ID:	Name:

BRAC University
Semester: Summer 2023
Course Code: CSE250
Circuits And Electronics
Section: 01
Faculty: PMD

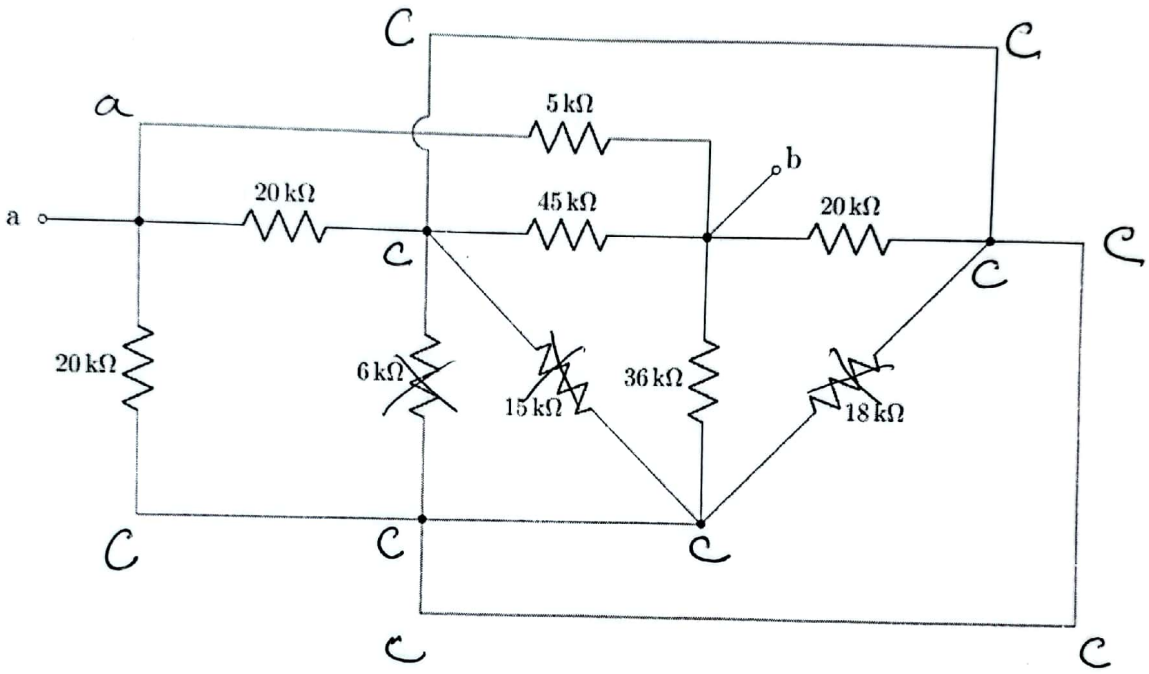
BRAC UNIVERSITY
Inspiring Excellence

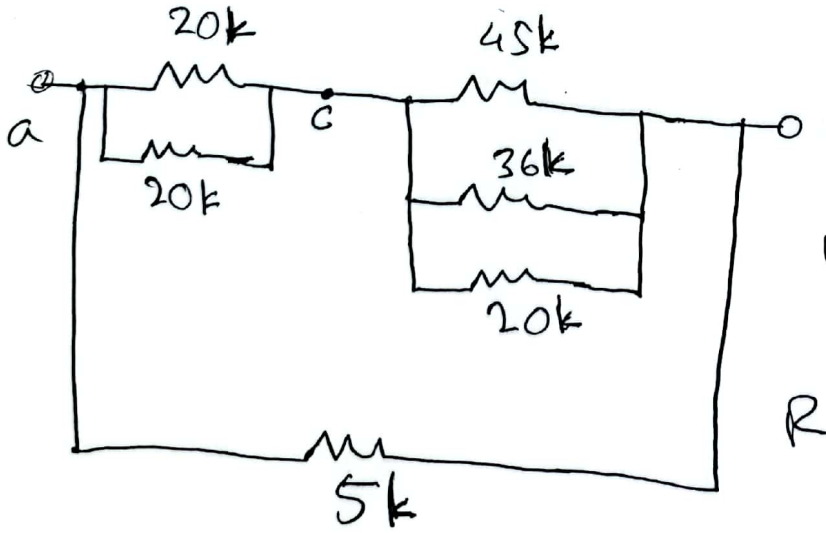
Assessment: *Assignment-1*

- ✓ Submit softcopy online by deadline
- ✓ Submit hardcopy in class by deadline

■ Question 1 of 6 *[CO1] [10 marks]*

Determine R_{ab}





$R_{ac} = 20k \| 20k$

$= 10k\Omega$

$R_{cb} = (45k \| 36k \| 120k)$

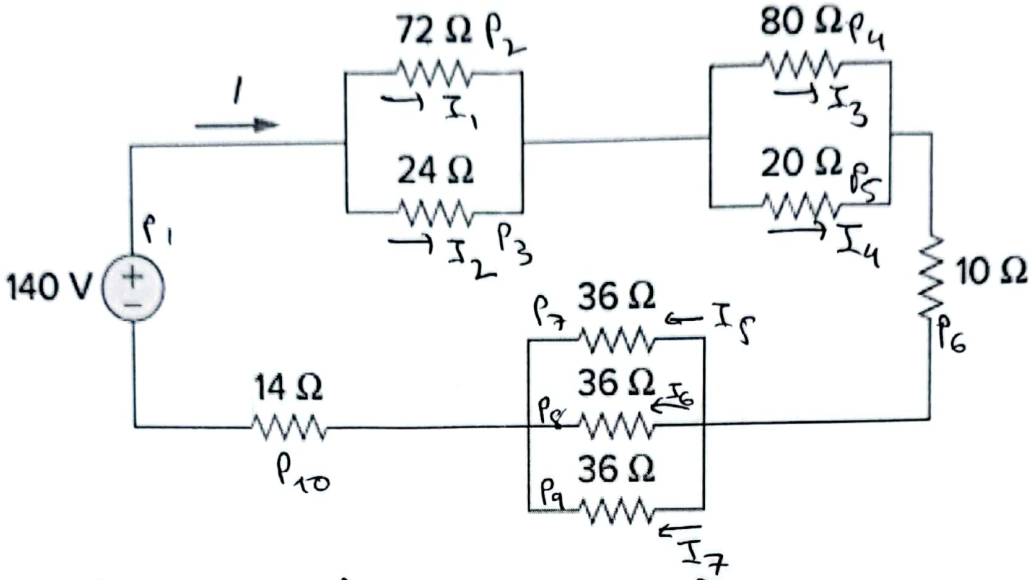
$= 10k\Omega$

$\therefore R_{eq} = (10k + 10k) \| 5k$

$= 4k\Omega$

Question 2 of 6 *[CO1] [10 marks]*

Determine R_{eq}, I and the power of each element. Mention which element absorbs and which supplies power.



$$R_{eq} = (72 \| 24) + (80 \| 20) + 10 + (36 \| 36 \| 36) + 14$$

$$= 70\,\Omega$$

$$I = \frac{140}{70} = 2A, \quad I_1 = \frac{24}{72+24} \times 2 = 0.5A, \quad I_2 = I - I_1 = 1.5A$$

$$I_3 = \frac{20}{80+20} \times 2 = 0.4A, \quad I_4 = I - I_3 = 1.6A$$

$$I_5 = I_6 = I_7 = \frac{36}{36+36+36} \times 2 = 0.67A$$

$P_1 = -140 \times 2 = -280W$ (supply), $P_2 = I_1^2 \times 72 = 180$ (absorb),

$P_3 = I_2^2 \times 24 = 54W$ (absorb), $P_4 = I_3^2 \times 80 = 12.8W$ (absorb)

$P_5 = I_4^2 \times 20 = 51.2\,W$ (absorb ~~supply~~)

$P_6 = I^2 \times 10 = 40\,W$ (absorb)

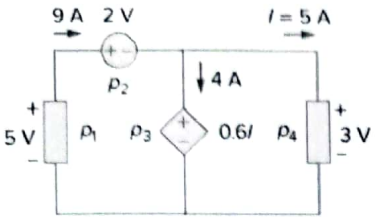
$P_7 = P_8 = P_9 = 0.67^2 \times 36$

$= 16.16\,W$ (absorb)

$P_{10} = I^2 \times 14 = 56\,W$ (absorb)

Question 3 of 6 *[CO1] [10 marks]*

Determine the power through all elements. Mention which element supplies and which absorbs power.



$P_1 = -5 \times 9 =$ −45W (supply)

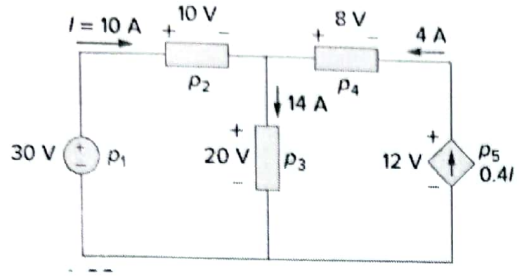
$P_2 =$ $2 \times 9 = 18W$ (absorb)

$P_3 = 0.6I \times 4 = 0.6 \times 5 \times 4 = 12W$ (absorb)

$P_4 = 3 \times 5 = 15W$ (absorb)

Question 4 of 6 *[CO1] [10 marks]*

Determine the power through all elements. Mention which element supplies and which absorbs power.



$P_1 = -30 \times 10 = -300\,W$ (supply)

$P_2 = 10 \times 10 = 100\,W$ (absorb)

$P_3 = 20 \times 14 = 280\,W$ (absorb)

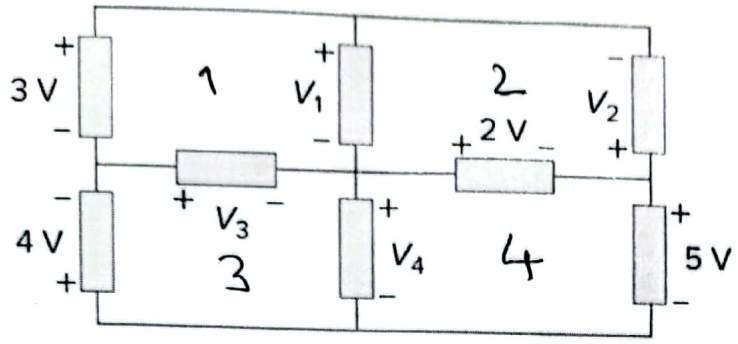
$P_4 = -8 \times 4 = -32\,W$ (supply)

$P_5 = -12 \times 0.4I = -12 \times 0.4 \times 10$

$= -48\,W$ (supply)

Question 5 of 6 *[CO1] [10 marks]*

Determine V_1 through V_4.



Applying KVL to loop 4 we get,

$-V_4 + 2 + 5 = 0$

or, $V_4 = 7V$

Applying KVL to loop 3 we get,

$4 + V_3 + V_4 = 0$

or, $V_3 = -4 - V_4 = -11V$

Applying KVL to loop 1 we get,

$-3 + V_1 - V_3 = 0$

or, $V_1 = 3 + V_3 = -8V$

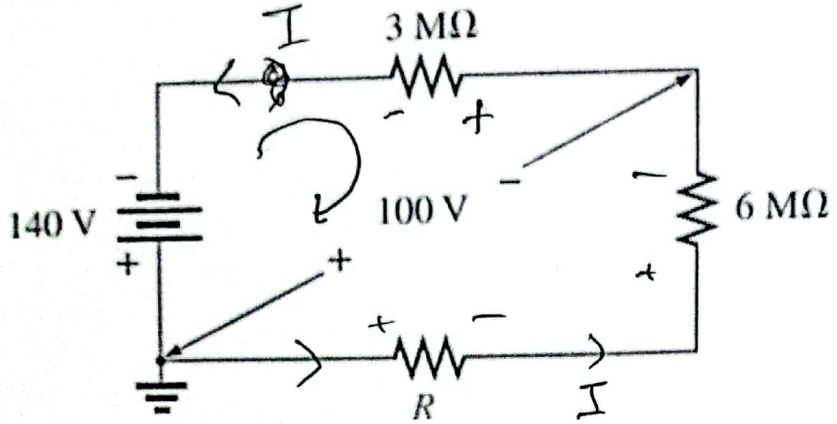
Applying KVL to loop 2 we get,

$$-V_1 - V_2 - 2 = 0$$

or, $V_2 = -V_1 - 2 = 6V$

■ Question 6 of 6 *[CO1] [10 marks]*

Determine I. the unknown resistance R using KVL. Also **determine** the voltage and power across the 6MΩ resistance.



$$I = \frac{140}{3+6+R} = \frac{140}{9+R} \quad \text{---(1)}$$

Using KVL on loop 1 we get,

$$140 - 3I - 100 = 0$$

or, $I = \frac{140-100}{3} = 13.33\,\mu A$

From equation (1),

$$I = \frac{140}{9+R} \quad \text{or, } R = \frac{140}{I} - 9$$

$$= 1.5\,M\Omega$$

$$V_{6M\Omega} = 13.33 \times 6 = 80V$$

$$P_{6M\Omega} = 80 \times 13.33 = 1066.4\,\mu W$$