MIDDLE EAST TECHNICAL UNIVERSITY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

EE 201 Circuit Theory I

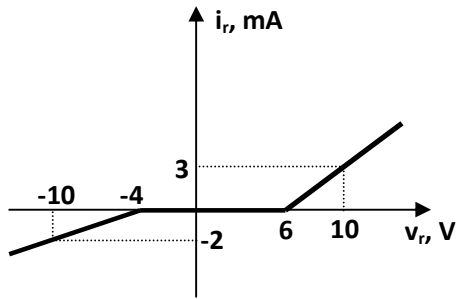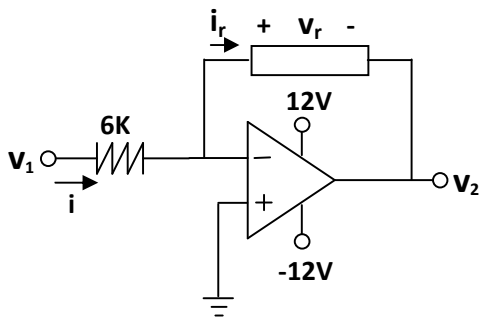Midterm Examination 3

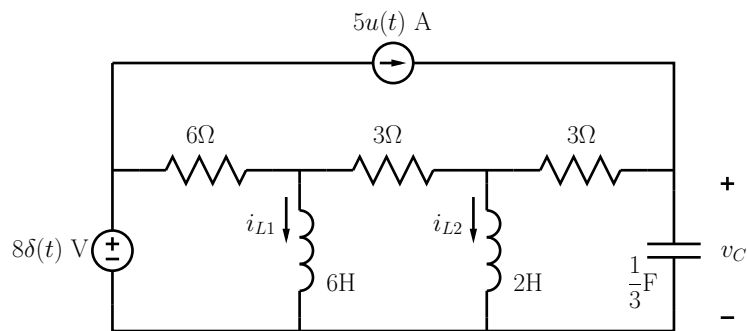December 26, 2012

Duration: 120 minutes

Q1	20 pts	
Q2	15 pts	
Q3	20 pts	
Q4	25 pts	
Q5	20 pts	
Total	100 pts	

Name:

Surname:

ID No:

Section:

Signature:

Question 1 (20 pts) Obtain and sketch the *input* (i-v_1) and *transfer* (v_2-v_1) characteristics.

Question 2 (15 pts) Consider the circuit below.
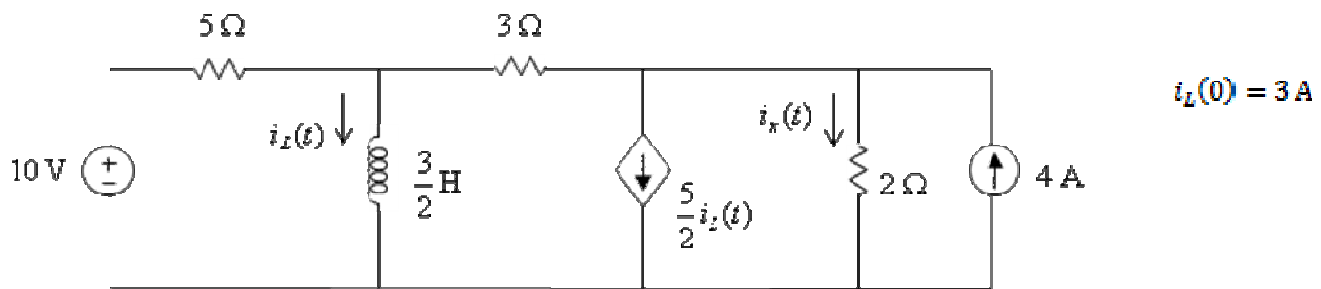

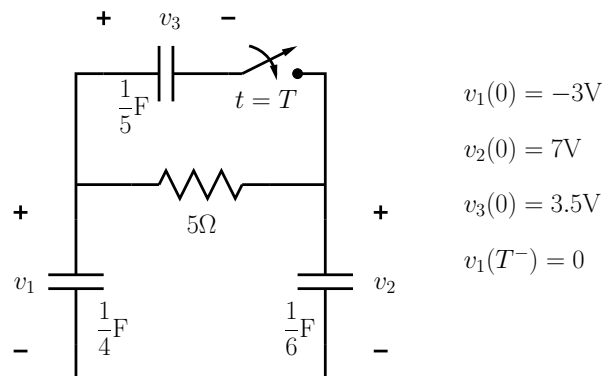$i_{L1}(0^-) = 1\text{A}$

$i_{L2}(0^-) = 3\text{A}$

$v_C(0^-) = -4\text{V}$

Find the inductor currents and the capacitor voltage at $t = 0^+$ and $t = \infty$.

Question 3 (20 pts) Find and sketch $i_x(t)$ for $t \geq 0$.
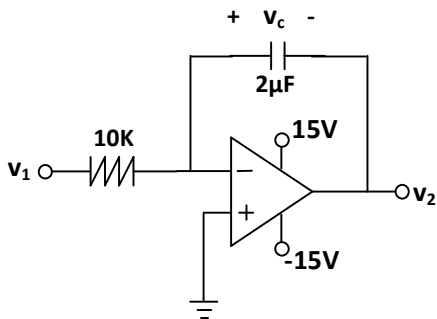
$$5\,\Omega \qquad 3\,\Omega$$

$$i_L(t) \downarrow \qquad \frac{3}{2}\,\text{H} \qquad \frac{5}{2}i_L(t) \qquad i_x(t) \downarrow \qquad 2\,\Omega \qquad 4\,\text{A}$$

$$10\,\text{V} \qquad i_L(0) = 3\,\text{A}$$

Question 4 (25 pts) Consider the circuit below.

$v_1(0) = -3\text{V}$

$v_2(0) = 7\text{V}$

$v_3(0) = 3.5\text{V}$

$v_1(T^-) = 0$

a) Find and sketch $v_1(t)$ for $t \geq 0$.

b) Find the energy delivered to the resistor on the interval $0 \leq t < T$.

Question 5 (20 pts) Obtain and sketch $v_c(t)$ for $t \geq 0$.

$$v_c(0^-) = -20 \text{ V}$$