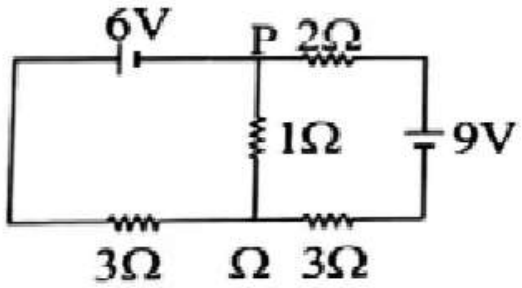
Q 03 In the circuit shown, the current in the 1Ω resistor is : **[2015]**



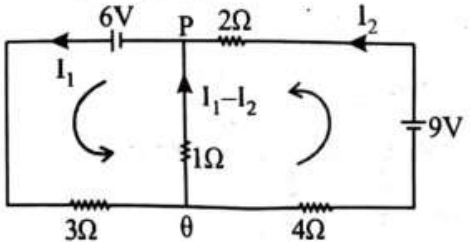
(a) 0.13 A, from Q to P (b) 0.13 A, from P to Q

(c) 1.3A from P to Q (d) 0A

solution

(a) From KVL

$-6+3I_1+1(I_1-I_2)=0$



$6=3I_1+I_1-I_2$

$4I_1-I_2=6$ ...(1)

$-9+2I_2-(I_1-I_2)+3I_2=0$

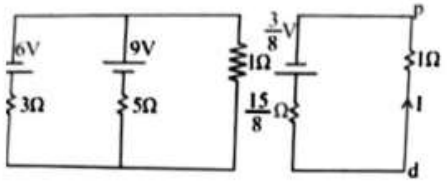
$-I_1+6I_2=9$ ...(2)

On solving (1) and (2)

$I_1=0.13A$

Direction Q to P, since $I_1>I_2$.

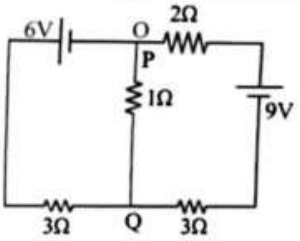
Alternatively



$$Eq=\frac{\frac{E_1}{r_1}+\frac{E_2}{r_2}}{\frac{1}{r_1}+\frac{1}{r_2}}=\frac{\frac{6}{3}-\frac{9}{5}}{\frac{1}{3}+\frac{1}{5}}=\frac{3}{8V}$$

$$\therefore\ I=\frac{\frac{3}{8}}{\frac{15}{8}+1}=\frac{3}{23}=0.13A$$

Considering potential at P as 0V and at Q as x volt, then



$$\frac{x-6}{3}+\frac{x-0}{1}+\frac{x+9}{5}=0$$

$$\therefore\ x=\frac{2}{23}$$

$$\therefore\ i=\frac{x-0}{1}=\frac{2}{23}=0.13A$$

From O to P