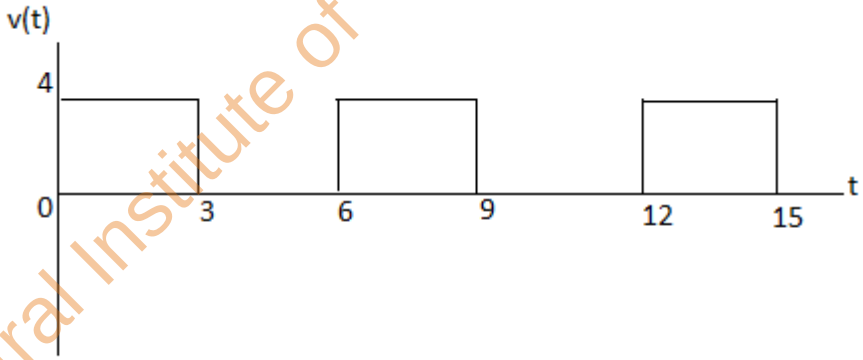
The figures in the margin indicate full marks for the questions.

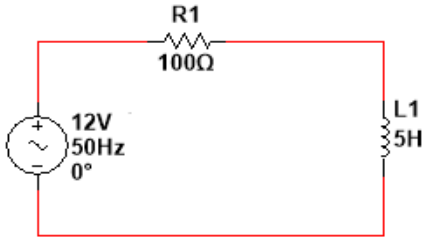
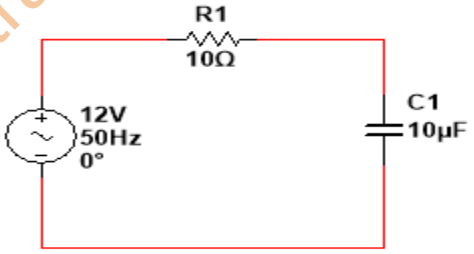
*Answer **any five** questions.*

1.	a)	Determine the equivalent resistance between terminals A and B in figure 1.  Figure 1	7
	b)	Using current divide rule , determine the current through 8Ω and 10Ω resistors in figure 2.  Figure 2	7

	c)	Determine the voltage across R3 and R4 in figure 3 using voltage divide rule.  Figure 3	6
2.	a)	State Kirchhoff's voltage law and Kirchhoff's current law.	4
	b)	Determine the current through 20 Ω resistor in figure 4 using KVL method or mesh analysis.  Figure 4	10
	c)	Explain Thevenin's Theorem using a suitable circuit diagram.	6
3.	a)	Determine the currents through 50Ω, 30Ω and 20Ω resistances in figure 5 using nodal analysis.	7

		 Figure 5	
	b)	What do you mean by node, branch, loop and mesh in a circuit? Determine the number of branches and meshes in the following circuit (figure 6)  Figure 6	7
	c)	What is independent and dependent sources? Show the symbols of independent and dependent voltage and current sources.	6
4.	a)	Determine the current through 10Ω resistor in figure 7 using Norton's Theorem.  Figure 7	10

	b)	Determine current through 10Ω resistor in figure 8 using Superposition Theorem.  Figure 8	10
5.	a)	The instantaneous value of a sinusoidal waveform is given as v(t)=100Sin100πt. Determine (i) RMS value of the waveform (ii) Average value of the waveform. (iii) Frequency of the waveform	6
	b)	Determine the average value and RMS value of the following waveform (figure 9):  Figure 9	10
	c)	A voltage waveform is represented in polar form as 15< 30°. Represent it in (i) Trigonometric form (ii) Rectangular form	4
6	a)	A RL circuit with source voltage 12V(RMS) at 50Hz is given below (figure 10):	10

		 Figure 10 Determine: (i) Impedance of the circuit. (ii) RMS value of current. (iii) Phase angle. (iv) Power factor. (v) Active and reactive power of the circuit.	
	b)	Discuss the behaviour of a circuit, when an AC voltage is connected to the following: (i) Resistance. (ii) Inductance. (iii) Series RL circuit. (iv) Parallel circuits.	10
7	a)	Discuss any two of the following with suitable examples (i) Source conversion (ii) Norton's Theorem (iii)Current divide rule	5x2=10
	b)	A RC circuit with source voltage 12 V (maximum) at 50Hz is given below (Figure 11):  Figure 11 Draw the phasor diagram of the circuit. Also determine the active and reactive power of the circuit.	10