* اللهم لا سهل إلا ما جعلته سهلا وأنت تجعل الحزن إذا شئت سهلا *

* اللهم ربنا لا إله إلا أنت سبحانك إنا كنا ظالمين *

* لا إله إلا الله محمد رسول الله *

12/30

The University of Jordan
Department of Electrical Engineering
Circuit I, EE-211
Fall 2014
Second Exam

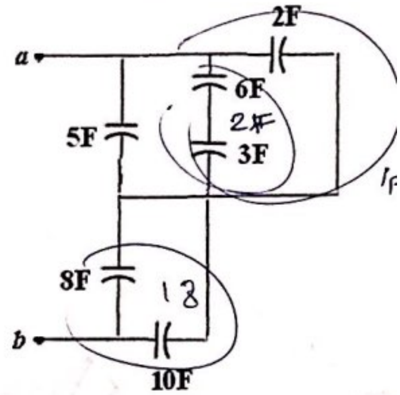
بسم الله الرحمن الرحيم

Date: Nov. 20 ,2014
Time: 90 Min. 8 - 9:30

Name (Arabic): [redacted] *Student #:* 0132436

☐ Dr Raed al-Zubi
☑ Eng. Reem Al-Debes (8-9:30)
☐ Eng. Noor Awad

Problem #1 ***(2 pt): Find C_{eq} between a and b***



(1)

$\frac{1}{6}+\frac{1}{3}=2F \rightarrow 4F$

$8+10=18F$

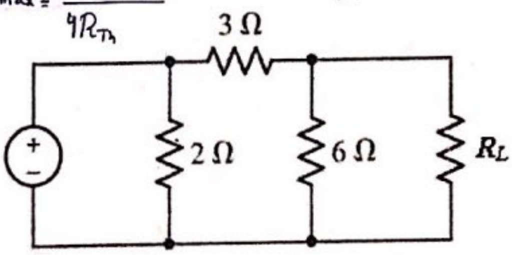
$\frac{1}{18}+\frac{1}{4}=3.27+5=$

$C_{eq}=8,27$ ✗

Problem #2 ***(2 pt): For the following circuit, find:***

1) ***The value of the load resistor (R_L) for maximum power transfer.***

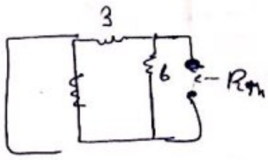
$P_{max}=\frac{V_{Th}^2}{4R_{Th}}$



(2)

Maximum when $R_L = R_{Th}$

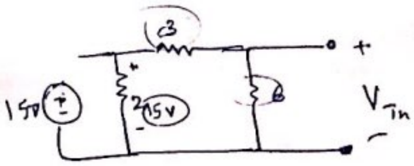
$1/R_{Th}=\frac{1}{3}+\frac{1}{6}=\frac{1}{2}$



$R_{Th}=2$ ✓

2) ***Calculate the value of the maximum power (P_{max}).***

$V_{Th}=10V$



$P_{max}=\frac{(10)^2}{4\times 2}=\frac{100}{8}$

$P_{max}=12.5\ W$ ✓

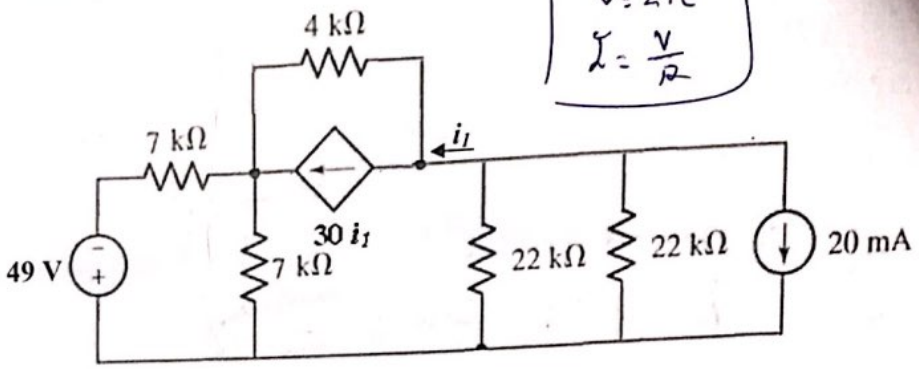
1c

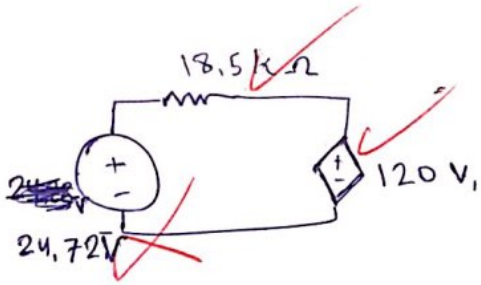
2

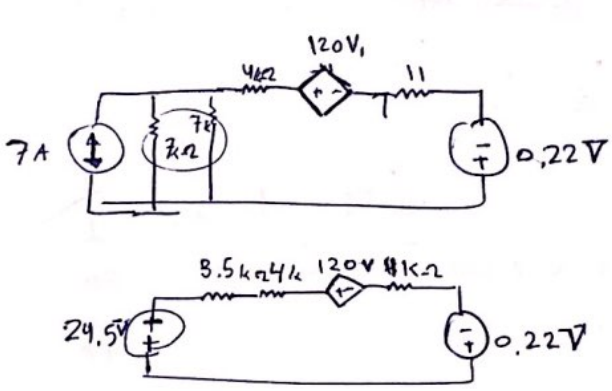
Problem #3 (3 pt): Simplify the following circuit to one single loop circuit consists of: one dependent voltage source, one independent voltage source and one resistor.

$V = IR$

$I = \frac{V}{R}$







Complete

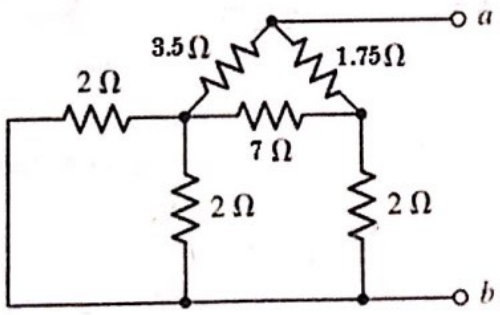
3

Problem #4 (3 pt): Find R_{eq} between a and b.

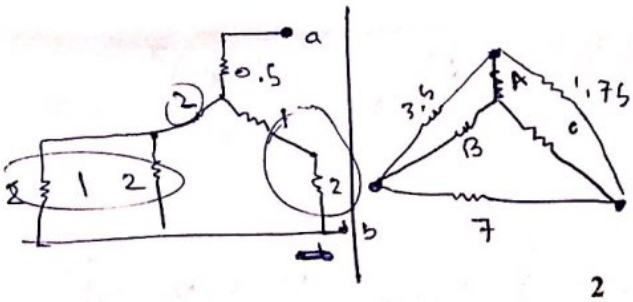
$R_A = \frac{6.125}{12.25} = 0.5\ \Omega$

$R_{13} = \frac{24.5}{12.25} = 2\ \Omega$

$R_C = \frac{12.25}{12.25} = 1\ \Omega$



$R_{eq} = 2$

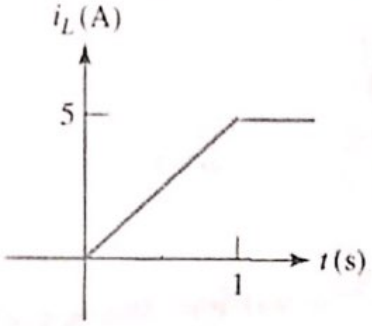


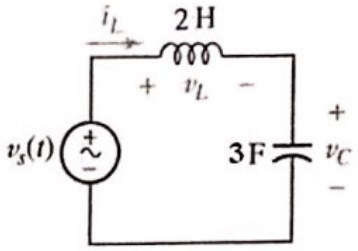
2

$R_{eq} = 3 \;//\; 3 + 0.5 =$

E 1

Problem #5 *(4 pt): Given the following:*





1) *Draw $v_L(t)$*

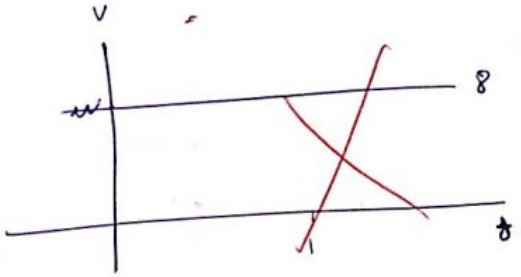
$V_L = L \frac{di}{dt}$

$i_L = 5A$

$y = x + b$

2×4

$V_L = 8$



2) *Find $v_C(t)$ for $t \geq 0$, if $v_C(0)=0$*

$V_c = \frac{1}{3} \int_{t_0}^{t} 5 \, dt + 0$

$V_c = \frac{1}{C} \int_{t_0}^{t} i \, dt + V_{(t_0)}$

0.5

i_c

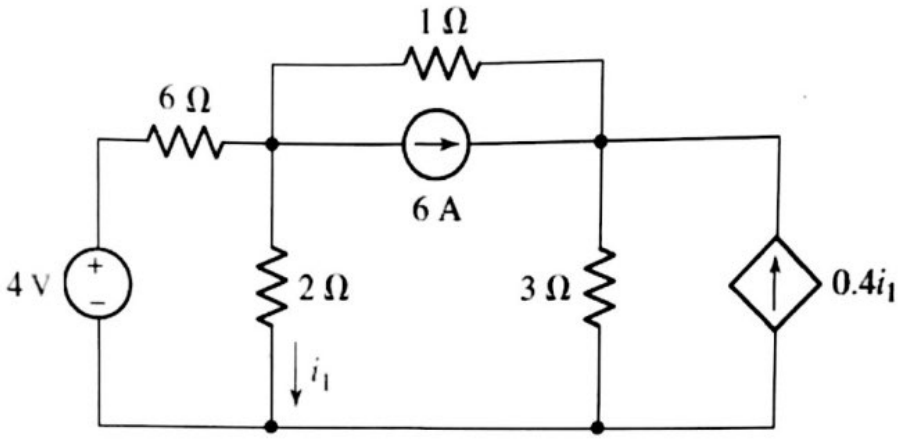
3) *Find the energy stored in the inductor $w_L(t)$) for $0<t<1$ if $w_L(0)=0$ J*

$E = \frac{1}{2} L \, i_{(t)}^2$

0.5

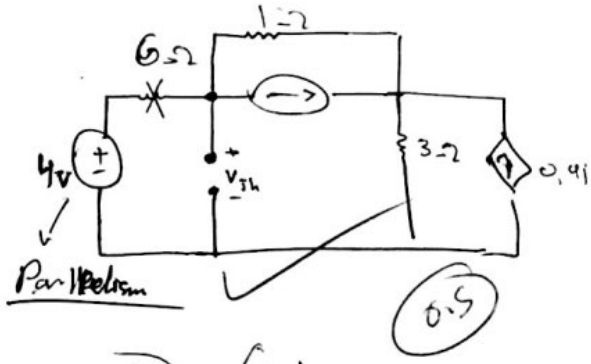
0.5

Problem #6 *(5 pt): For the circuit shown below, find the values of* V_{th} *and* I_N *seen by the (2 Ω) resistor.*

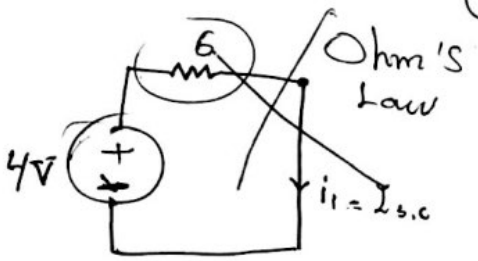


$V_{Th} = 4$ V

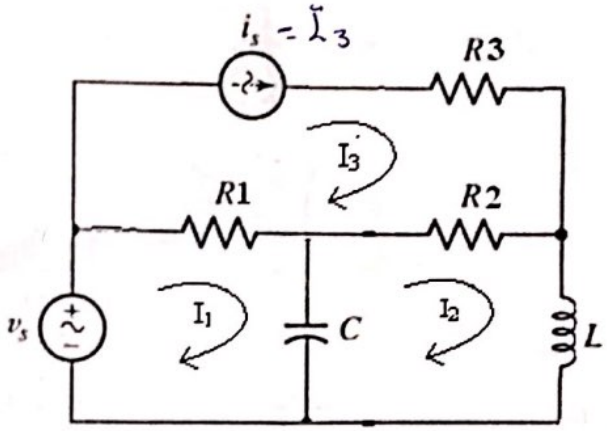
$I_{s.c} = 0.6$ A



0.5



***Problem #7** (3 pt): Write the Mesh equations for the following circuit for $t \geq 0$ (no need to solve them):*



2

For Mesh1:

$$-V_{s(t)} + R_1(I_1 - I_3) + \frac{1}{C}\int_{t_0}^{t} d(I_1 - I_2) + V(t_0) = 0$$

For Mesh2:

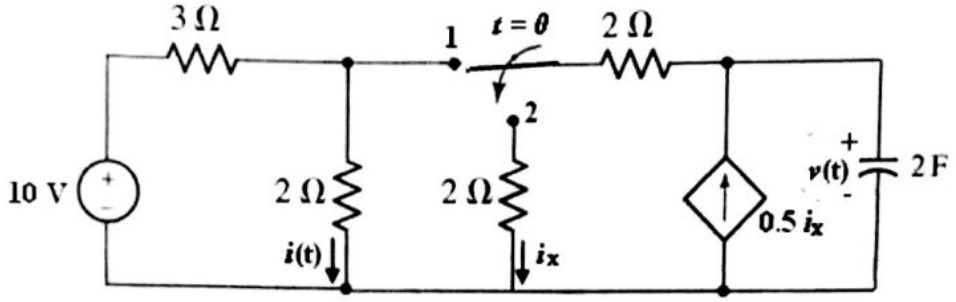
$$-\frac{1}{C}\int_{t_0}^{t} d(I_2 - I_1) + V(t_0) + R_2(I_2 - I_3) + L\frac{d(I_2)}{dt} = 0$$

For Mesh3:

$$0 = I_s R_3 + R_1(I_s - I_2) + R_1(I_s - I_1)$$

0.5

***Problem #8** (8 pt): For the following circuit, the switch is moved from position 1 to position 2 at t=0. Find:*

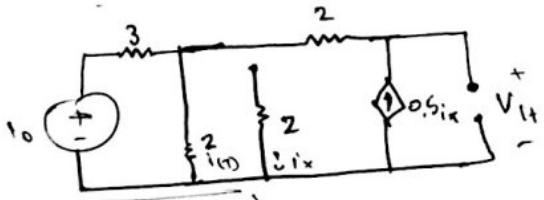


1) *The time constant τ*

$\tau = RC$ 0.5

R_{eq}

$t < 0$



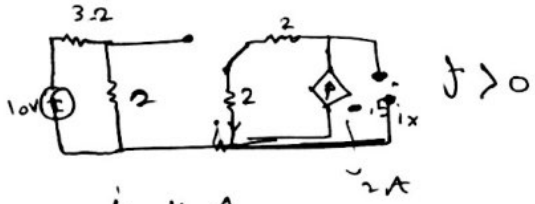
$i_{(t=0)} = 4A$

$V_{(t=0)} = 0V$

$t < 0$

2) *v(t) for all t*

$$v(t) \begin{cases} 0 & , t < 0 \\ 0 & , t > 0 \end{cases}$$



$t > 0$

$i_x = 4\ A$

$0.5 \times 4 = 2$

3) *i(t) for all t*

$$i(t) \begin{cases} 4A & , t < 0 \\ 4A & , t > 0 \end{cases}$$