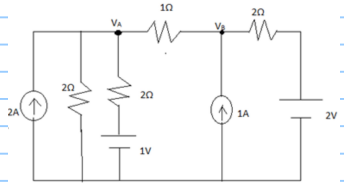
Note Title 10/25/2020

ch4 Quiz

1- Find VA and VB using Node-Voltage method in the given circuit.



a) 2.5V, 3.6V
b) 2.87V, 3.25V
c) 2.65V, 3.47V
d) 3.15V, 2.76V

(A) $-2+\frac{V_A}{2}+\frac{V_A-1}{2}+\frac{V_A-V_B}{1}=0$

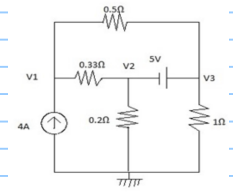
$2V_A - V_B = 2.5$ — (1)

$\frac{V_B-V_A}{1} - 1 + \frac{V_B-2}{2} = 0$

$-V_A + \frac{3}{2}V_B = 2$ — (2)

$V_A = 2.875\,V$ ✗ $V_B = 3.25\,V$

2- Find V3 in the circuit given below



a) 4.833V
b) 2.616V
c) -4.833V
d) -2.616V

V_1

$\frac{V_1-V_2}{6.33} - 4 + \frac{V_1-V_3}{0.5} = 0$

$\frac{166}{33}V_1 - \frac{10}{3}V_2 - 2V_3 = 4$ — (1)

V_2

$\frac{V_2-V_1}{0.33} + \frac{V_2}{0.2} + \frac{V_3}{1} + \frac{V_3-V_1}{0.5} = 0$

$-\frac{166}{33}V_1 + \frac{265}{33}V_2 + 3V_3 = 0$ — (2)

Super node

$V_3 - V_2 = 5$ — (3)

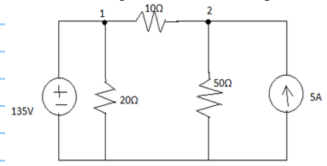
$5V_2 + V_3 = 4$ — (1) + (2)

$5(V_3-5)+V_3=4$

$6V_3 - 25 = 4$

$V_3 = 29/6 \Rightarrow V_3 = 4.833\,V$

4- What is the voltage at 2nd terminal in the given circuit?



a) 132.57V
b) 154.16V
c) 173.25V
d) 123.57V

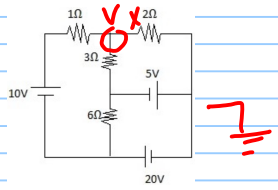
$V_1 = 135\ V$

$$\frac{V_2 - 135}{10} + \frac{V_2}{50} - 5 = 0$$

$$\frac{3}{25} V_2 = 18.5$$

$$V_2 = 154.16\ V$$

5- Find the current flowing through 3Ω resistor in the given circuit.



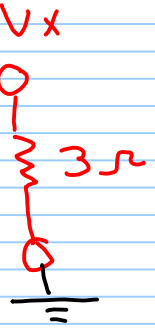
a) 2.57A
b) 3.64A
c) 4.78A
d) 5.89A

$$\frac{V_x - 10}{1} + \frac{V_x + 5}{3} + \frac{V_x}{2} = 0$$

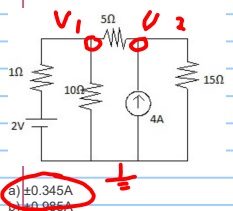
$$\frac{11}{6} V_x = \frac{25}{3}$$

$$V_x = \frac{50}{11}\ V$$

$$i_{3\Omega} = \frac{V_x + 5}{3} = 3.181\ A$$



6- Calculate the current flowing through 10Ω resistor in the circuit shown below



a) ±0.345A
b) ±0.985A
c) 1.217A
d) 2.782A

$$V_1 - 2 + \frac{1}{10} V_1 + \frac{1}{5} V_1 - \frac{1}{5} V_2 = 0$$

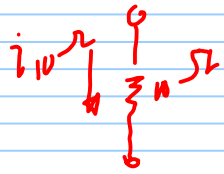
$$1.3 V_1 - 0.2 V_2 = 2 \quad \text{—①}$$

$$\frac{1}{5} V_2 - \frac{1}{5} V_1 - 4 + \frac{1}{15} V_2 = 0$$

$$0.2 V_1 + \frac{4}{15} V_2 = 4 \quad \text{—②}$$

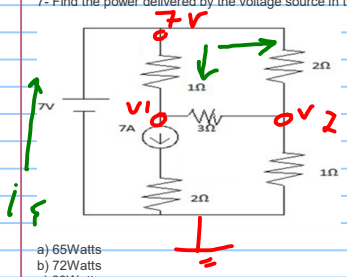
$V_1 = 3.448\ V$

$V_2 = 12.4135\ V$



$$\therefore i_{10\Omega} = \frac{V_1}{10} = 0.3448\ A$$

7- Find the power delivered by the voltage source in the network given below.



a) 65Watts
b) 72Watts
c) 63Watts
d) 76Watts

$$7 + \frac{V_1 - V_2}{3} + \frac{V_1 - 7}{1} = 0$$

$$\frac{4}{3}V_1 - \frac{1}{3}V_2 = 0 \quad -(1)$$

$$\frac{V_2 - V_1}{3} + \frac{V_2}{1} + \frac{V_2 - 7}{2} = 0$$

$$-\frac{1}{3}V_1 + \frac{11}{6}V_2 = \frac{7}{2} \quad -(2)$$

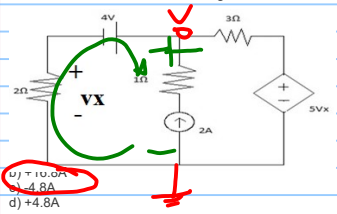
$V_1 = 0.5\,V$, $V_2 = 2\,V$

$\therefore i_f = i_{1\Omega} + i_{2\Omega} = \frac{7 - 0.5}{1} + \frac{7 - 2}{2} = 9A$

$\therefore P = -(7)(9) = -63W$

$= 63W$ delivered!

8- Find the value of V_x in the circuit given below.



b) -4.8A
d) +4.8A

$$\frac{V - 4}{2} - 2 + \frac{V - 5V_x}{3} = 0$$

$$\frac{5}{6}V - 4 - \frac{5}{3}V_x = 0$$

But $V_x = (V - 4)$

$$\frac{5}{6}V - 4 - \frac{5}{3}V + \frac{20}{3} = 0$$

$$-V_x - 4 + V = 0$$

$$V_x = V - 4$$

$$\frac{5}{6}V - \frac{5}{3}V - 4 + \frac{20}{3} = 0$$

$$-\frac{5}{6}V = -\frac{32}{3}$$

$V = +12.8\,V$

$+3.2V$

$\therefore V_x = -16.8\,V$