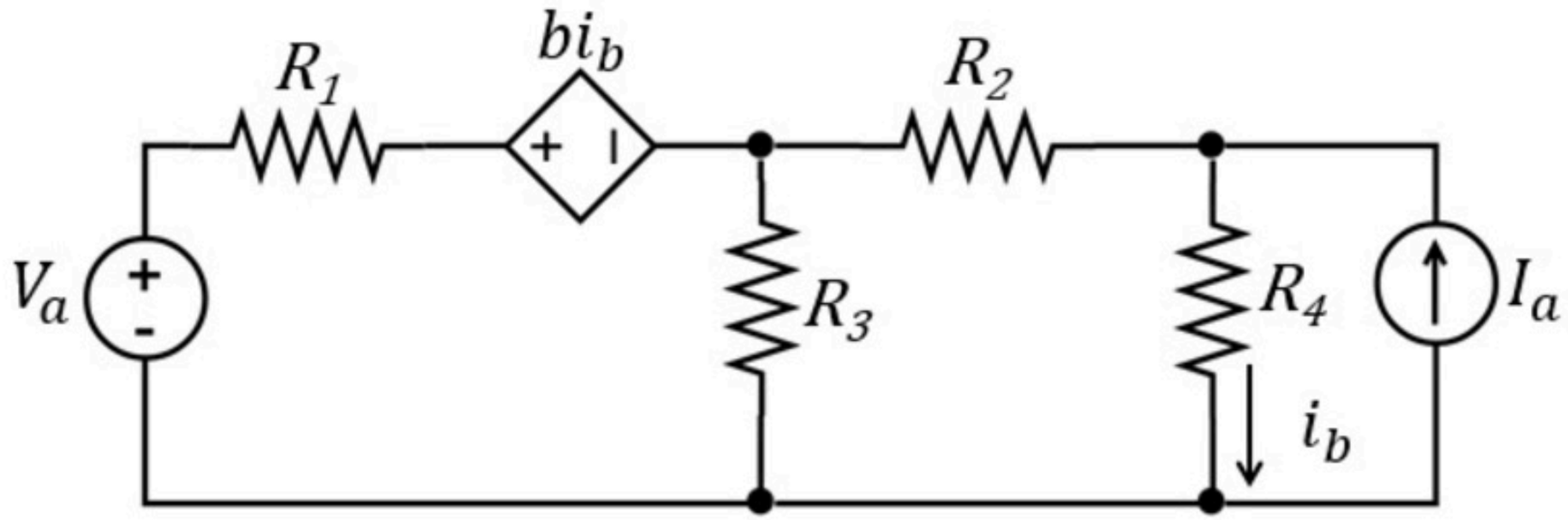
Nodal Mesh 011

Problem has been graded.

Find the value of the current i_b.
Use mesh analysis.



Given Variables:

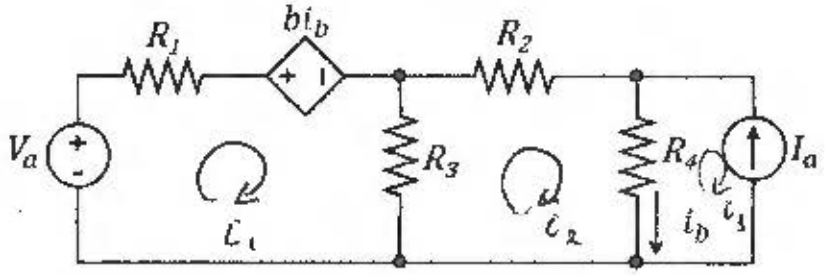
Va : 16 V
R1 : 2 ohm
R2 : 6 ohm
R3 : 8 ohm
R4 : 1 ohm
b : 2 V/A
Ia : 1 A

Calculate the following:

ib (A) :

> Hint: Do we need to use a supermesh?

Find the value of the current i_b.
Use mesh analysis.



Va = 16 V

R1 = 2 Ω

R2 = 6 Ω

R3 = 8 Ω

R4 = 1 Ω

b = 2 V/A

Ia = 1 A

$i_3 = -I_a = -1\,A$

$i_b = i_2 - i_3 = i_2 + 1$

MESH 1: $-16 + 2\cdot i_1 + 2\cdot i_b + 8(i_1 - i_2) = 0$

$-16 + 2i_1 + 2i_2 + 2 + 8i_1 - 8i_2 = 0$

$10\,i_1 - 6\,i_2 = 14$

$5i_1 - 3i_2 = 7 \quad (1)$

MESH 2: $8(i_2 - i_1) + 6i_2 + 1\cdot(i_2 + 1) = 0$

$-8i_1 + 15\,i_2 = -1 \quad (2)$

$5\times(1) + (2)$: $17\,i_1 = 34 \Rightarrow i_1 = 2A \Rightarrow i_2 = 1A$

$i_b = i_2 + 1 \Rightarrow \boxed{i_b = 2A}$

CHECK KVL