SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai

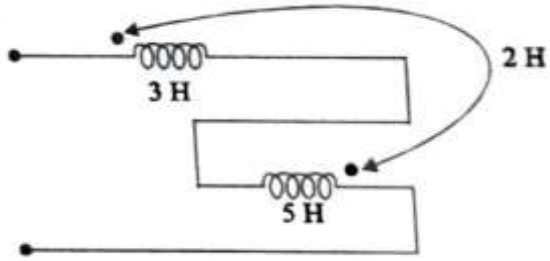
I Semester

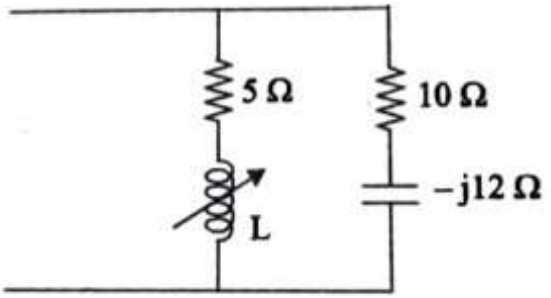
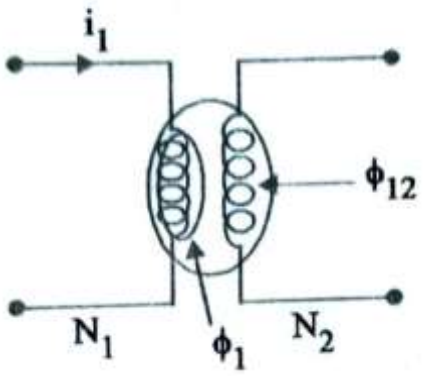
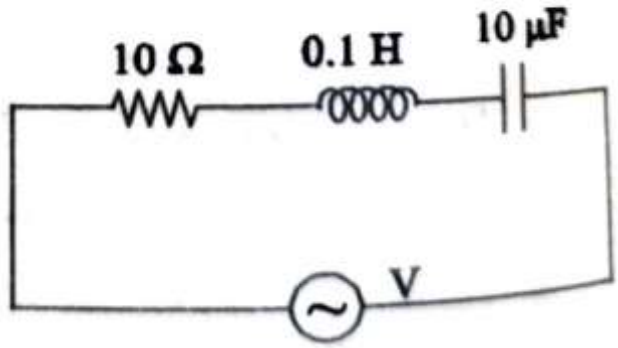
B.E-Electrical and Electronics Engineering

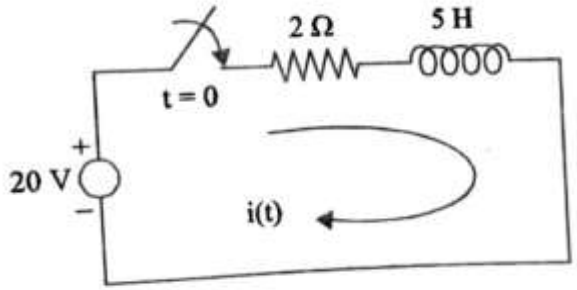
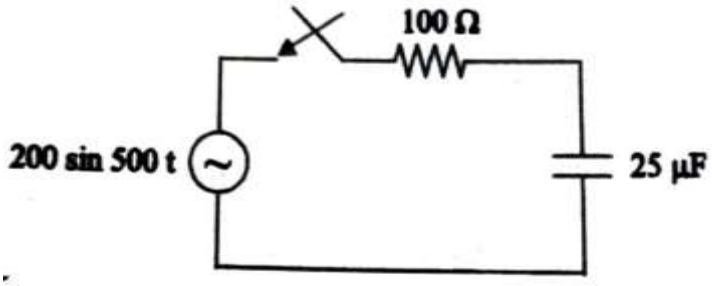
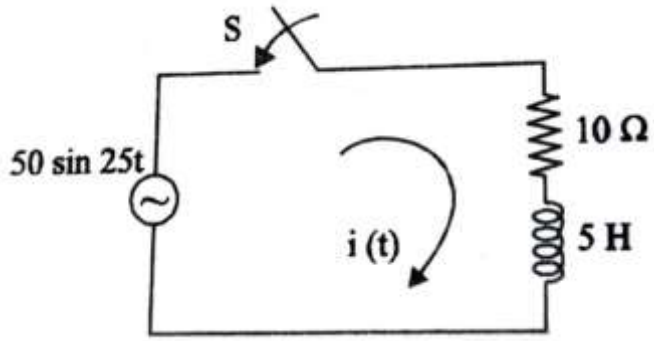
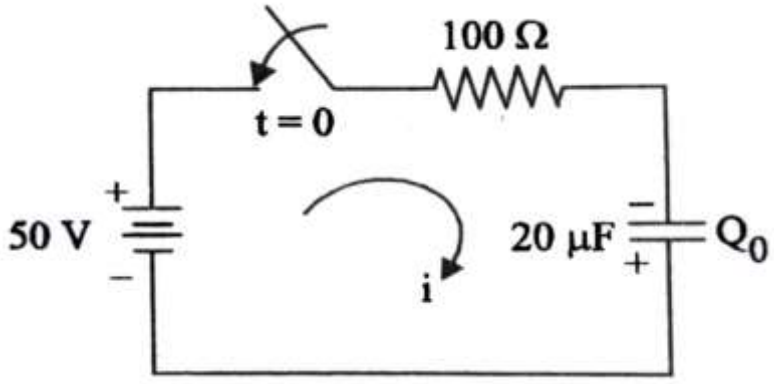
19EE201 – Circuit Theory

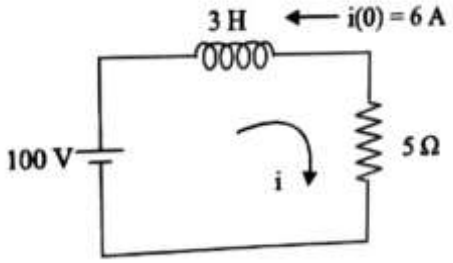
Regulations 2019

QUESTION BANK FOR IAE III

	PART A
1	Define resonance.
2	Determine the quality factor of a coil for the series circuit consisting of R=10 Ω, L=0.1 H, C=10 μF.
3	Find the value of the effective inductance of the combination. 
4	Compare Self-inductance and Mutual inductance.
5	A coil of resistance 2 Ω and inductance 0.01 H is connected in series with a capacitor C. If maximum current occurs at 25 Hz, find C.
6	Two inductively coupled coils have self-inductance L_1=50 mH and L_2=200 mH. If the coefficient of coupling is 0.5 (i) Find the value of mutual inductance between the coils and (ii) What is the maximum possible mutual inductance?
7	Write the expression for transient current for series RL and RC circuits.
8	In a series RLC circuit, L=2 H and C=5 μF. Determine the value of R to give critical damping.
9	A DC voltage of 100 volts is applied to a series RL circuit with R=25 Ω. What will be the current in the circuit at twice the time constant?
10	Define transient response.
11	Define Self- inductance.
12	Define time constant in RL circuit.
13	Define transient time.
14	Define resonant frequency.
15	Define quality factor.
	PART B & C
1	A series RLC circuit with R = 10 Ω, L = 10 mH and C = 1 μF has an applied voltage of 200 V at resonant frequency. Calculate the resonant frequency, the current in the circuit and voltages across the elements at resonance. Find also the quality factor and bandwidth.
2	(i) Find the value of L at which the circuit resonates at a frequency of 1000 rad/Second in the circuit shown in fig.

	 (ii) Following data refer to the coupled coils 1 and 2 shown in fig. $\emptyset_{11} = 0.5\, mwb$; $\emptyset_{12} = 0.3 mwb$; $N_1 = 100$ turns; $N_2 = 600$ turns; $i_1 = 1\, A$. Find K, the coefficient of coupling, the inductances L_1 and L_2 and M, the mutual inductance. 
3	For the circuit shown in fig, determine the impedance at resonant frequency, 10 Hz above resonant frequency, and 10 Hz below the resonant frequency. 
4	A coil having an inductance of 100 mH is magnetically coupled to another coil having an inductance of 900 mH. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance if the two coils are connected in (i) Series aiding (ii) Series opposing (iii) Parallel aiding (iv) Parallel opposing.
5	A Coil of resistance 40 Ω and inductance 0.75 H forms part of a series circuit for which the resonant frequency is 55 Hz. If the supply voltage is 250 V, 50 Hz. Find, (i) the line current (ii) power factor (iii) voltage across the coil.
6	A series RLC circuit has R = 10 Ω, L = 0.54 H and C = 40 μF. The applied voltage is 100 V. Find (i) Resonant frequency (ii) Quality factor (iii) Half power frequencies (iv) Bandwidth (v) Current at resonance (vi) Current at half power points (vii) Voltage across inductance at resonance.
7	In the circuit shown in fig, find the transient current and the initial rate of growth of current when the switch is closed at t=0. Also determine the voltage across the resistor and inductor.

	
8	In the circuit of figure, find the current i(t). Assume initial charge in the capacitor is zero. 
9	A series RLC circuit with R = 100 Ω, L = 0.1 H and C = 100 μF has a DC voltage of 200 volts applied to it at t=0 through a switch. Find the expression for the transient current. Assume initially relaxed circuit conditions.
10	The circuit shown in fig. consists of series RL elements. The sine wave is applied to the circuit when the switch is closed at t=0. Determine the current i(t). 
11	A 20 μF capacitor in circuit of figure has an initial charge Q_0=0.001 coulomb as shown. The switch is closed at t=0. Find the transient current, voltage across the resistor and capacitor. 
12	In the circuit of figure, the current in the inductance is -6 A at t=0. Find the expression for the transient current. Find also the initial rate of growth of current.


3 H
i(0) = 6 A
100 V
i
5 Ω