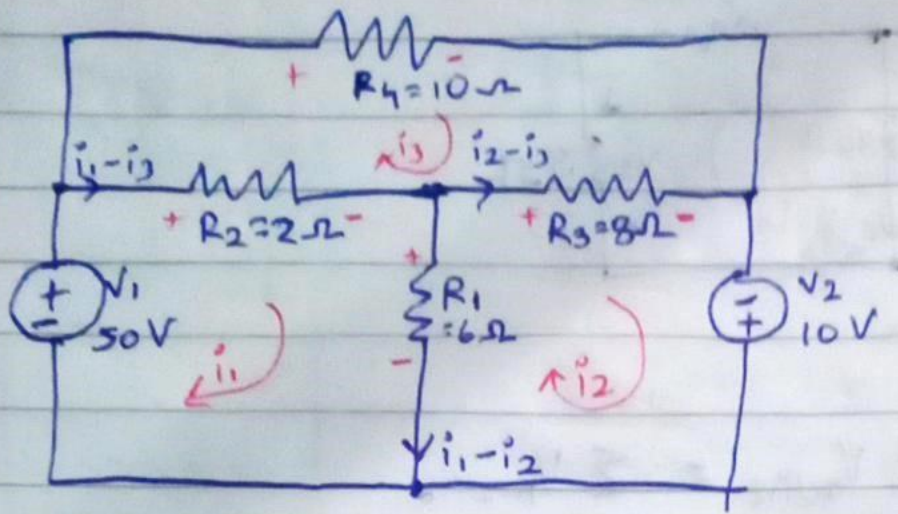
Q2



KVL in loop①: $\sum V_{active} = \sum V_{passive}$

$$50 = 2(i_1 - i_3) + 6(i_1 - i_2)$$

$$8i_1 - 6i_2 - 2i_3 = 50$$

$$\Rightarrow 4i_1 - 3i_2 - i_3 = 25 \quad -①$$

KVL in loop②: $\sum V_{active} = \sum V_{passive}$

$$6(i_1 - i_2) + 10 = 8(i_2 - i_3)$$

$$\Rightarrow 6i_1 - 14i_2 + 8i_3 = -10$$

$$\Rightarrow 3i_1 - 7i_2 + 4i_3 = -5 \quad -②$$

KVL in loop③: $\sum V_{active} = \sum V_{passive}$

$$2(i_1 - i_3) + 8(i_2 - i_3) = 10i_3$$

$$2i_1 + 8i_2 - 20i_3 = 0$$

$$\Rightarrow i_1 + 4i_2 - 10i_3 = 0$$

$$\Rightarrow i_1 = 10i_3 - 4i_2 \quad -③$$

Substituting i_1 in ① and ②

$-19i_2 + 39i_3 = 25$

$-19i_2 + 34i_3 = 5$ (−)

$5i_3 = 30$

$\Rightarrow \boxed{i_3 = 6} \Rightarrow \boxed{i_2 = 11} \Rightarrow \boxed{i_1 = 16}$

$I_{R_1} = i_1 - i_2 = \boxed{5A}$

∴ Loop currents: $\boxed{i_1 = 16A,\ i_2 = 11A,\ i_3 = 6A}$ Current through R_1 $\boxed{(I_{R_1}) = 5A}$