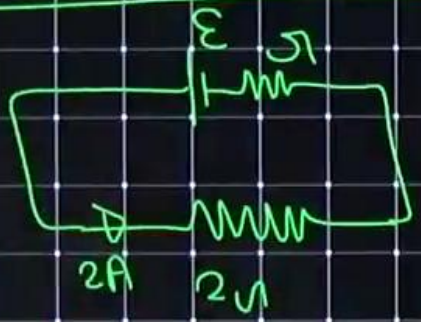
Q1:- A Current of 2A flow through a 2Ω resistor when connected across a battery. The same battery supplies a current of 0.5A when connected across a 9Ω resistor. The internal resistance of battery.

(a) 0.5Ω.

(b) 1/3Ω.

(c) 1/4Ω.

(d) 1Ω



$R_{eq} = r + 2$

$\varepsilon_{net} = \varepsilon$

$2(r+2) = 0.5(r+9)$

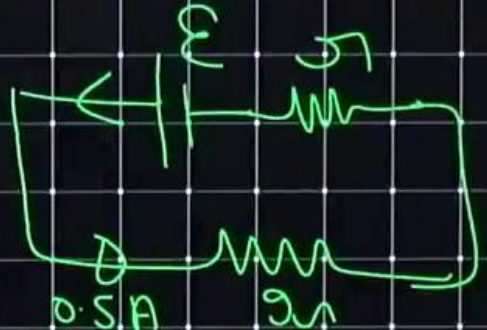
$2r + 4 = 0.5r + 4.5$

$1.5r = 0.5$

$r = \frac{1}{3}$ Ohm

$2A = \frac{\varepsilon}{r+2}$ ---(1)

$\varepsilon = 2(r+2)$



$\varepsilon_{net} = \varepsilon$

$R_{net} = r + 9$

$i = \frac{\varepsilon}{r+9} \Rightarrow 0.5 = \frac{\varepsilon}{r+9}$

$\varepsilon = 0.5(r+9)$

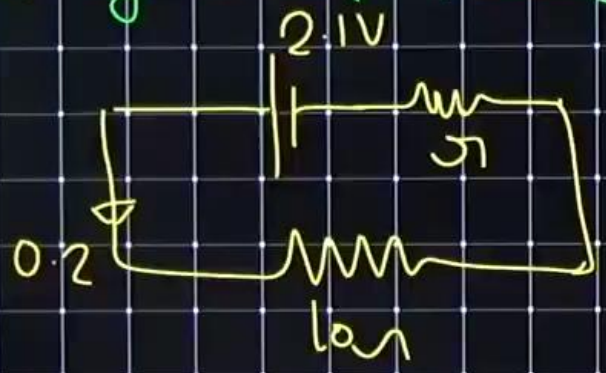
Q) NEET 2013 The internal resistance of a 2.1V cell which gi
a current of 0.2Amp through a resistance of 10Ω is

(a) 0.8Ω

(b) 1.0Ω

(c) 0.2Ω

(d) 0.5Ω



$E_{net} = 2.2$ Volt

$R_{eq} = r + 10$

$i = \frac{E_{net}}{R_{eq}} \Rightarrow 0.2 = \frac{2.1}{r+10}$

$0.2r + 2 = 2.1$

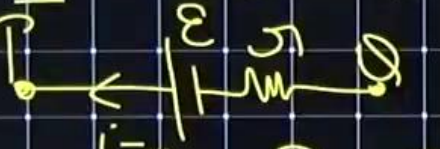
$0.2r = 0.1$

$r = \frac{0.1}{0.2} = \frac{1}{2} = 0.5\Omega$

Q3) AIPMT

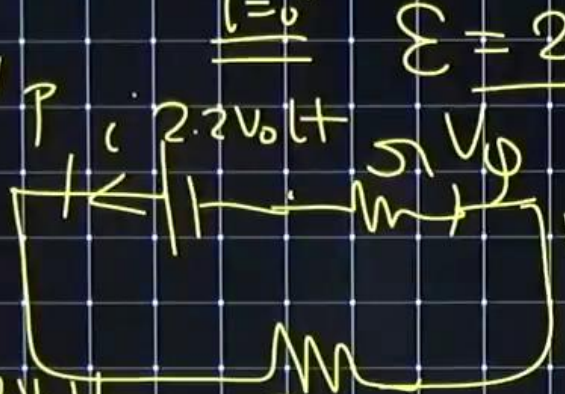
For a cell terminal potential difference is 2.2V when ckt is open & reduce to 1.8V when cell is connected a resistance of 5Ω. Determine internal resistance of cell

(a) 1/9 Ω.
(b) 9/10 Ω.
(c) 11/9 Ω
(d) 5/9 Ω.



$V_P - V_\phi = T.P = \varepsilon_{emf}$

$\varepsilon = 2.2$ Volt



$V_P - V_\phi =$

$V_P - V_\phi = 1.8$ Volt

$\varepsilon - Ir = 1.8$ Volt

open ckt
$T.P = \varepsilon$

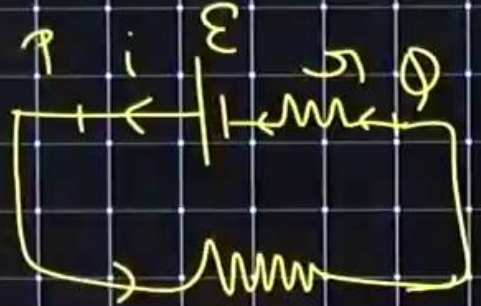
discharging
$T.P = \varepsilon - Ir$
$T.P < \varepsilon$

Charging
$T.P > \varepsilon$
$T.P = \varepsilon +$

2.2 V, 5Ω

$\mathcal{E} = 2.2$ Volt

$\mathcal{E} - i5 = 1.8$ Volt



$V_P - V_Q = T.P.$

$V_P - V_Q = 1.8$ Volt

$V_P - \mathcal{E} + i5 = V_Q$

$V_P - V_Q = \mathcal{E} - i5$

$i = \frac{\mathcal{E}}{5+5}$

$2.2 - \left(\frac{2.2}{5+5}\right)5 = 1.8$ Volt

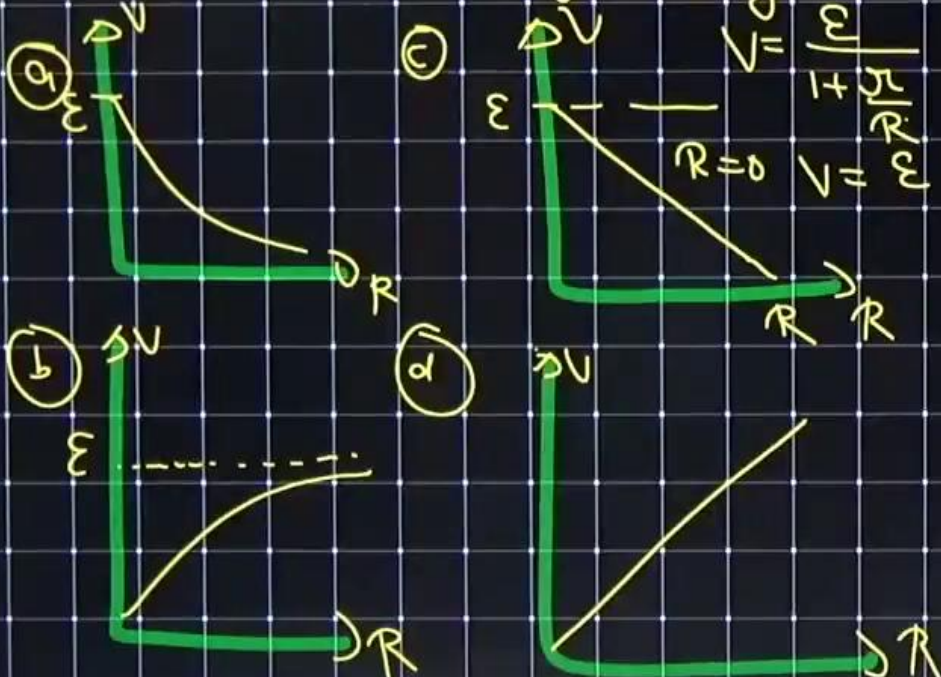
$2.2 - 1.8 = \frac{2.2(5)}{5+5}$ $\Rightarrow .4(5+5) = 2.2(5)$

$.4 = \frac{2.2(5)}{5+5}$ $2 = .18(5)$

$5 = \frac{20}{18}$

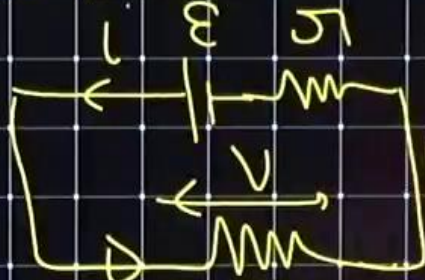
$5 = \frac{10}{9}\Omega$

Q) A Cell having an emf ε & intend resistance r is connected across a variable extend resistance R. As the Resistance R in increased, the plot of potential difference V across R is given by



$V = \frac{\varepsilon}{1 + r/R}$

$V = \varepsilon$



$\varepsilon_{net} = \varepsilon$

$R_{eq} = r + R$

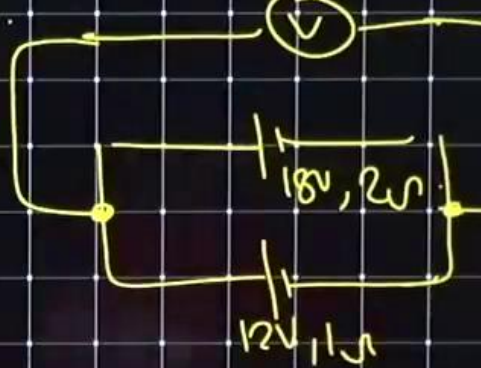
$i = \frac{\varepsilon}{r + R}$

$V = iR = \left(\frac{\varepsilon}{r+R}\right) R = \left(\frac{\varepsilon}{r+R}\right) R$

$V = \frac{\varepsilon}{\frac{r}{R} + \frac{R}{R}}$

$V = \frac{\varepsilon}{1 + r/R}$

(#) Two battery, one of Emf 18 Volt & internal resistance 2Ω other of Emf 12 Volt & internal resistance 1Ω, are connected as shown. The Voltmeter V will record of



(a) 30V.

(b) 18 Volt.

(c) 15 Volt

(d) 19 Volt.

$$\mathcal{E}_{net} = \frac{\mathcal{E}_1 r_2 + \mathcal{E}_2 r_1}{r_1 + r_2}$$

$$= \frac{18 \times 1 + 12 \times 2}{2 + 1}$$

$$= \frac{18 + 24}{3} = 6 + 8 = 19 \text{ Volt}$$