NORTH SOUTH UNIVERSITY
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

Assignment-1

Summer 2025

EEE141: Electrical Circuits I

Section: 15

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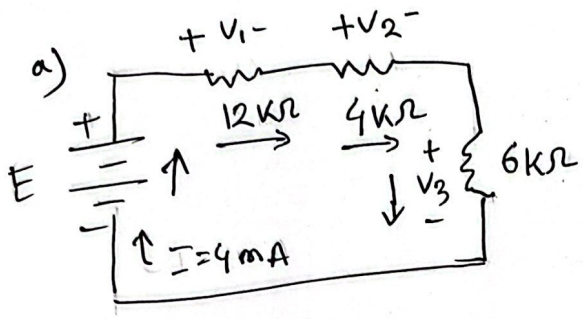
1. Find the applied voltage E necessary to develop the current specified in each circuit.

a)



here, $R_T = R_1 + R_2 + R_3$

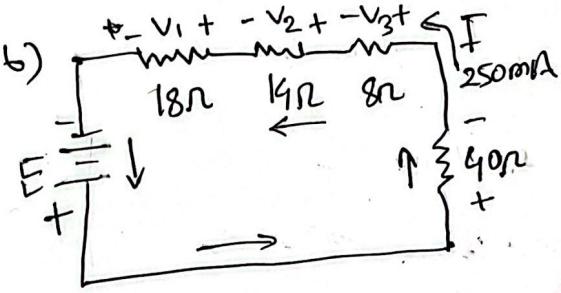
$= 22\,K\Omega$

$E = IR_T$

$= 4mA \times 22K\Omega$

$= 88\,V$

b)



here, $R_T = 18 + 14 + 8 + 40$

$= 80\Omega$

$E = IR_T$

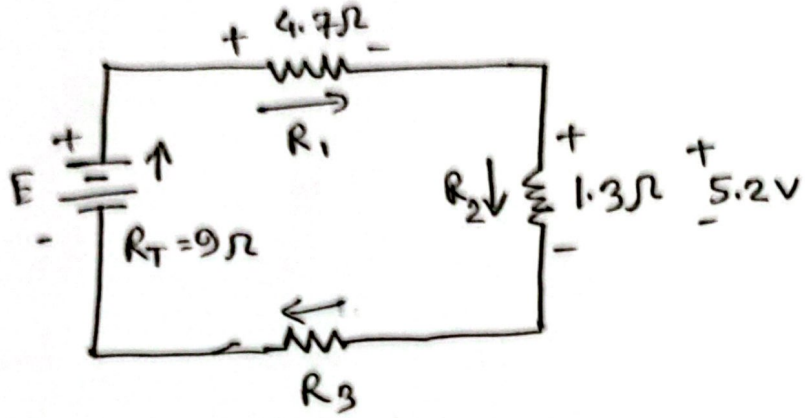
$= 250mA \times 80\Omega$

$= 20\,V$

Am.

2. Using the information provided. find the un. known quantities.

a)



$R_3 = R_T - (R_1 + R_2)$

$= 9 - 6$

$= 3$

Current $I = \frac{V_2}{R_2}$

$= 4A$

Voltage $V_1 = IR_1$

$= 4 \times 4.7$

$= 18.8V$

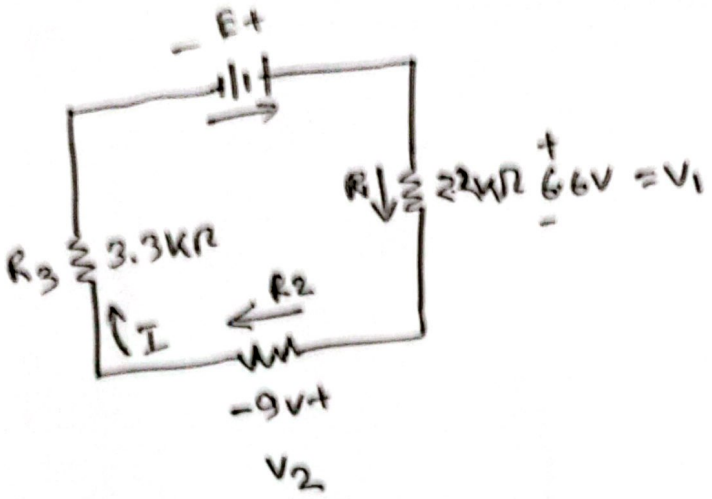
$V_2 = 5.2V$

$V_3 = IR_3$

$= 12V$

Ans.

6.



Current $I = \frac{V_1}{R_1}$

$= 3mA$

Resistance $R_2 = \frac{V_2}{I}$

$= 3K\Omega$

$T_R = R_1 + R_2 + R_3$

$= 2.2 + 3 + 3.3$

$= 8.5K\Omega$

Total voltage $E = IR$

$= 3mA \times 8.5K\Omega$

$= 25.5V$

Voltage $V_3 = IR_3$

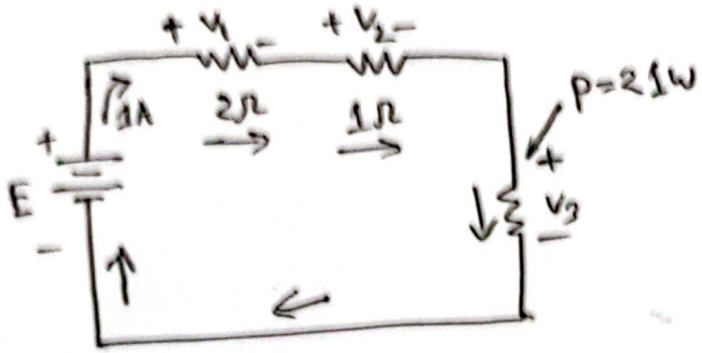
$= 3 \times 3.3$

$= 9.9V$

Ans.

3. Using the information provided, find the unknown quantities.

a)



Power $P_3 = I^2 R_3$

$$R_3 = \frac{P_3}{I^2}$$

$$= \frac{21W}{1A}$$

$$= 21\Omega$$

$R_T = (2+1+21)\Omega$

$= 24\Omega$

Voltage $E = IR_T$

$= 24V$

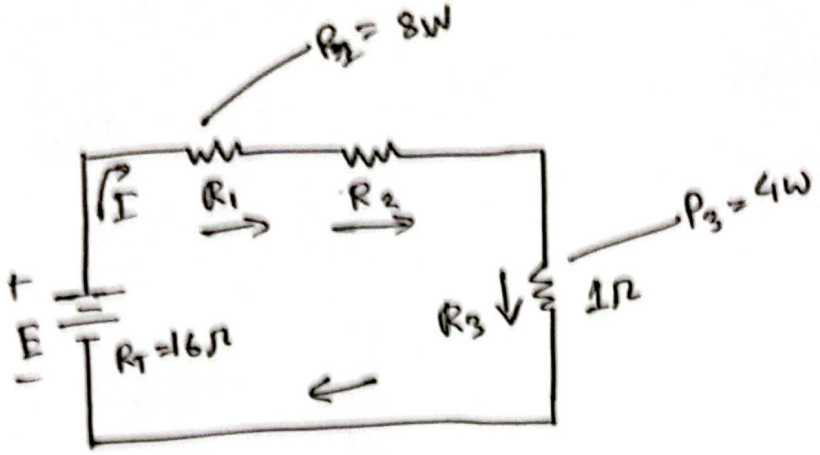
$V_1 = IR_1 = 2V$

$V_2 = 1V$

$V_3 = 21V$

Ans.

b)



Current

$$P_3 = I^2 R_3$$

$$I = \sqrt{\frac{P_3}{R_3}}$$

$$= 2A$$

resistance $R_1 = \frac{P_1}{I^2}$

$$= 4\Omega$$

$$R_2 = R_T - (R_1 + R_3)$$

$$= 16 - 5$$

$$= 11\Omega$$

Voltage IR_T

$$= 32V$$

$$V_1 = IR_1 = 2 \times 4 = 8V$$

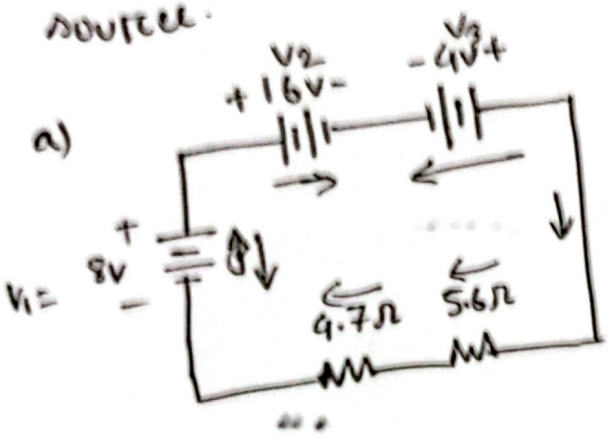
$$V_2 = 2 \times 11 = 22V$$

$$V_3 = 2V$$

Ans.

4. Determine the current I and its direction for each network. Before solving for I, redraw each network with a single voltage source.

a)



Combine the voltage

$$E = -V_1 + V_2 - V_3$$

$$= -8 + 16 - 4$$

$$= 4V$$

$$R_T = R_1 + R_2$$

$$= 10.3\Omega$$

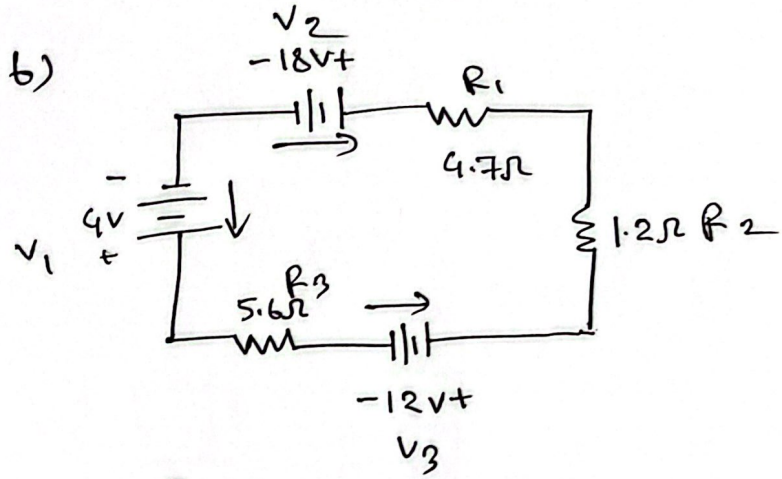
Current $I = \frac{E}{R_T}$

$$= \frac{4}{10.3}$$

$$= 0.388A$$

A-

b)



$E = +4 - 18 - 12$

$= -2\,V$

$E = 2\,V$ (If we chang the direction)

$R_T = R_1 + R_2 + R_3$

$= 11.5\,\Omega$

Current $I = \frac{E}{R_T}$

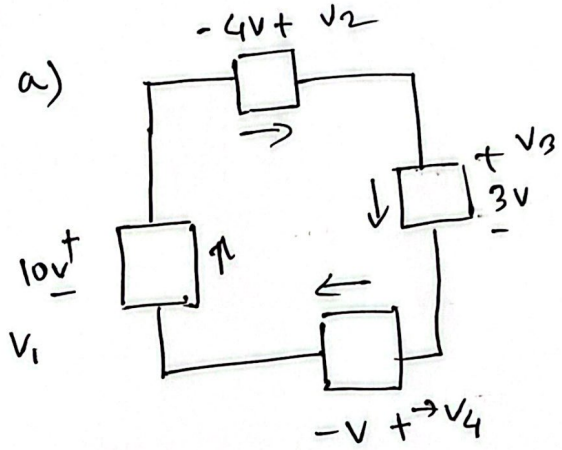
$= \frac{2}{11.5}$

$= 0.17\,A$

Ans.

5. Using KVL, find the unknown voltage.

a)



Using KVL

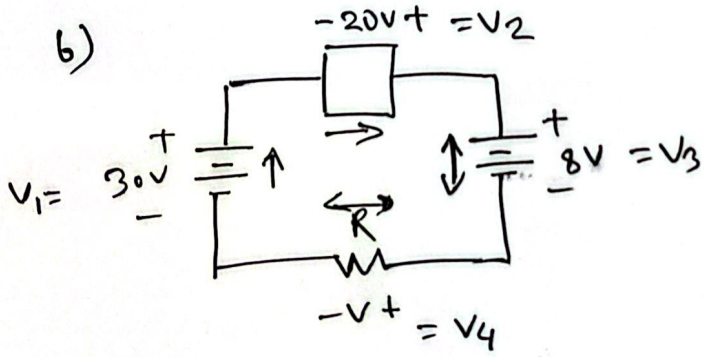
$$V_1 + V_2 + V_3 + V_4 = 0$$

$$-10 - 4 + 3 + V_4 = 0$$

$$-11 + V_4 = 0$$

$$V_4 = 11$$

b)



$$V_1 + V_2 + V_3 + V_4 = 0$$

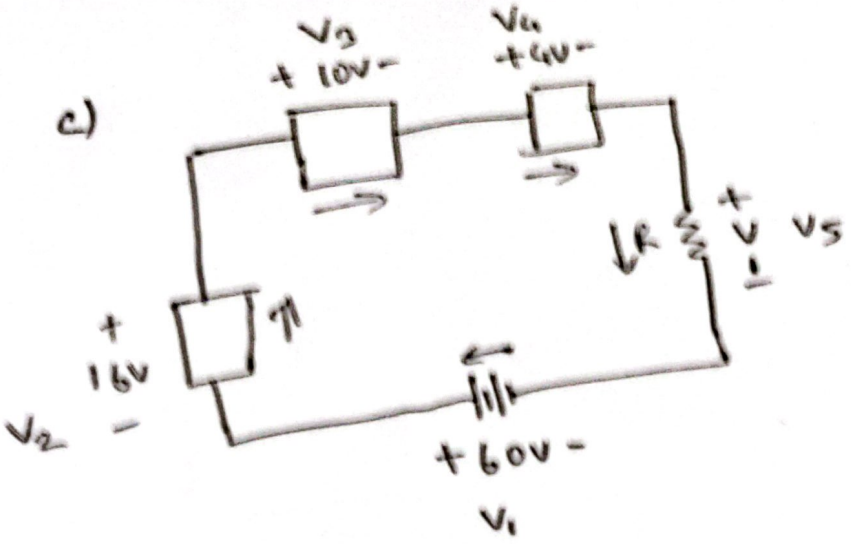
$$-30 - 20 + 8 + V_4 = 0$$

$$-42 + V_4 = 0$$

$$V_4 = 42$$

Ans.

c)



using KVL

$$V_1 + V_2 + V_3 + V_4 + V_5 = 0$$

$$-60 - 16 + 10 + 4 + V_5 = 0$$

$$-62 + V_5 = 0$$

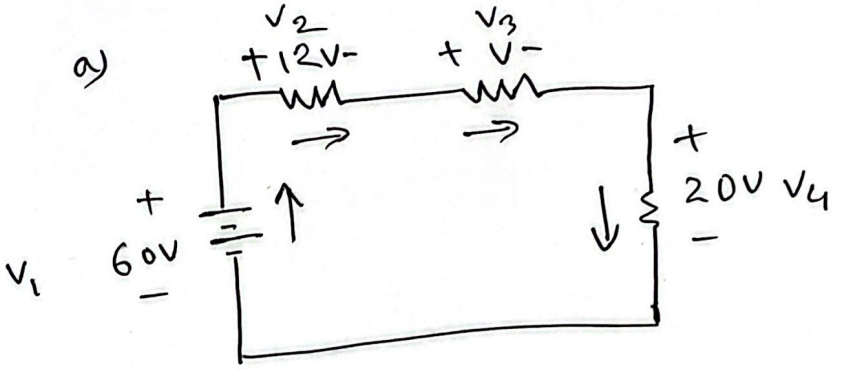
$$V_5 = 62$$

hem unknow voltage $V = 62$

Ans.

6. Using KVL, Find the unknown voltage.

a)

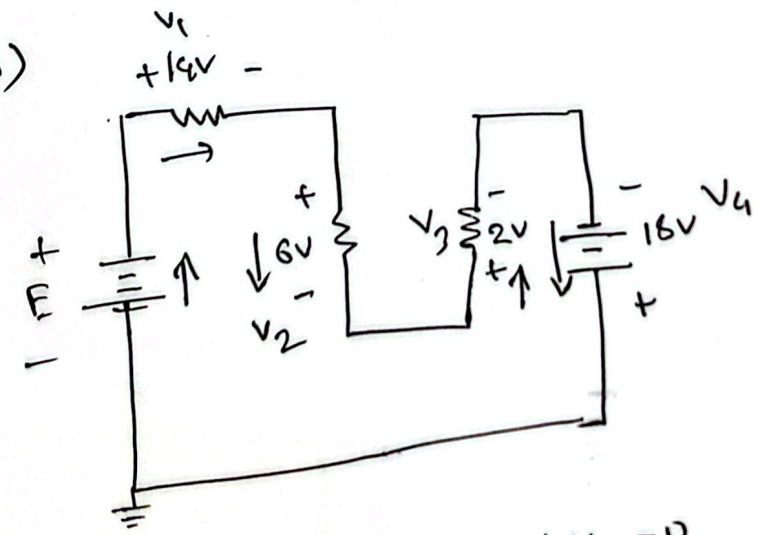


$$V_1 + V_2 + V_3 + V_4 = 0$$

$$-60 + 12 + V_3 + 20 = 0$$

$$V_3 = 28V$$

b)



$$E + V_1 + V_2 + V_3 + V_4 = 0$$

$$-E + 14 + 6 + 2 - 18 = 0$$

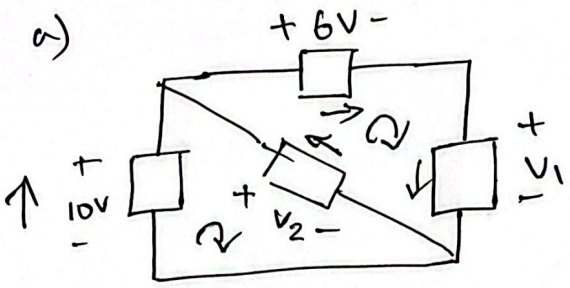
$$-E + 4 = 0$$

$$E = 4V$$

A

7. Using KVL, find the unknow voltage V_1 and V_2.

a)



1st loop

$-10 + V_2 = 0$

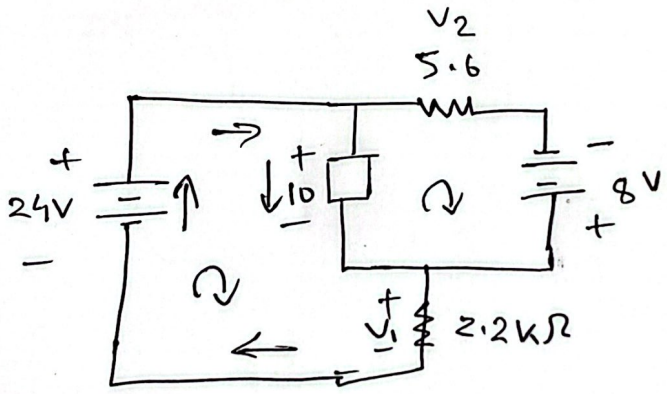
$V_2 = 10\ V$

2nd loop

$-10 + 6 + V_1 = 0$

$V_1 = 4\ V$

b)



1st loop,

$-24 + 10 + V_1 = 0$

$V_1 = 14\ V$

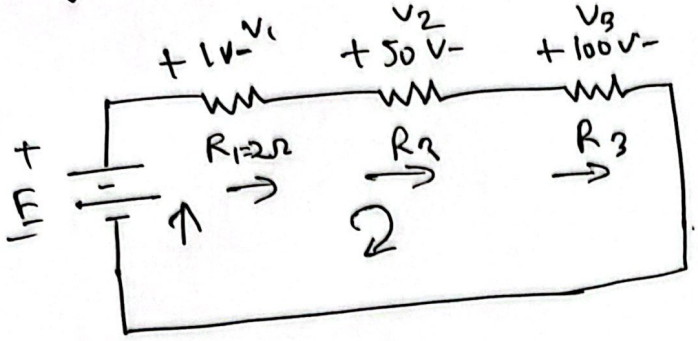
2nd loop,

$-10 + V_2 - 8 = 0$

$V_2 = 18\ V$

Ans.

9. Using VDR, find the indicated resistances.



here current,

$$I = \frac{V}{R_1} = \frac{1}{2} = 0.5A$$

$R_1 = 2\Omega$

$R_2 = 25\Omega$

$R_3 = I \times V_3 = 50\Omega$

using KVL we get value of E

$$-E + 1 + 50 + 100 = 0$$

$$E = 151\ V$$

using VDR

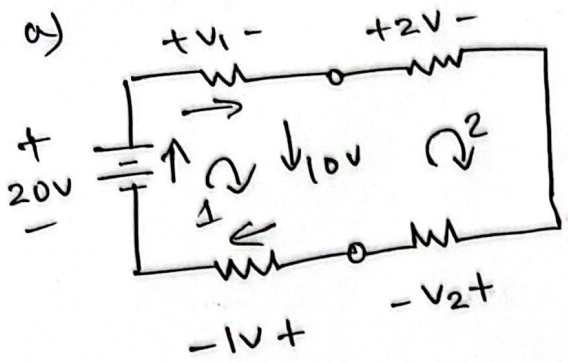
$$R_2 = \frac{V_2 \times R_T}{E}$$

$$R_2 = \frac{50 \times (R_1 + R_2 + R_3)}{151}$$

$$R_2 = \frac{100 + 50R_2 + 50R_3}{151}$$

8. Using KVL, Find the voltage V_1 and V_2

a)



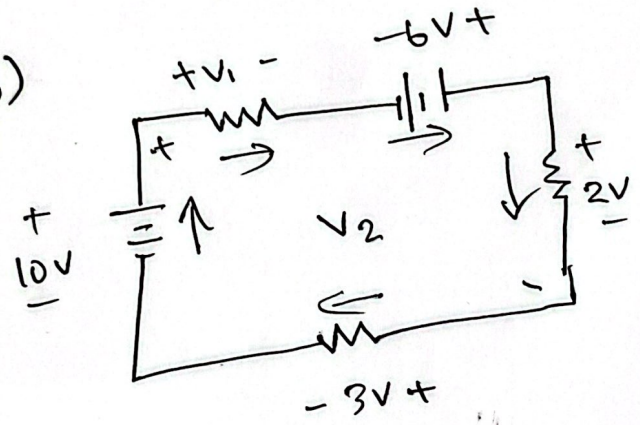
1st loop,

$$-20 + V_1 + 10 + 1 = 0$$

$$-9 + V_1 = 0$$

$$V_1 = 9V$$

b)



$$-10 + V_2 + 3 = 0$$

$$-7 + V_2 = 0$$

$$V_2 = 7V$$

$$-10 + V_1 - 6 + 2 + 3 = 0$$

$$-11 + V_1 = 0$$

$$V_1 = 11V$$

Ans

using VDR

$$V_1 = R_1 \frac{E}{R_T}$$

$$1 = 2 \frac{151}{R_T}$$

$$\frac{302}{R_T} = 1$$

$$302 = R_T$$

$$V_2 = \frac{R_2 E}{R_T}$$

$$R_2 = \frac{V_2 R_T}{E}$$

$$= \frac{50 \times 302}{151}$$

$$= 100\Omega$$

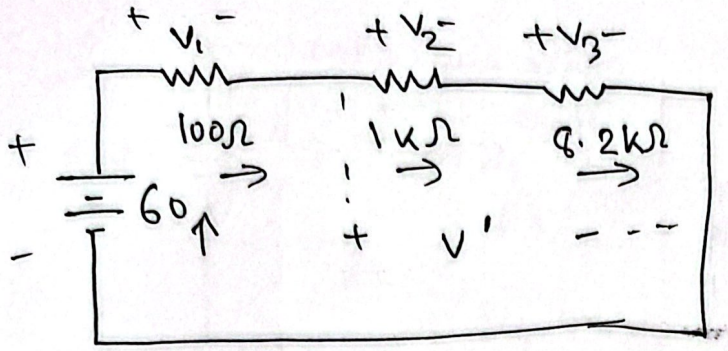
$$V_3 = \frac{R_3 E}{R_T}$$

$$R_3 = \frac{100 \times 302}{151}$$

$$= 200\Omega$$

Ans.

10. using VDR, find the indicated voltage.



using VDR,

$$V_1 = \frac{R_1 \times E}{R_T}$$

$$= \frac{100\Omega \times 60V}{9.3k\Omega}$$

$$= 0.65V$$

$$V_2 = \frac{R_2 \times E}{R_T}$$

$$= 6.45V$$

$$V_3 = \frac{R_3 \times E}{R_T}$$

$$= 52.90V$$

$$R_T = 100\Omega + 1k\Omega + 8.2k\Omega$$

$$= 9.3k\Omega$$

$$V_0' = \frac{E \times R'}{R_T}$$

$$= \frac{E \times (R_2 + R_3)}{R_T}$$

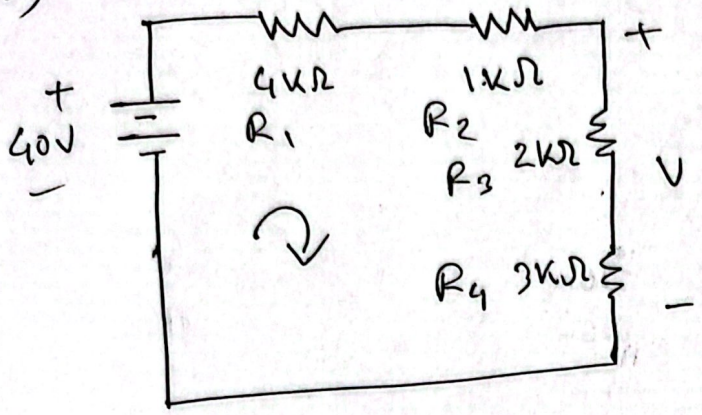
$$= \frac{60 \times 9.2}{9.3}$$

$$= 59.35V$$

Ans.

11. Using the VDR, find the indicated voltages.

a)



$$R_T = 4 + 1 + 2 + 3 = 10K\Omega$$

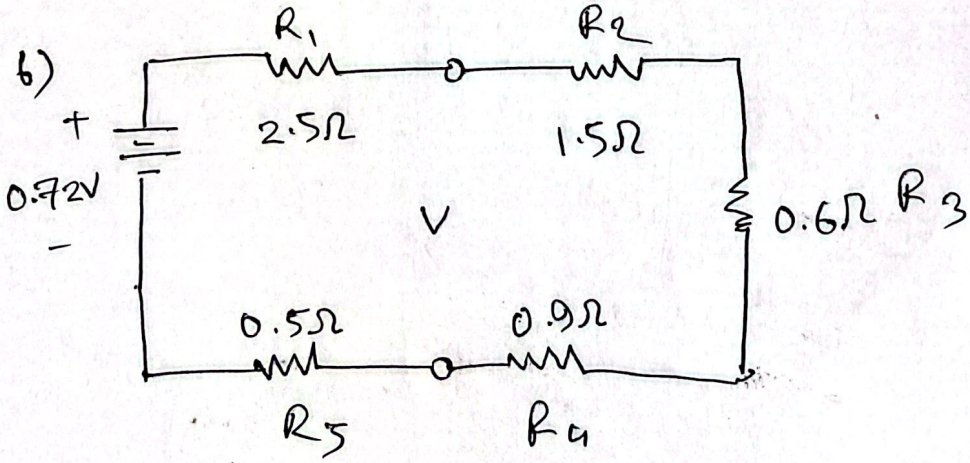
$$V' = \frac{ER'}{R_T}$$

$$= \frac{40(R_3 + R_4)}{10}$$

$$= \frac{200}{10}$$

$$= 20\ V$$

b)



$R_T = 2.5 + 1.5 + 0.6 + 0.9 + 0.5$

$= 6\Omega$

$$V' = \frac{ER'}{R_T}$$

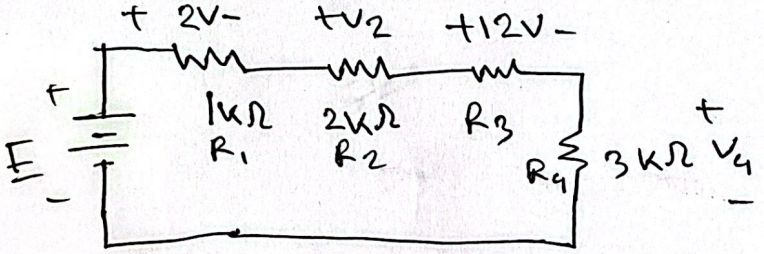
$$= \frac{0.72(R_2 + R_3 + R_4)}{6}$$

$$= \frac{0.72 \times 3}{6}$$

$V = 0.36\ V$

Ans.

12. Using the information, find the unknown values.



current $= I \times R_1 = 2 \times 1K\Omega = 2mA$

$V_2 = 2 \times 2 = 4V$

$V_4 = 3 \times 2 = 6V$

$$R_3 = \frac{V_3}{I}$$

$$= \frac{12}{2mA}$$

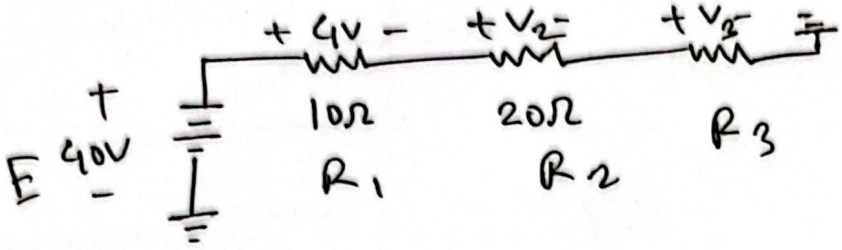
$= 6K\Omega$

using KVL $-E + 2 + 4 + 12 + 6 = 0$

$-E + 24 = 0$

Ans. $E = 24\ V$

13. using the information provided, find the unknown quantities.



current $I = \frac{V}{R} = \frac{4}{10} = 0.4A$

votage, $V_1 = 4V$

$V_2 = 8V$

using KVL $-40 + 4 + 8 + V_3 = 0$

$V_3 = 28V$

Resistance,

$R_3 = \frac{V_3}{I}$

$= \frac{28}{0.4}$

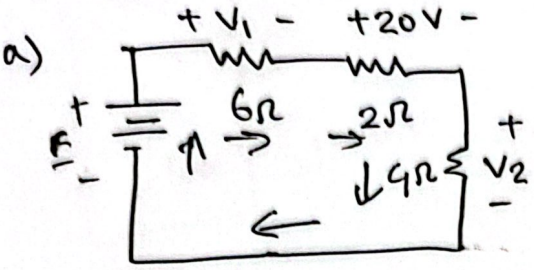
$= 52\Omega$

$= 70\Omega$

Ans.

14. Using VDR or KVL, to find unknow voltage

a)



current $I = \frac{V_2}{R_2} = \frac{20}{2} = 10A$

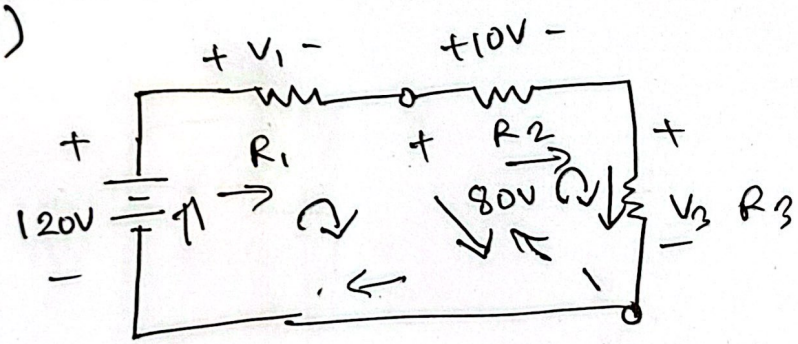
$V_1 = 6 \times 10 = 60V$

$V_2 = 4 \times 10 = 40V$

Using KVL $-E + 60V + 20V + 40V = 0$

$E = 120V$

b)



KVL, $-120 + V_1 + 80 = 0$

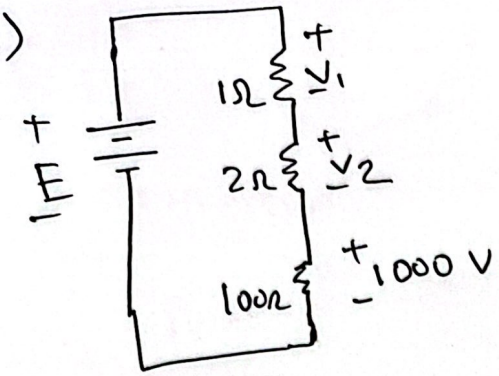
$V_1 = 40V$

$-80 + 10 + V_3 = 0$

$V_3 = 70V$

Ans.

c)



current $I = 10\ A$

voltage $V_2 = 20V$

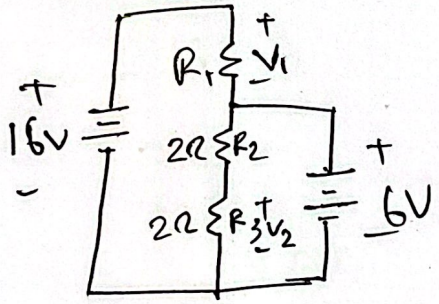
$V_1 = 10V$

Using KVL $\quad -E + 10 + 20 + 1000 = 0$

$-E + 1030 = 0$

$E = 1030\ V$

d)



KVL $\quad -16 + V_1 + 6 = 0$

$V_1 = 10V$

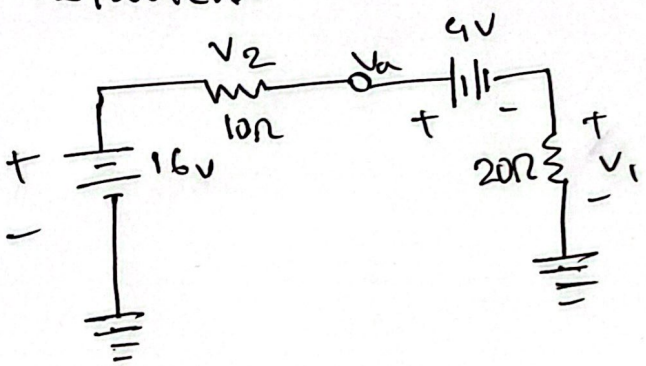
$$V_2 = \frac{E R_2}{R_T}$$

$$= \frac{6 \cdot 2}{4}$$

$$= 3V$$

Ans.

15. Determine the voltage V_a and V_1 for the networks



$$\text{current } I = \frac{\text{Total Voltage}}{\text{total Resistance}}$$

$$= 0.4$$

$$V_2 = 10 \times 0.4$$

$$= 4V$$

$$V_a = 16 - 4$$

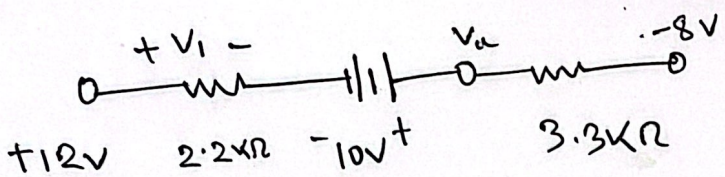
$$= 12V$$

$$V_1 = 20 \times 0.4$$

$$= 8V$$

Ans.

6)



Current $I = \frac{30V}{5.5k\Omega} = 5.45\ mA$

$V_1 = IR_1 = 2.2 \times 5.45$

$= 12V$

$V_a = 12 - 12 + 10$

$= 10V$

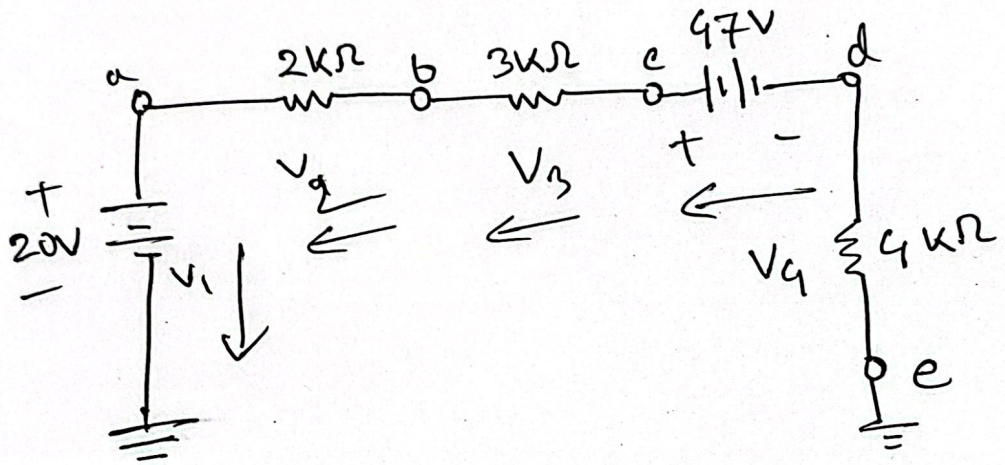
Ans

16. For the network in fig. determine the voltage.

a). V_a, V_b, V_c, V_d, V_e

b) V_{ab}, V_{dc}, V_{cb}

c) V_{ac}, V_{db}



Current $I = \dfrac{\text{Total voltage}}{R_T}$

$= \dfrac{27}{9} = 3mA$

$V_2 = 6V$

$V_3 = 9V$

$V_4 = 12V$

$V_{db} = -38V$

$V_a = 20V$

$V_b = 26V$

$V_c = 35V$

$V_d = 35 - 47 = 12V$

$V_e = 0V$

$V_{ab} = -6V$

$V_{dc} = -47$

$V_{cb} = 9V$

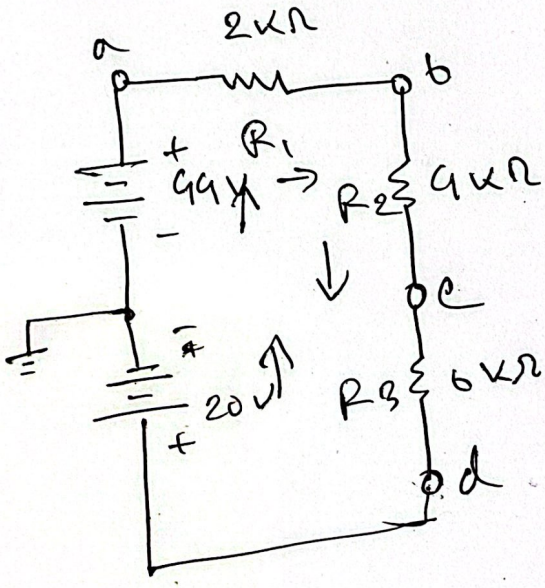
$V_{ac} = -15V$

17. For the network fig. determine the voltage.

a) V_a, V_b, V_c, V_d

b) V_{ab}, V_{cb}, V_{cd}

c) V_{ad}, V_{ca}



Current $I = \frac{24}{12} = 2mA$

$V_{R_1} = 2 \times 2 = 4V$

$V_{R_2} = 8V$

$V_{R_3} = 12V$

a) $V_a = 44V$

$V_b = 44 - 4 = 40V$

$V_c = 44 - 4 - 8 = 32V$

$V_d = 20V$

b) $V_{ab} = 4V$

$V_{cb} = -8V$

$V_{cd} = 12V$

c) $V_{ad} = V_a - V_d$

$= 24V$

$V_{ca} = -12V$

Ans.