بسم الله الرحمن الرحيم

اللهم لا سهل إلا ما جعلته سهلاً وأنت تجعل الحزن إذا شئت سهلاً

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(8 / 9:30) أنشئ أرجد

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

13/20

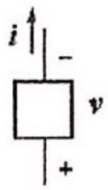
Time: 60 Min. *Date: Oct. 23,2014*

Name (Arabic): [redacted] *Student #* [redacted] *Section #:* 1

Problem #1 *(1 pt)*

Find the absorbed power for each element of the following:

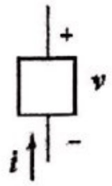
1. i=3 A and v=8V



$P = IV = (3)(8) = 24\ W$

(1)

2. i=3 A and v= -8V



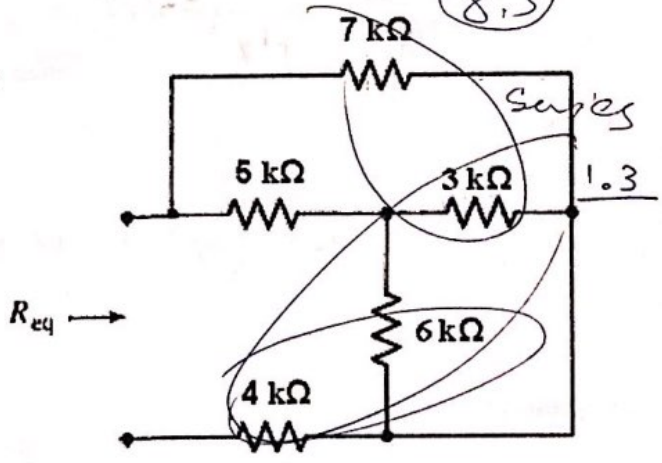
$P = IV = (-I)(+V) = (-3)(-8) = 24W$

Problem #2 *(1.5 pts)*

Find R_{eq} of the following connection:

1333
4165

(8.3)



$R_{eq} = 3.124\ \Omega$

4 // 6 = 2.4

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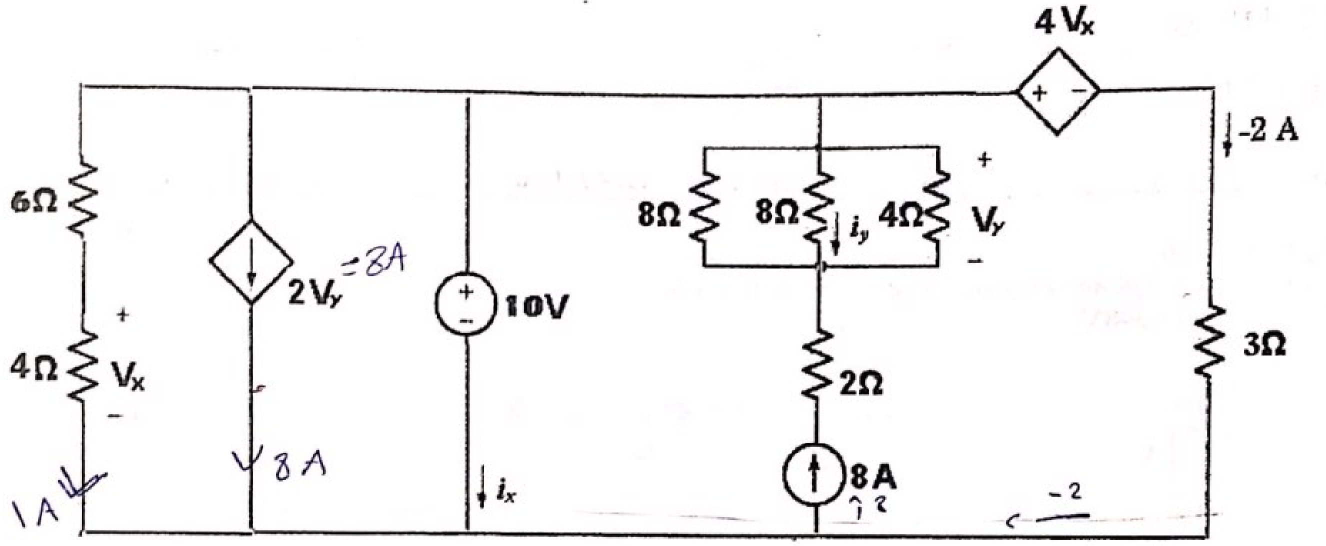
Problem #3 (4.5 pts)

Don't use MESH, NODAL or SUPERPOSITION to solve the following circuit:



1. *find V_x by voltage division rule only.*

$V_x = V_T \frac{4}{10} = 4V$

2. *find i_y by current division rule only.*

$i_y = 8 \frac{1/8}{1/8 + 1/8 + 1/4} = -2A$

3. *find V_y*

$V_y = iR = (-4)(4) = -16V$

4. *find i_x using KCL.*

$1 + 8 + i_x = 2 + 8$

$9 + i_x = 10$

$i_x = 1A$

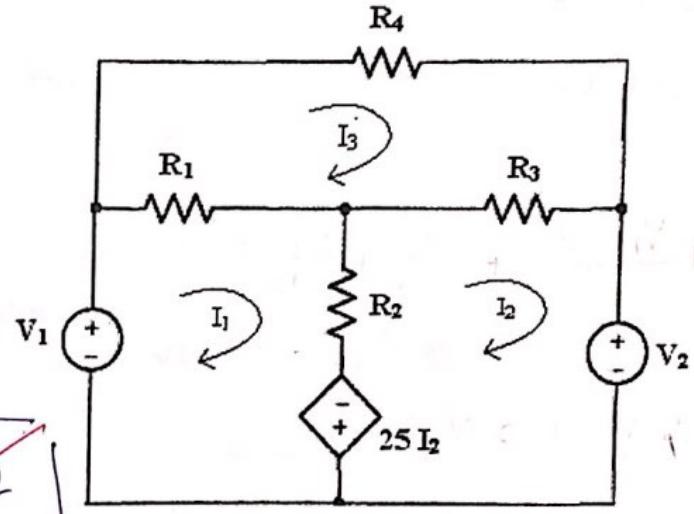
Problem #4 *(4 pts)*
The ***Mesh*** *Equations of the following Circuit are given by:*

$20\ I_1 - 40\ I_2 - 5\ I_3 = V_1$

$-15\ I_1 + 65\ I_2 - 25\ I_3 = -V_2$

$-5\ I_1 - 25\ I_2 + 35\ I_3 = 0$

Find R_1, R_2, R_3 and R_4.



$R_2 = 15\ \Omega$

$R_1 = 5\ \Omega$

$R_3 = 5\ \Omega$

$R_1 = 5\ \Omega$

$R_2 = 15\ \Omega$

$R_3 = 5\ \Omega$

$R_4 = 25\ \Omega$

$+V_1 = R_1(I_1 - I_3) + R_2(I_1 - I_2) + 25 I_2$

$R_1 I_1 - R_1 I_3 + R_2 I_1 - R_2 I_2 + 25 I_2$

$R_1(I_3 - I_1) + R_4 I_3 + R_3(I_3 - I_2)$

$R_1 I_3 - R_1 I_1 + R_4 I_3 + R_3 I_3 - R_3 I_2 = 0$

$R_1 I_3 + R_4 I_3 + R_3 I_3 = 35 I_3$

$5 + R_4 + 5 = 35$

$R_4 = 25\ \Omega$

$-R_2 I_2 - 25 I_2 = -40 I$

$20 I_1 = R_1 I_1 + 15 I_2$

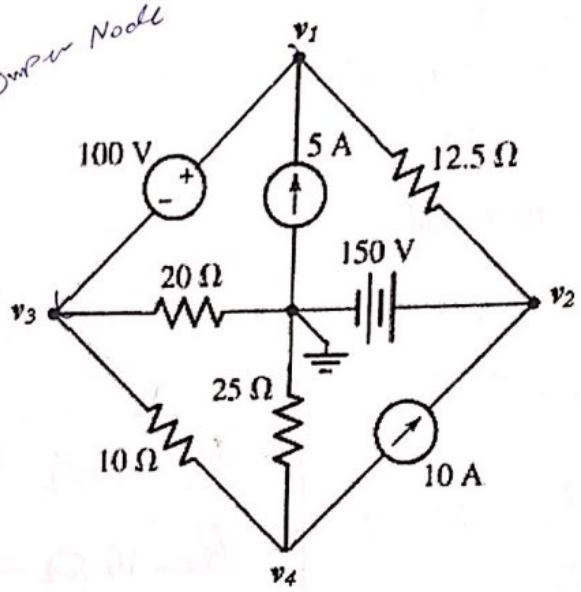
4

Problem #5 (5 pts)

Write the NODAL voltage equations for the following circuit (Don't solve them; just arrange them to fill the blanks below.

(KCL)

Super Node



$$5 + \frac{V_1 - V_2}{12.5} + \frac{V_3}{20} + \frac{V_3 - V_4}{10} = 0 \quad \cdots$$

$V_1 - V_3 = 100\ V$

$$10 + \frac{V_2}{12.5} - \frac{V_1}{12.5} - \frac{V_3}{20} - \frac{V_4}{25} = 0$$

$V_2 = 150\ V$

$$10 + \frac{V_2 - V_1}{12.5} = 0$$

$$10 + 0.08V_2 - 0.08V_1 = 0$$

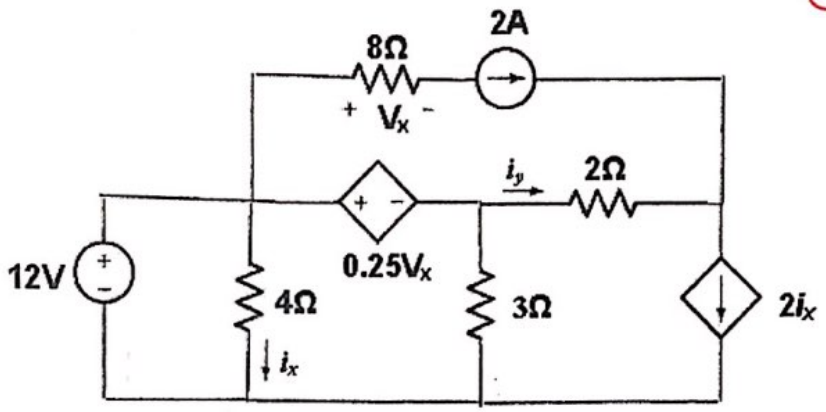
$$\frac{V_4}{25} + \frac{V_4 - V_3}{10} = 10$$

$$0.04V_4 + 0.1V_4 - 0.1V_3 = 10$$

$$0.14V_4 - 0.1V_3 = 10$$

0.08	v_1 +	-0.08	v_2 +	0.15	v_3 +	-0.1	v_4 =	-5
-0.08	v_1 +	0.08	v_2 +	0	v_3 +	0	v_4 =	-10
0	v_1 +	0	v_2 +	-0.1	v_3 +	0.14	v_4 =	10
1	v_1 +	0	v_2 +	-1	v_3 +	0	v_4 =	100

Problem #6 (4 pts)
Use Superposition Principle to find i_x and i_y in the following circuit.



12 V

$i_x' = \frac{U}{R} = \frac{12}{4} = 3A$

i w $V_x = 0$

$i_y' = 2i_x' = 2(3) = 6A$

2A

$i_x'' = 0$

Volt Division

$i_y'' = 0.8$

Use the S.C

$V_x = 16\ V$

$0.25 \times 16 = 4$

$i_x = i_x' + i_x'' = 3A$

$i_y = i_y' + i_y'' = 6.8\ A$