Set 1

Code No: 20EC21004

Geethanjali College of Engineering and Technology, Hyderabad (Autonomous)

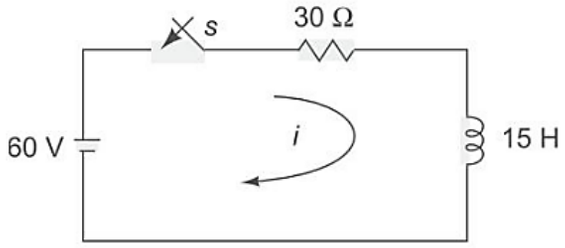
II B.Tech. (ECE) I Semester I Mid-Term Examinations, Nov, 2023

CIRCUIT THEORY

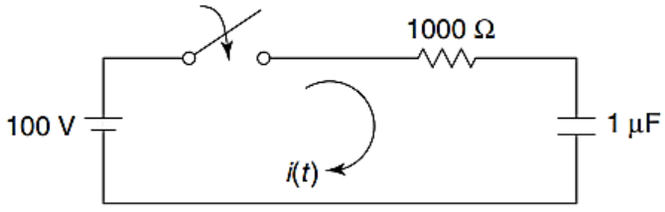
Date: **Time: 100 Min** **Max. Marks: 20**

Note: Answer Any Four Questions. All questions carry equal marks. (4 x 5 = 20)

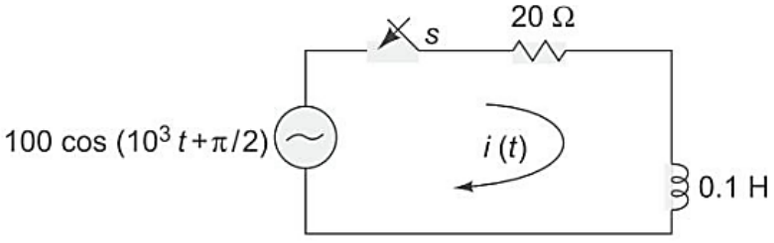
1	a	Differentiate between transient and steady state response of an electrical network.	2 M	CO 1	L1
	b	A series RL circuit is shown below for which the switch is closed at t = 0. Determine the current *i*, the voltage across resistor and the voltage across the inductor for all t > 0.	3 M	CO 1	L3



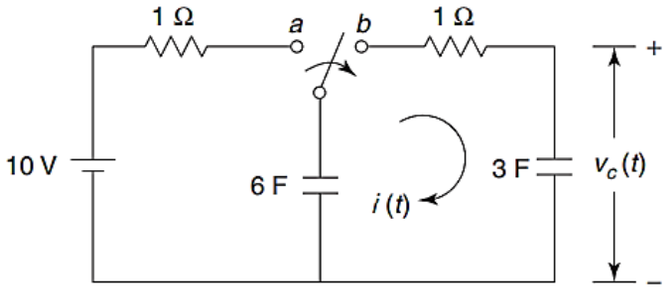
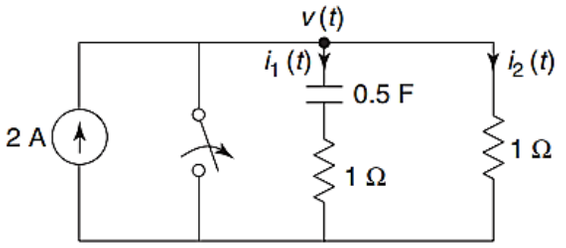
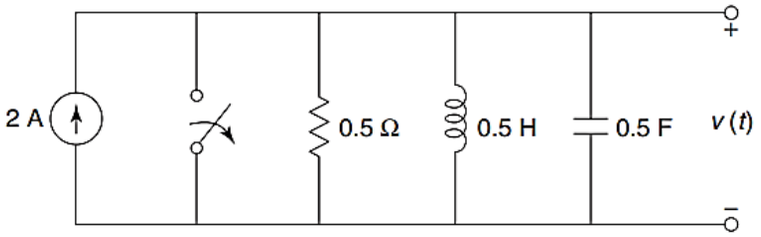
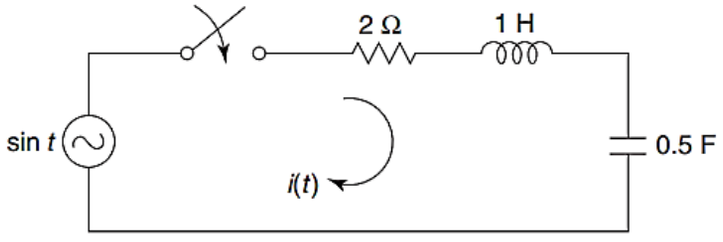
2	a	In the circuit shown below, the switch is closed at t=0 which was opened for a long time. Find $i \; and \; \frac{di}{dt} \; at \; t = 0+$	2 M	CO 1	L2



	b	In the circuit shown below, determine the complete solution for the current, when the switch is closed at t = 0. The circuit was under equilibrium condition initially.	3 M	CO 1	L3



3	a	A series RLC circuit is excited by a voltage of $1V$ DC signal at $t = 0$ and is described by the equation $1 = 150i + 1.5\frac{di}{dt} + \frac{1}{0.2}\int_0^t idt$. What are the component values of R, L and C ?	2 M	CO 1	L2
	b	A parallel RC circuit is excited by an impulse current of $\delta(t)A$. Derive the expression for voltage across capacitor for all the times $t \geq 0$. The circuit was initially under equilibrium condition.	3 M	CO 1	L3

4	a	In the network shown below, the switch is moved from position a to b at t = 0. Determine $i(t)$ and $v_c(t)$	2 M	CO 2	L1
					
	b	In the network shown below, the switch is closed for a long time and at t=0, the switch is opened. Determine the current through the capacitor.	3 M	CO 2	L3
					
5	a	For the circuit shown below, the switch is opened at time t=0. Transform the same into s-domain and determine V(s).	2 M	CO 2	L2
					
	b	For the network shown below, the switch is closed at t = 0. Determine the current i(t) assuming zero initial conditions.	3 M	CO 2	L3
					
6	a	Find Laplace Transform of i) Unit step function ii) sin(1000t)	2 M	CO 2	L3
	b	A series RC circuit is excited by an impulse of δ(t) V. Derive the expression for the current through the capacitor for all the times t≥0. The circuit was initially under equilibrium condition.	3 M	CO 2	L3

*****

Set 2

Code No: 20EC21004

Geethanjali College of Engineering and Technology, Hyderabad (Autonomous)

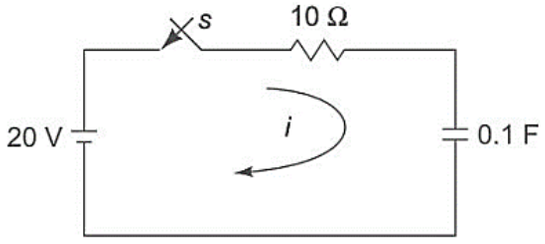
II B.Tech. (ECE) I Semester I Mid-Term Examinations, Dec, 2022

CIRCUIT THEORY

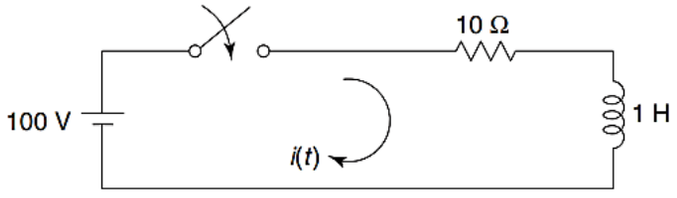
Date: **Time: 100 Min** **Max. Marks: 15**

Note: Answer Any Four Questions. All questions carry equal marks. **(4 x 5 = 20)**

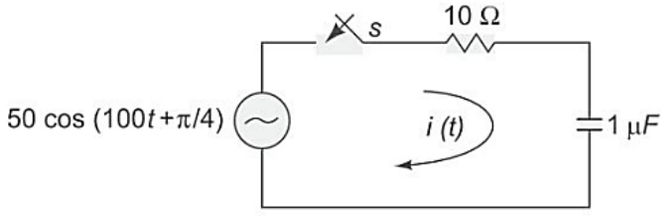
1	a	Why current through an inductor and voltage across a capacitor don't change instantaneously?	2 M	CO 1	L2
	b	For the circuit shown below, the switch S is closed at t=0. Determine the voltage across the resistor for all t > 0.	3 M	CO 1	L3



2	a	In the circuit shown below, the switch is closed at t=0 after opening it for a long time. Find $i\ and\ \frac{d^2i}{dt^2}\ at\ t = 0+$	2 M	CO 1	L3

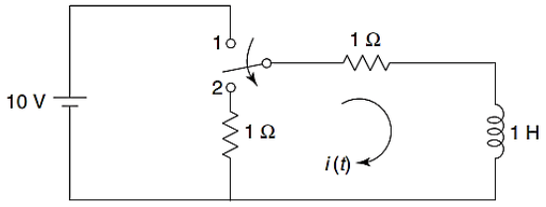


	b	In the circuit shown below, determine the complete solution for the current, when switch is closed. The circuit was under equilibrium condition initially.	3 M	CO 1	L3

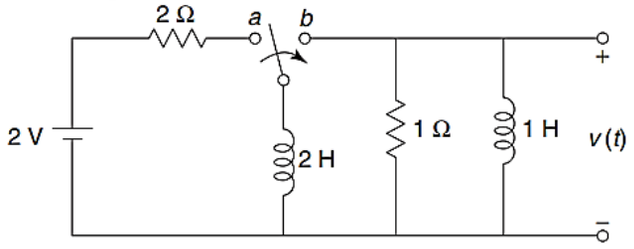


3	a	A parallel RLC circuit is excited by a DC current of $1A$ at $t = 0$ and is described by the equation $1 = \frac{v}{180} + 0.8\frac{dv}{dt} + \frac{1}{10}\int_0^t vdt$. What are the component values of R, L and C ?	2 M	CO 1	L3
	b	A parallel RL circuit is excited by an impulse current $\delta(t)$. Derive the expression for voltage across the resistor for all the times $t \geq 0$. The circuit was initially under equilibrium condition.	3 M	CO 1	L3

4	a	In the circuit shown below, the switch is moved from position 1 to 2 at t=0 with steady-state condition having been established in the position 1. Determine $i(t)\ for\ t\ >\ 0$.	2 M	CO 2	L2



	b	The network shown below was initially in the steady state with the switch in the position a. At t = 0, the switch goes from position a to b. Find an expression for voltage *v* (t) for t > 0.	3 M	CO 2	L3



5	a	Find the Laplace Transforms of the signals e^{-t} and $\delta(t)$.	2 M	CO 2	L3
	b	A parallel RL network is excited by a unit step current. The circuit was initially unenergized. Find the voltage across the resistor.	2 M	CO 2	L3
6	a	Voltage across a 2mF capacitor varies at a rate of 2V/s. Find the current through the capacitor and the energy stored in the magnetic field.	2 M	CO 2	L3
	b	A series RL circuit is excited by an impulse of δ(t) V. Derive the expression for the current through the inductor for all the times t≥0. The circuit was initially under equilibrium condition.	3 M	CO 3	L3

*****