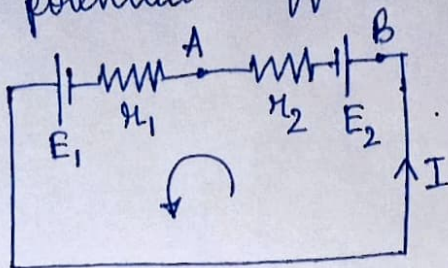


24. The circuit figure shows 2 cells connected in opposition to each other. Cell  $E_1$  is of e.m.f 6V and internal resistance  $2\Omega$ , cell  $E_2$  is of e.m.f 4V and internal resistance  $8\Omega$ . Find the potential difference between points A & B.



$E_1 = 6V$	$E_2 = 4V$
$r_1 = 2\Omega$	$r_2 = 8\Omega$

Answer:

$$-4 - 8I - 2I + 6 = 0$$

$\begin{matrix} \uparrow & & \downarrow & & \downarrow & & \rightarrow \\ \text{Cell} & & \text{Internal} & & \text{Internal} & & \text{Cell} \\ E_2 \text{ e.m.f} & & \text{resistance} & & \text{resistance} & & E_1 \text{ e.m.f} \\ & & \text{of } E_2 & & \text{of } E_1 & & \end{matrix}$

$$\Rightarrow I = 0.2 A$$

Now,  $V_B - 4 - (0.2 \times 8) = V_A$

$$\therefore \boxed{V_B - V_A = 5.6 V}$$

Note: sign convention for Kirchoff's law,

- (i) change of potential in transversing a resistance in the direction of current is  $(-IR)$  while in the opposite direction is  $(+IR)$
- (ii) change of potential in traversing an e.m.f source from negative to positive terminal is  $+E$  while in the opposite direction  $-E$  irrespective of direction of current.