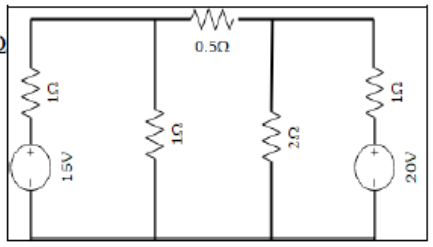
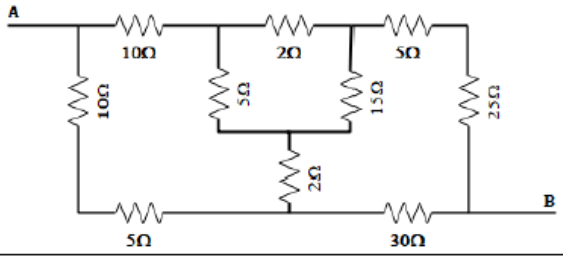
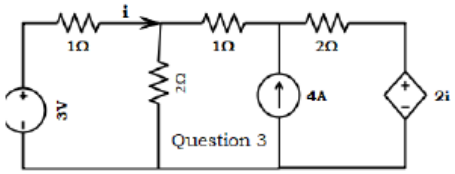
USN | | | | | | | | | | |

Internal Assessment Test 1 – Dec 2022

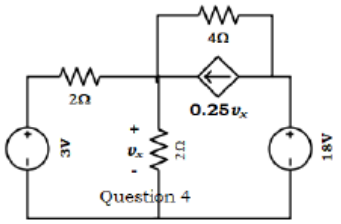
Sub:	Electric Circuits Analysis					Sub Code:	21EE	Branch:	EEE
Date:	03.12.2022	Duration:	90 mins	Max Marks:	50	Sem / Sec:	3		OBE

Answer any five questions

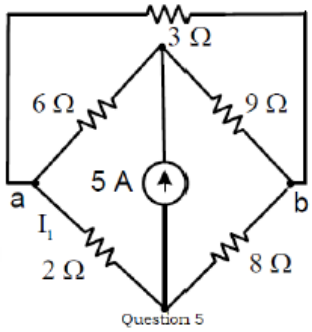
		MARKS	CO	RBT
1	Determine the current through 0.5 Ω resistance. Use nodal analysis. 	[10]	CO2	L4
2	Determine resistance between 'A' & 'B', use Y-Δ transformation. 	[10]	CO2	L4
3	Determine the current 'i' in in the circuit, using mesh analysis.	[10]	CO1	L4
4	Determine 'v_x', in the circuit, using source transformation.	[10]	CO1	L4
5	Use source shifting and transformation to find voltage across 'a' – 'b'.	[10]	CO1	L4
6	For Δ ABC to be equivalent to Y A'B'C', obtain expression for R_1 in terms of R_{12}, R_{13}, and R_{23}.	[10]	CO1	L2



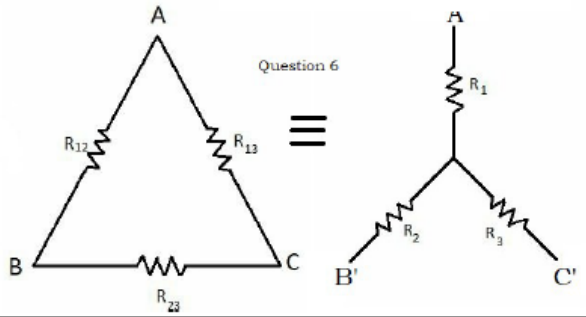
Question 3



Question 4



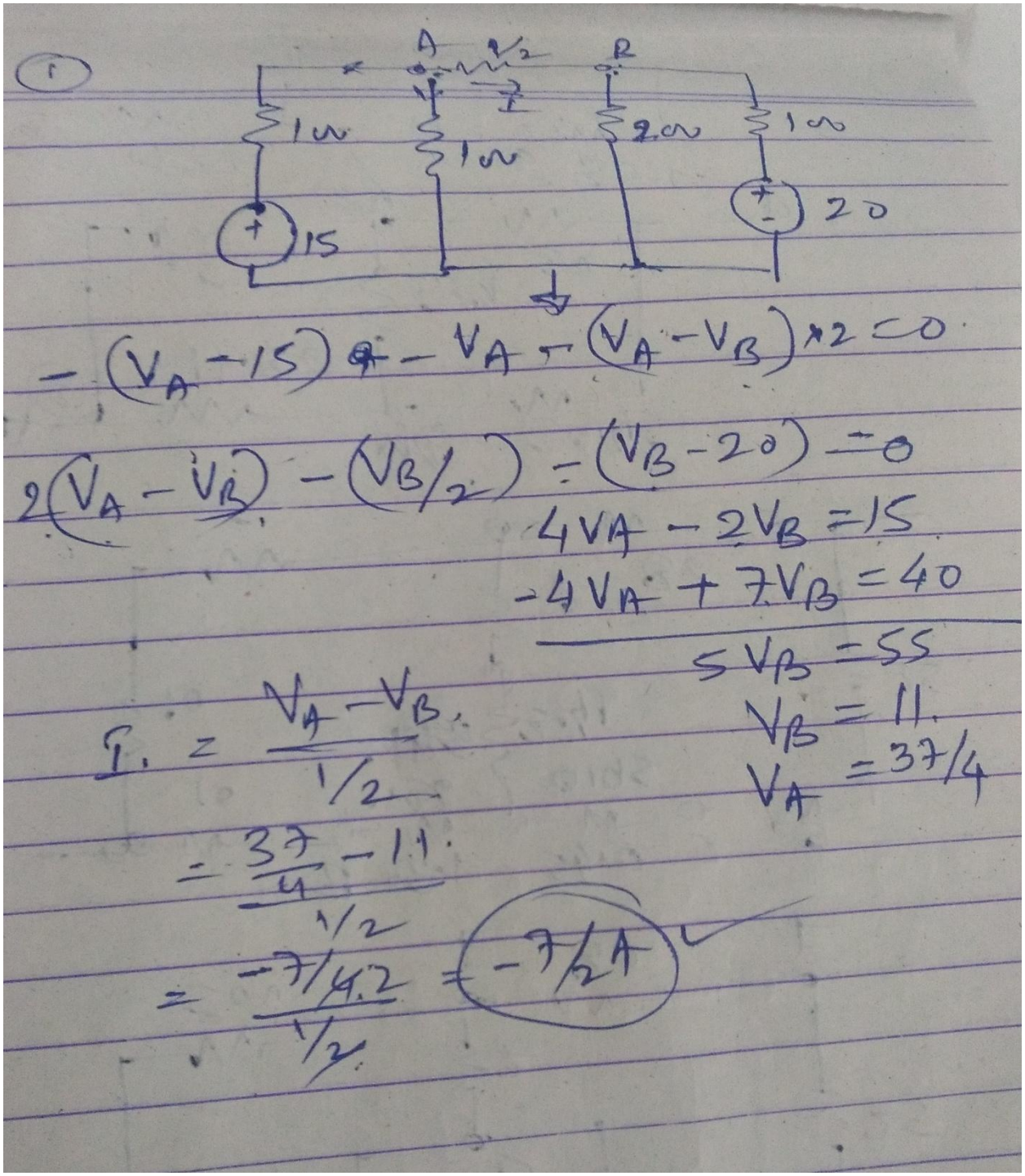
Question 5



Question 6

Signature of CI | Signature of CCI | Signature of HoD

Solution:



$$-(V_A - 15) - V_A - (V_A - V_B) \times 2 = 0$$

$$2(V_A - V_B) - (V_B/2) = (V_B - 20) = 0$$

$$4V_A - 2V_B = 15$$

$$-4V_A + 7V_B = 40$$

$$5V_B = 55$$

$$V_B = 11$$

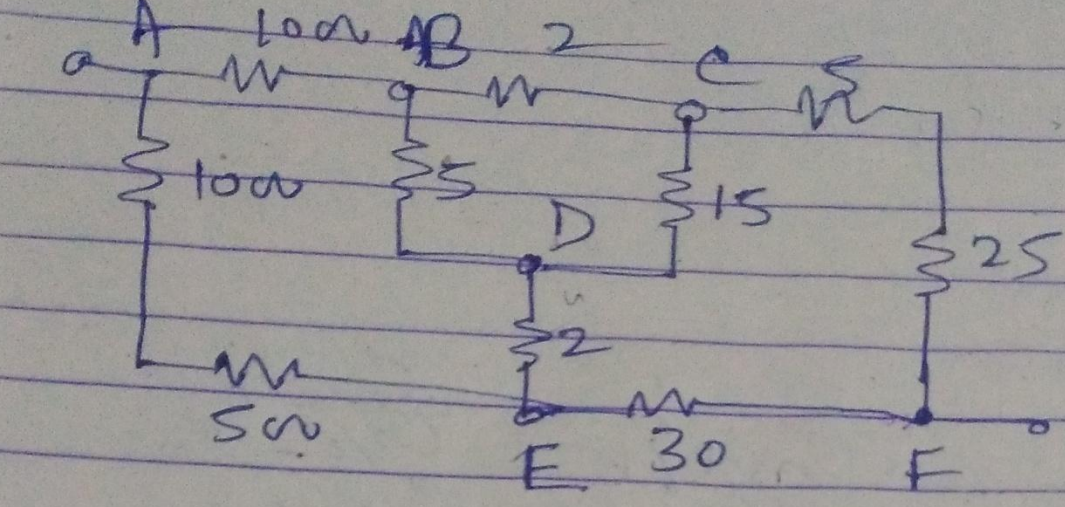
$$V_A = 37/4$$

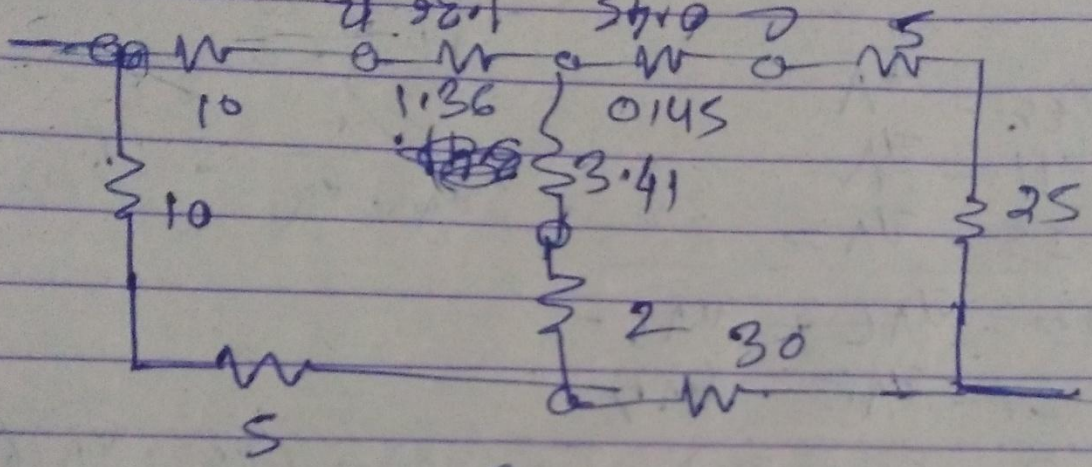
$$I = \frac{V_A - V_B}{1/2}$$

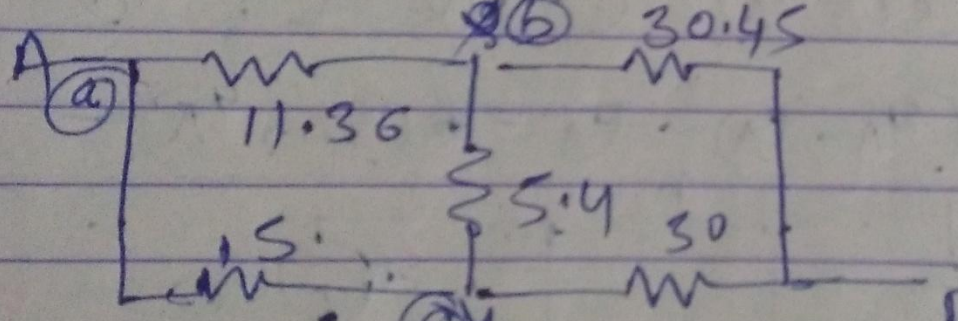
$$= \frac{\frac{37}{4} - 11}{1/2}$$

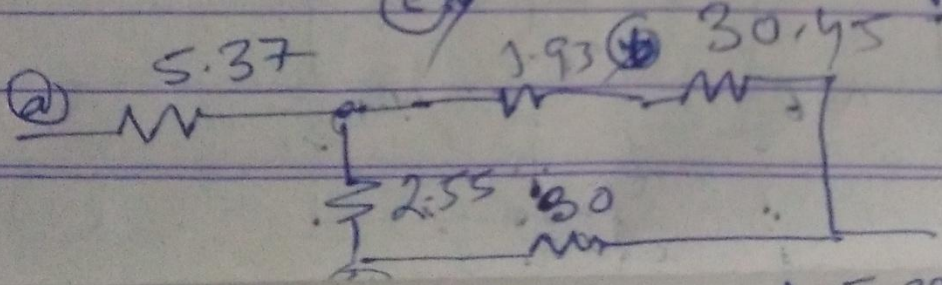
$$= \frac{-7/4.2}{1/2} = -7/2\,A$$

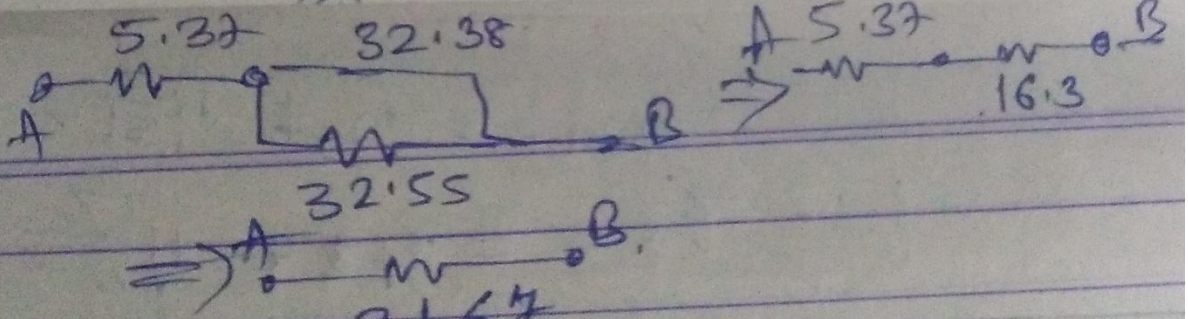
(2)


A
100
B
2
C
100
5
15
D
25
2
5Ω
E
30
F

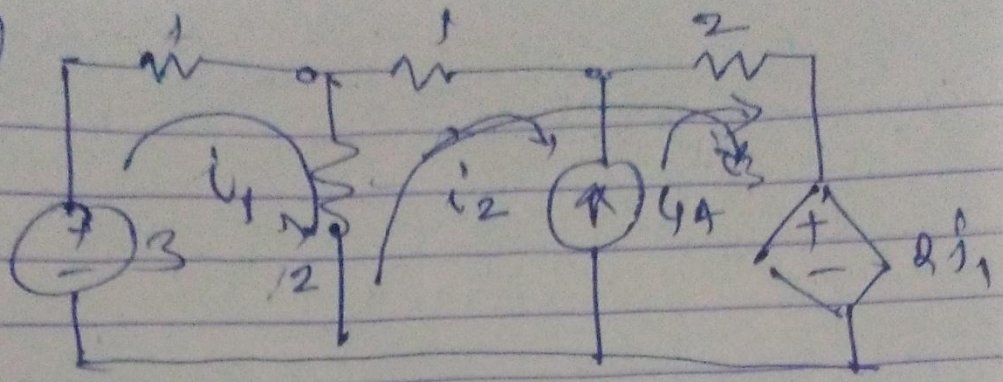

10
1.36
0145
10
3.41
25
2
30
5


A
a
11.36
5.4
30.45
30
B'


5.37
1.93
30.45
2.55
30


5.37
32.38
A
B
32.55
A
5.37
B
16.3
A
B.

(3)



(1) $3 - i_1 - (i_1 - i_2)2 = 0$

$3 - 3i_1 + 2i_2 = 0 \quad \cdots (1)$

Substitusi (2).

(2) $-(i_2 - i_1)2 - i_2 - 2i_3 - 2i_1 = 0$

$2i_1 - 2i_2 - i_2 - 2i_1 - 2i_3 = 0$

$-i_1 - 3i_2 - 2i_3 = 0 \quad \cdots (1)$

$-3i_1 + 2i_2 + 0i_3 = -3$

$-2i_2 + 2i_3 = 8$

$-i_1 - 5i_2 = 4$

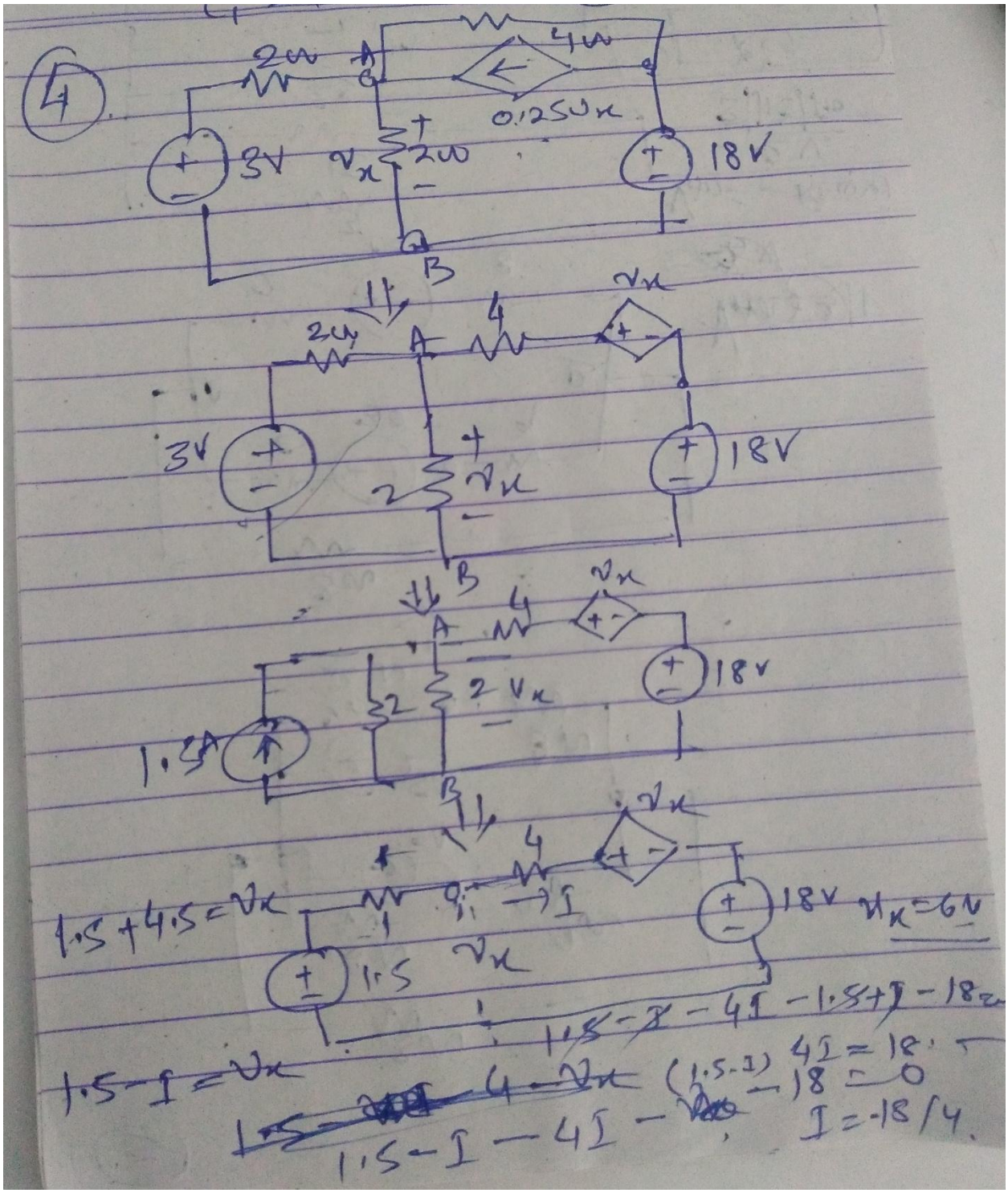
$-\frac{3}{2}i_1 + 2i_2 = -3/2$

$-\frac{15}{2}i_1 + 5i_2 = -15/2$

$-4.5i_1 = -3.5$

$i_1 = +3.5/4.5 = 7/9$ A

(4)



$1.5 + 4.5 = v_x$

$v_x = 6V$

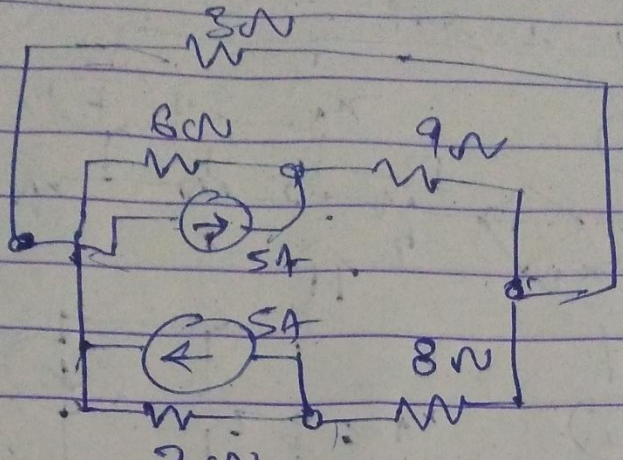
$1.5 - I = v_x$

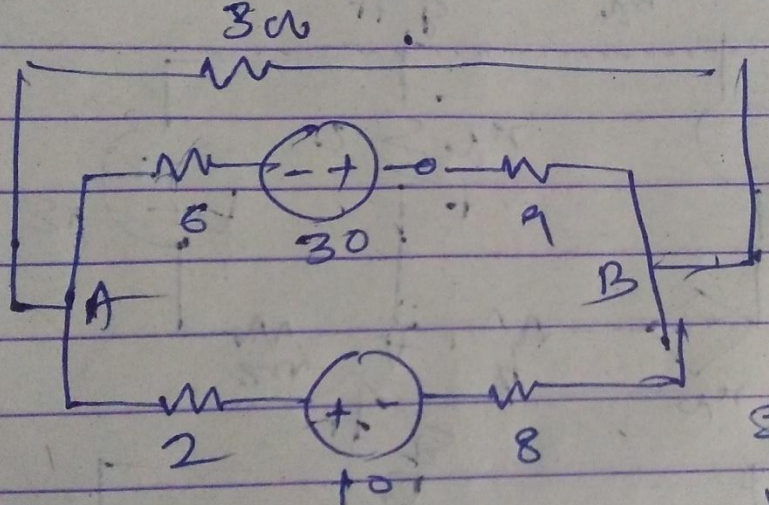
$1.5 - I - 4I - 1.5 + I - 18 = 0$

$1.5 - I - 4I = 18$

$I = -18/4$

(5)





$V_{AB} = -2V$

$3 \| 15 \| 10$