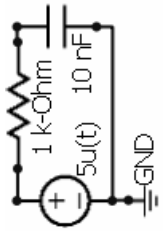
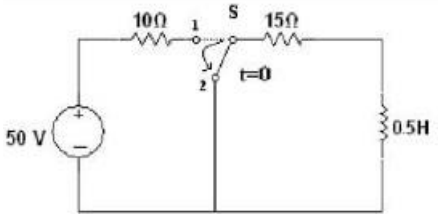
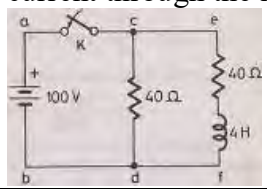
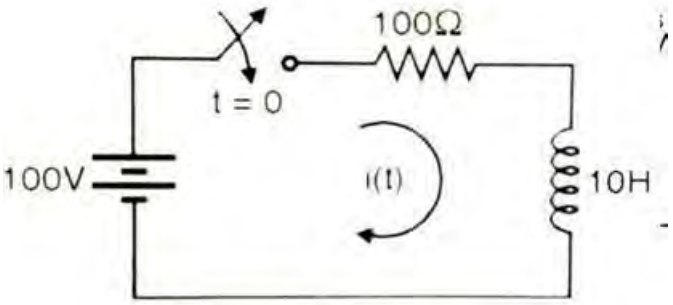
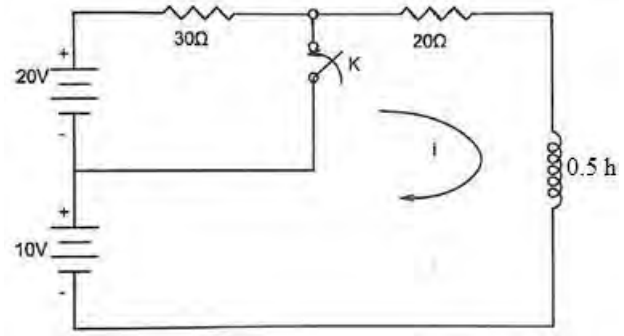
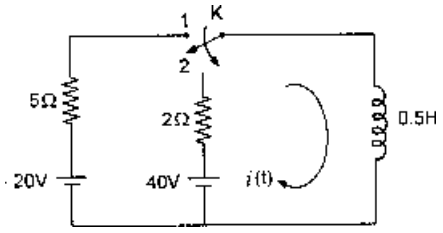
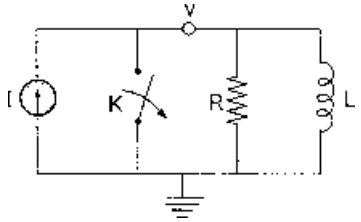
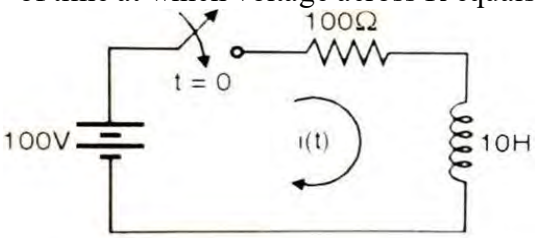
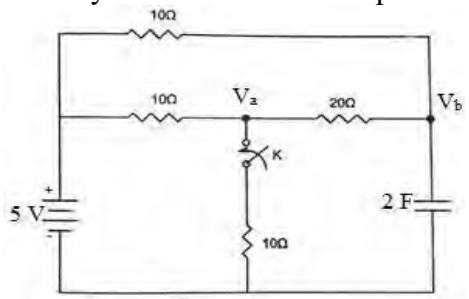
Sardar Vallabhbhai Patel Institute of Technology, Vasad.

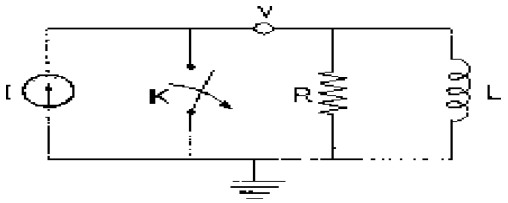
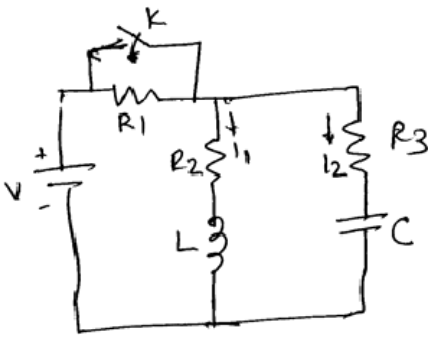
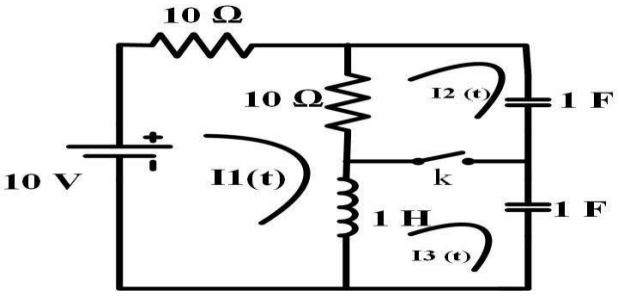
ELECTRICAL/CE/IT/EC/CIVIL/IC

Question Bank

	Time domain response of First order RL and RC Circuits
	Derive expression for rise of current and decay of current in RL series circuit excited by DC voltage source. Discuss the role of time constant in each.
	Obtain the response $v_C(t)$ and $i_L(t)$ for the source free RC and RL circuits respectively. Assume initial voltage V_0 and initial current I_0 respectively
	Obtain the response $V_c(t)$ and $i_L(t)$ for the source free RC and RL circuits respectively. Assume initial voltage V_0 and initial current I_0.
	Define the time-constant of RL and RC networks and explain the significance of the time-constant.
	Explain how to determine the initial condition in an RL network and the current i(t) based on these conditions.
	Explain the term transient response & steady state Response
	Derive expression for rise of current and decay of current in RL series circuit excited by DC voltage source. Discuss the role of time constant in each.
	 Obtain the loop-current i(t) in the RC network in Fig., by solving the differential equation of the loop.

	For the circuit shown in Figure 5, the switch "S" is at position "1" and the steady state condition is reached. The switch is moved to a position "2" at t = 0. Find the current i(t) in both the cases, i.e. with switch at position 1 and switch at position 2 
	In figure steady state condition is reached with 100 V DC source . At t=0,switch K is suddenly opened. Find the expression of current through the inductor. Also find current through the inductor at t=0.5 second. 
	In the circuit shown in figure: , the switch 'K' is closed at t=0. Assuming no initial current through inductor. Find current at t = 0.3 sec. Also find instant of time at which voltage across R equals voltage across L. 
	For the network shown in figure, the switch *k* is closed at *t=0*, also it reaches a steady state with the switch *k* open. Find the current *i(t)* for all time. 
	In the network of Fig., the switch K is moved from 1 to 2 position at t=0, steady state having previously been attained. Determine the current i(t).

	
	What is time constant? Explain time constant in terms of RL and RC circuit
	How inductor and capacitor will behave at t=0 and at t=∞.
	A series RLC circuit with zero inductor current and zero capacitor voltage is excited by 50V dc source, find i(0+) and di(0+)/dt. Take R=20Ω, C=10μF, L=1H.
	In the network of Fig.the switch K is opened at t=0. Find the values of V, dV/dt and d2V/dt2 at t=0+ if I=10A, R=10Ω and L=1H. 
	State the Initial and final condition of R, L and C at t=0+ and t=∞. (Initially all are uncharged and put across the source).
	In the circuit shown in figure: the switch 'K' is closed at t=0. Assuming no initial current through inductor. Find current at t = 0.3 sec. Also find instant of time at which voltage across R equals voltage across L. 
	Determine *Vb(0+)* and *Vb(∞)* for the network shown in figure 4, which reaches to steady state with switch *k* open and at *t=0*, the switch *k* is closed. 
	Explain how to determine the initial conditions in an RL network and the current i(t) based on these conditions

	In the given network as shown in figure. , the switch k is opened at t = 0. Solve for v, $\frac{dv}{dt}$, $\frac{d^2v}{dt^2}$ at t = 0^+, if I = 10 A, R = 10 Ω, and L = 1 H. 
	In the network as shown in figure, a steady state is reached with the switch k is open with V= 100V, R1 = 10 Ω, R2=R3= 20 Ω, L = 1H, and C = 1μF. At t = 0, the switch k is closed. Determine 1) voltage across capacitor C before the switch is closed and the polarity. 2) i1 and i2 at t = 0^+ 3) $\frac{di_1}{dt}$ and $\frac{di_2}{dt}$ at t = 0^+ 4) $\frac{di_1}{dt}$ at t = ∞ 
	In the Network shown in figure,the steady state is reached with switch k open. At t=0+ switch is closed . Find (1) I1 (0+), (2) I2 (0+) and (3) I3 (0+). 
	What is significance of initial condition? Write initial conditions for *R*, *L* and *C* at $t=0^+$ and at $t=\infty$.

AC Circuits

Q.1 What do What do you understand by phasor representation of alternating quantity? What is an alternating quantity? When is an alternating quantity said to be lagging or leading with respect to another quantity?

Q.2 Prove that power factor of purely resistive circuit is unity and calculate average power of it.

Q.3 Show that the current through pure inductance lags by 90^0 with the applied voltage & calculate the average power of it.

Q.4 Show that the current through pure capacitance leads by 90^0 with the applied voltage & calculate the average power of it.

Q.5 Prove that the average power of pure inductor & capacitor is zero.

Q.6 Draw & explain series R-L Circuit in detail.

Q.7 Draw & explain series R-C Circuit in detail.

Q-8 Discuss the procedure for conversation of rectangular form into Polar form with suitable example.

Q-9 Explain the how to convert the polar form of alternating current into complex form with suitable

Example.

Q-10 Perform the different complex algebra operation of alternating quantities.

Complex form: Addition, subtraction, multiplication and division

Polar Form: Addition, subtraction, multiplication and division