CBCS SCHEME

USN | | | | | | | | | | |

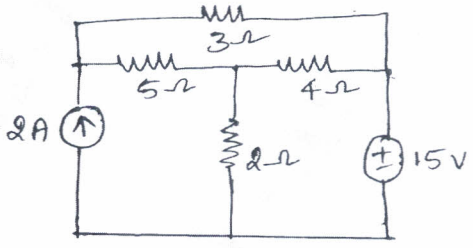
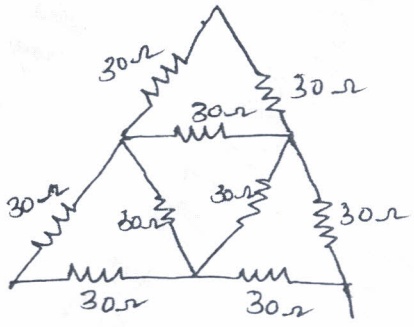
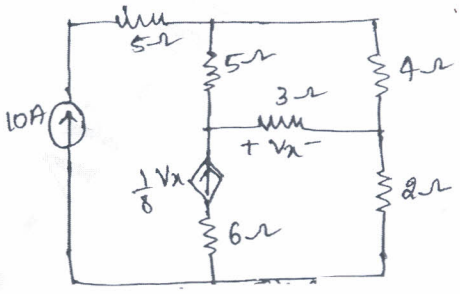
BEE302

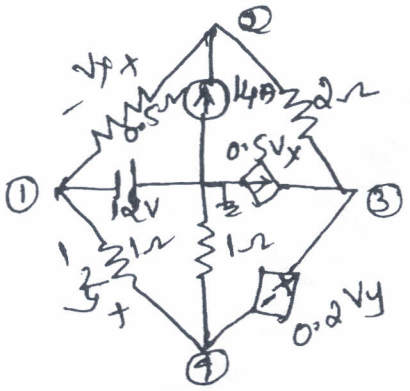
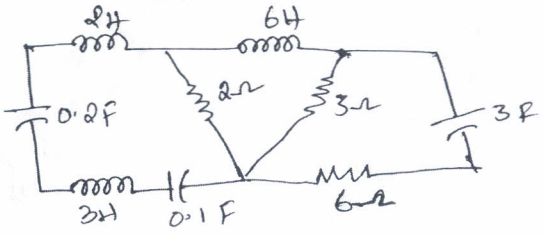
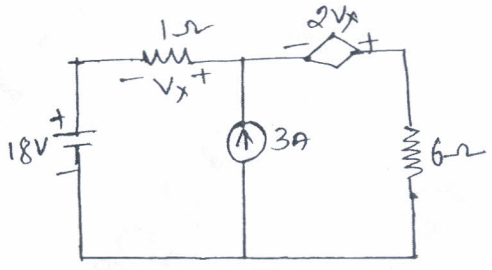
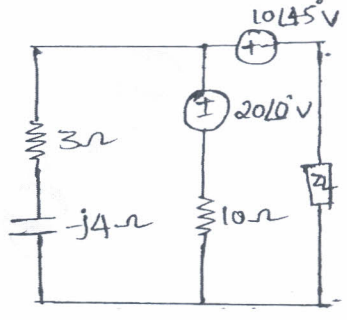
Third Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

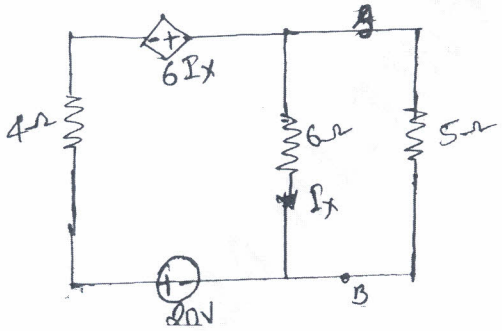
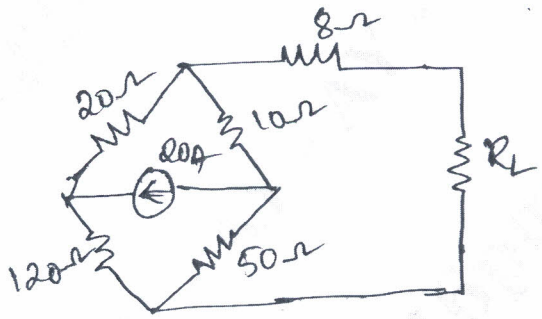
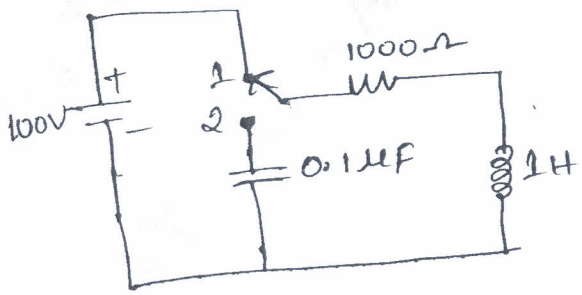
Electric Circuit Analysis

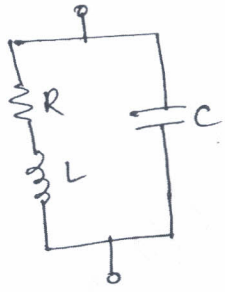
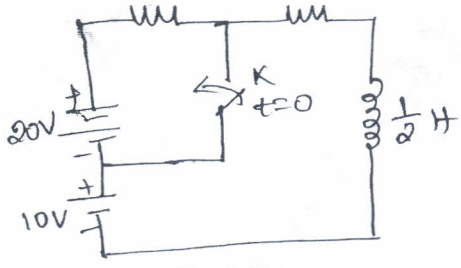
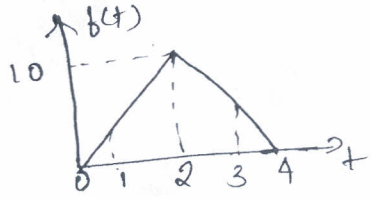
Time: 3 hrs. Max. Marks: 100

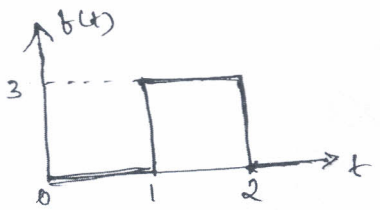
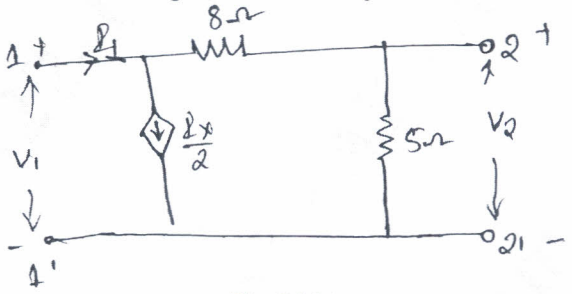
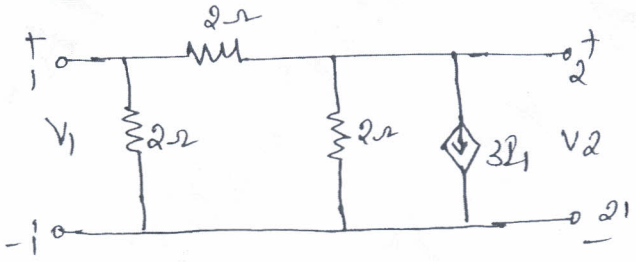
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the following terms : i) Active and Passive element ii) Ideal and practical voltage sources.	6	L2	CO1
	b.	Using sources transformation and source shifting techniques find the voltage across 2Ω resistor in the Fig Q1(b)  Fig Q1(b)	6	L3	CO1
	c.	Find the equivalent resistance between terminal AB shown in Fig Q1(c)  Fig Q1(c)	8	L3	CO1
		OR			
Q.2	a.	Find the loop current I_1, I_2 and I_3 in the circuit shown in Fig Q2(a), by loop analysis  Fig Q2(a)	8	L3	CO1

	b.	Find the voltage at nodes 1, 2, 3, 4 for the network shown in Fig Q2(b)	8	L3	CO1
		 Fig Q2(b)			
	c.	For the network shown in Fig Q2(c) draw the dual network.	4	L3	CO1
		 Fig Q2(c)			
		Module – 2			
Q.3	a.	State and explain the super position theorem.	8	L1	CO2
	b.	For the network shown in Fig Q3(b). Find the Thevenin's voltage, Short circuit current and determine the current flowing through 6Ω resistor.	8	L3	CO2
		 Fig Q3(b)			
	c.	Find the value of Z_L for which maximum power transfer occurs in the circuit given in Fig Q3(c)	4	L2	CO2
		 Fig Q3(c)			

		OR			
Q.4	**a.**	Determine the Norton's equivalent circuit across AB terminals in network of Fig Q4(a). Hence determine the current in 5Ω. Also draw the Thevenin's equivalent circuit across AB terminals.  Fig Q4(a)	**10**	**L3**	**CO2**
	b.	In the network shown in Fig Q4(b). Find the value of R_L for which maximum power is delivered. Also find the maximum power transfer to load R_L.  Fig Q4(b)	**10**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Show that for a series RLC circuit the selectivity $Q_0 = \frac{f_0}{f_2 - f_1}$. Where $f_0 \rightarrow$ resonant frequency and f_1, f_2 are half power frequency.	**10**	**L3**	**CO3**
	b.	Determine the i, $\frac{di}{dt}$ and $\frac{d^2i}{dt}$ at $t = 0^+$ when switch 'K' is moved from position 1 to 2 at $t = 0$ for the network shown in Fig Q5(b). Assume capacitor is initially uncharged.  Fig Q5(b)	**10**	**L3**	**CO3**

		OR			
Q.6	**a.**	If R = 25Ω, L = 0.5H and C = 5μF, find the War, Q and bandwidth for the circuit as shown in the Fig Q6(a)  Fig Q6(a)	**6**	**L3**	**CO3**
	b.	The network shown in Fig Q6(b) reaches a steady state with switch 'K' is closed. At t = 0, the switch is opened, find i(t) to t > 0.  Fig Q6(b)	**8**	**L3**	**CO3**
	c.	Write the initial conditions for the basic passive elements.	**6**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Write the definition of Laplace transform and obtain the Laplace transform of f(t) = K for t ≥ 0 = 0 for t < 0 Where 'K' is constant.	**4**	**L1**	**CO4**
	b.	Find the Laplace transform of i) δ(t) ii) u(t) iii) sin ωt iv) e^{-at} cosωt	**8**	**L3**	**CO4**
	c.	Obtain the Laplace transform of the function shown in Fig Q7(c)  Fig Q7(c)	**8**	**L3**	**CO4**
		OR			
Q.8	**a.**	State and prove initial and final value theorem in Laplace transform.	**8**	**L2**	**CO4**
	b.	Use initial and find value theorems, where they apply to find f(0) and f(∞) for the following : i) $F(s)=\frac{s^3+7s^2+5}{s(s^3+3s^2+4s+2)}$ ii) $F(s)=\frac{e^{2s}(s+2)}{s^2+5}$.	**8**	**L3**	**CO4**

	c.	Express the waveform shown in Fig Q8(c), in terms of step functions.  Fig Q8(c)	4	L2	CO4
		Module – 5			
Q.9	a.	Determine the line current and total power supplied to a Delta connected load of $Z_{ab} = 10\angle 60^\circ\ \Omega$, $Z_{bc} = 20\angle 90^\circ\ \Omega$ and $Z_{ca} = 25\angle 30^\circ\ \Omega$. Assume 3-$\phi$ 400V, ABC system.	10	L3	CO5
	b.	For the network shown in Fig Q9(b), find Z-parameters  Fig Q9(b)	10	L3	CO5
		OR			
Q.10	a.	Express Y-parameters in terms of Z-parameters	10	L2	CO5
	b.	Find the Y-parameters of the two part network shown in Fig Q10(b)  Fig Q10(b)	10	L3	CO5

* * * * *