



## Weekly Test 3 – Network Theory

**Date:** 01-09-2012

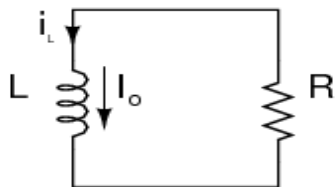
**Time:** 30 Min

**Course:** E2Sem1\_(CSE-ECE)

**Max Marks:** 10

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1. In a source free RL ckt shown below, the initial value of the current in an inductor is  $I_o$ , if the root of the differential equation formed in this source free Circuit is  $-2$ . What is the Time constant of this network.

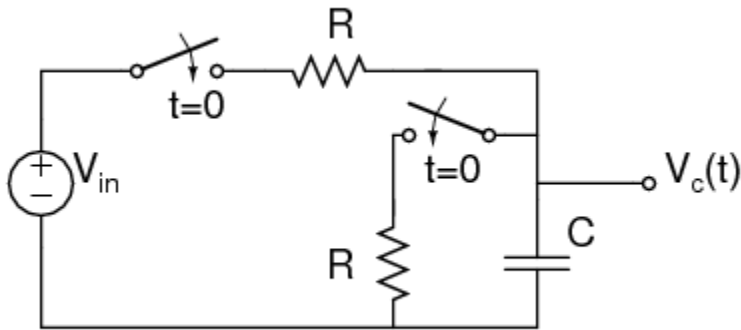


- a) 1 sec
- b) 2 sec
- c) 0.5 sec
- d) data not sufficient

2.  $\int_{-\infty}^{+\infty} \delta(t) \cos 2t dt$  is

- a)  $\infty$
- b) 1
- c) 2
- d) 0

3. Find  $V_c(t)$  for  $t \geq 0$ . Assume initial voltage in a capacitor is  $V_o$ .



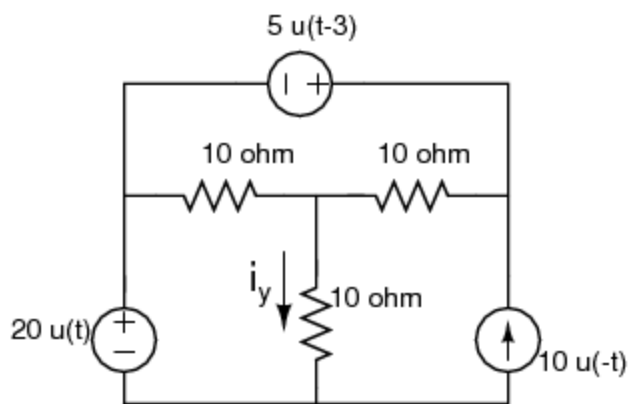
- a)  $V_{in} + (V_o - V_{in}) e^{-t/0.5RC}$
- b)  $0.5V_{in} + (V_o - 0.5V_{in}) e^{-t/0.5RC}$
- c)  $0.5V_{in} + (V_o - V_{in}) e^{-t/0.5RC}$
- d)  $V_{in} + (V_o - V_{in}) e^{-t/RC}$

4. In problem 3, the natural response is

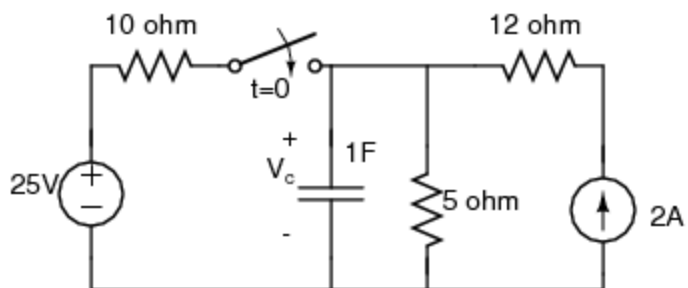
- a)  $V_o - V_{in} e^{-t/0.5RC}$
- b)  $V_o - 0.5V_{in} e^{-t/0.5RC}$
- c)  $V_o e^{-t/0.5RC} - 0.5V_{in} e^{-t/0.5RC}$
- d)  $(V_o - V_{in}) e^{-t/0.5RC}$

5. what is the value of  $i_y$  at time  $t=4$  s, in fig given below

- a) 1.5 A
- b) 1.33 A
- c) 0.166 A
- d) None



6. What is  $V_c(t)$  for  $t \geq 0$  for the fig given below.



a)  $15 - 5e^{-3t/10}; t \geq 0$

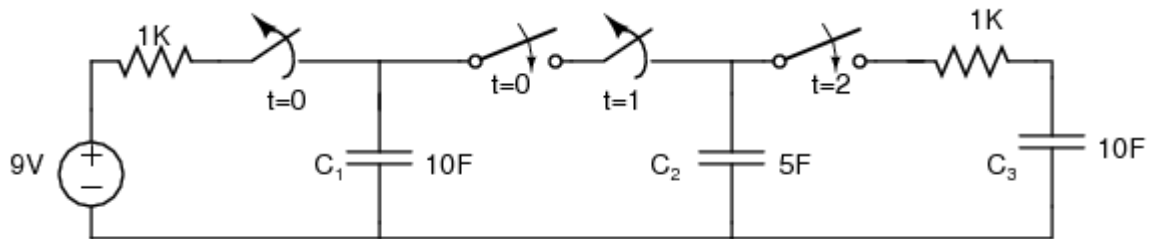
b)  $15 - 10e^{-3t/10}; t \geq 0$

c)  $15 - 10e^{-10t/3}; t \geq 0$

d)  $15 - 5e^{-10t/3}; t \geq 0$

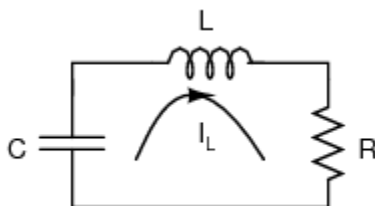
7) What is the voltage in the capacitor  $C_2$  at  $t=\infty$  as shown in fig below, the initial voltage in  $C_2$  and  $C_3$  is zero.

- a) 0 V      b) 6V      c) 9V      d) 2V

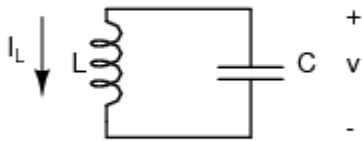


8. A second order differential equation is formed in a series RLC Circuit is given  $\frac{d^2 i_L}{dt^2} + \frac{di_L}{dt} + \frac{i_L}{25} = 0$ . What is the Quality factor of the circuit and nature of the response for the ckt as shown below.

- a) 0.04 and overdamped.  
 b) 0.04 and underdamped.  
 c) 0.2 and overdamped.  
 d) 0.2 and underdamped.  
 e) data not sufficient

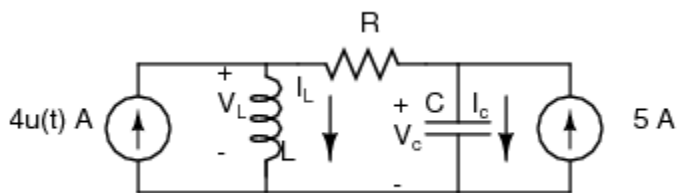


9.  $i_L(0) = -1/6$  A and  $v(0) = 0$  V, What is  $v(t)$  for  $t > 0$ , undamped frequency and nature of the response for the ckt shown below. Given  $L = 4$  H and  $C = 1/36$  F.



- a)  $3\cos 3t + 2\sin 3t$ , 3 rad/sec and undamped.
- b)  $3\cos 6t + 2\sin 6t$ , 6 rad/sec and underdamped.
- c)  $3\cos 3t$ , 3 rad/sec and undamped.
- d)  $2\sin 3t$ , 3 rad/sec and undamped.

10. Find  $v_c(t)$ . Given  $R = 30 \Omega$ ,  $L = 3$  H and  $C = (1/27)$  F



- a)  $150 + 135(e^{-t} - e^{-9t})$
- b)  $150 + 13.5(e^{-t} - e^{-9t})$
- c)  $75 + 27(e^{-t} - e^{-9t})$
- d)  $150 + 13.5(e^{-9t} - e^{-t})$

## KEY

1)c

2)b

3)b

4)c

5)a

6)a

7)d

8)c

9)d

10)b