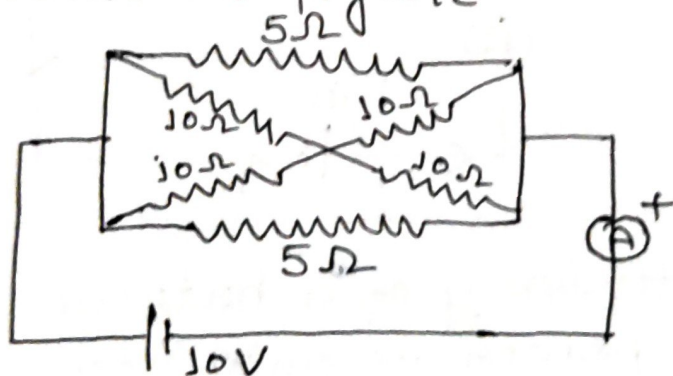


Current Electricity

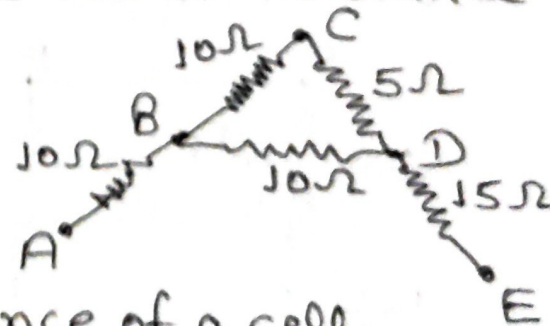
[PHYSICS BY RAJAT SACHDEV] [9580951094]

- ① Define the terms current ~~etc~~ density, conductance and conductivity. Write their S.I. units. Express Ohm's law in vector form.
- ② A wire of resistance $4R$ is bent in the form of a circle. What is the effective resistance between the ends of the diameter? [Ans - R]
- ③ A set of n identical resistors, each of resistance $R \Omega$, when connected in series have an effective resistance $X \Omega$ and when the resistors are connected in parallel, their effective resistance is $Y \Omega$. Find the product of X and Y . [Ans - R^2]
- ④ Calculate the current shown by ammeter A in the circuit in figure [Ans - $5A$]



- ⑤ Letter A as shown in figure has resistances on each side of arm. Calculate the total resistance between two ends of the legs. [Ans - 31Ω]

[9580951094]

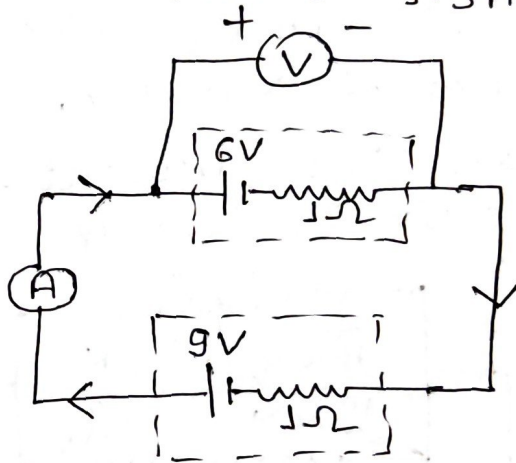
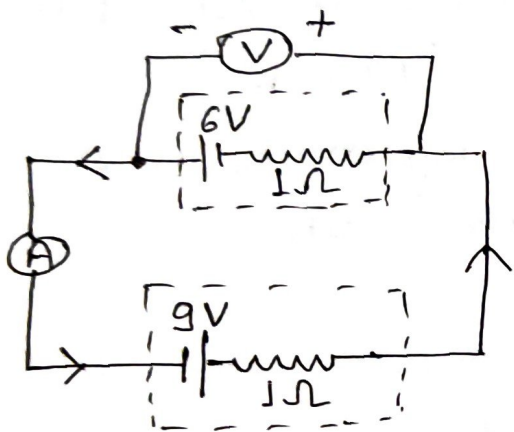


- ⑥ Define terminal potential difference of a cell. Derive a relation between the internal resistance, emf and terminal potential difference of a cell. Draw (i) E vs R (ii) V vs R (iii) V vs I graphs for a cell and explain their significance.

⑦ A battery of emf 12V and internal resistance 4Ω is connected to an external Resistance R . If the current in the resistance is 0.5A . Calculate the value of (a) R and (b) terminal voltage of the battery. [Ans (a) 20Ω (b) 10V]

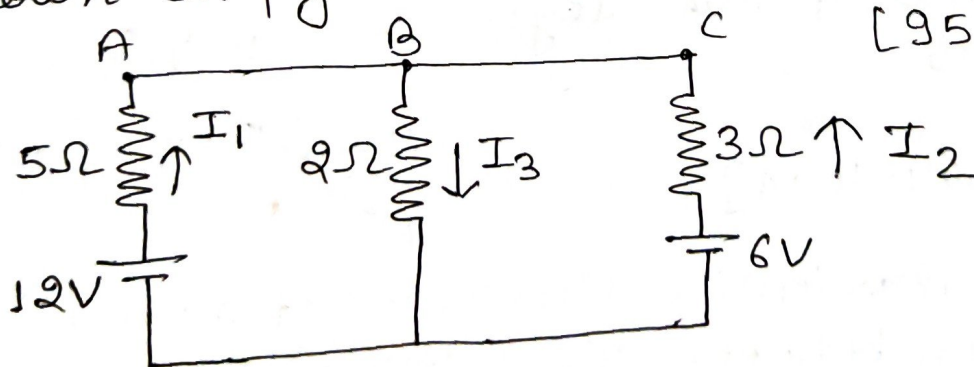
⑧ Derive condition for maximum current from a series combination of cells. [9580951094]

⑨ In the two electric circuits shown in figure, determine the readings of ideal ammeter (A) and the ideal voltmeter (V). [Circuit a $\rightarrow 7.5\text{A}, -1.5\text{V}$
Circuit b $\rightarrow 1.5\text{A}, 7.5\text{V}$]



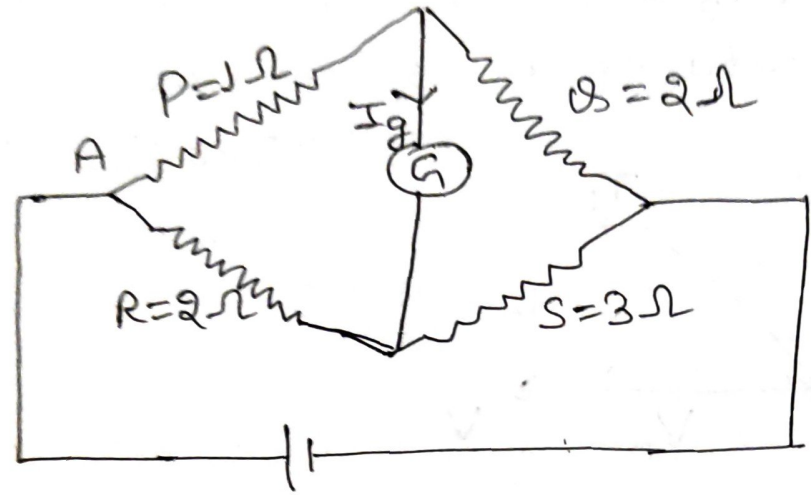
⑩ Show that the efficiency of a battery when delivering maximum power is only 50%.

⑪ Using Kirchhoff's laws in the electrical network shown in figure. Calculate the value of I_1, I_2 & I_3 . [9580951094]



$$[I_1 = \frac{48}{31}\text{A}, I_2 = \frac{18}{31}\text{A}, I_3 = \frac{66}{31}\text{A}]$$

12) In a wheatstone bridge, $P=1\Omega$, $Q=2\Omega$, $S=3\Omega$ and $R=4\Omega$. Find the current through the galvanometer in the unbalanced position of the bridge, when a battery of $2V$ and internal resistance 2Ω is used. [9580951094]



[Ans - $\frac{1}{91}$ Amp]

13) Twelve wires each having a resistance of 3Ω are connected to form a cubical network. A battery of $10V$ and negligible internal resistance is connected across the diagonally opposite corners of this network. Determine its equivalent resistance and the current along each edge of the cube. [4/3A, 2/3A]

14) The current flowing through a conductor is $2mA$ at $50V$ and $3mA$ at $60V$. Is it an ohmic or non-ohmic conductor? [9580951094]

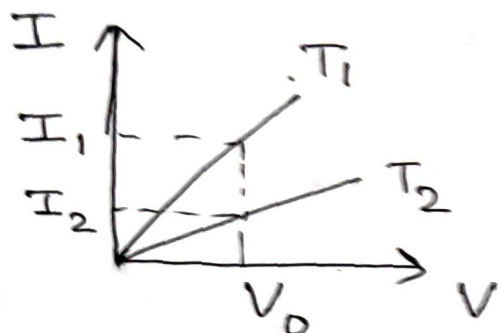
15) Two wires of equal cross-sectional area, one of copper and other of manganin have the same resistance. Which one will be longer?

16) Two wires of the same material having lengths in the ratio $1:2$ and diameters in the ratio $2:3$ are connected in series with an accumulator. Compute the ratio of P.D. across the two wires. [A - 9:8]

17) If the current supplied to a variable resistor is constant, draw a graph between voltage and resistance.

18) I-V graph for a metallic wire at two different temperatures, T_1 and T_2 is as shown in figure which of the two temperatures is lower and why?

[9580951094]



19) A conductor of length l is connected to a d.c. source of emf \mathcal{E} . If the length of the conductor is tripled by stretching it, keeping \mathcal{E} constant explain how its drift velocity would be affected.

[Am-1/3]

