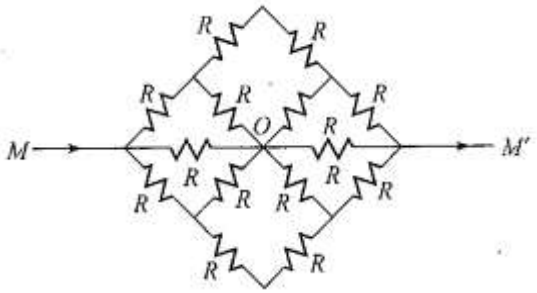
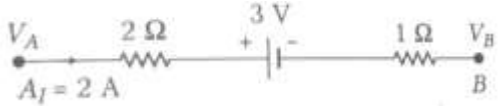
Assignment Current Electricity

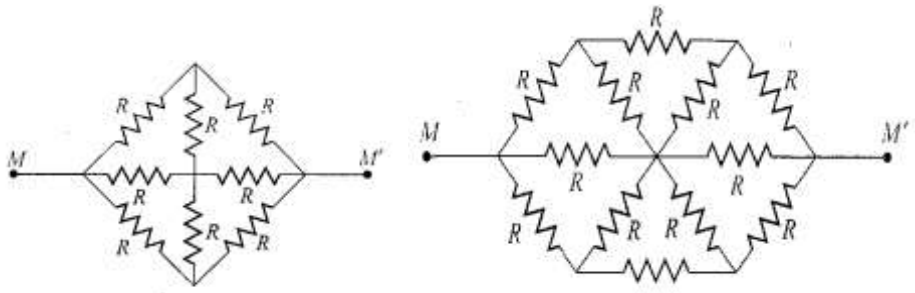
1. A wire of mass m, length l, density d and area of cross section α is stretched in such a way that its length increases by 10% of its original value. Express the changed resistance in percentage.
2. A uniform copper wire of mass 2.23 x 10^{-3} kg carries a current of 1 Amp when 1.7 V is applied across it. Calculate the length and the area of cross section. If the wire is uniformly stretched to double its length; calculate the new resistance. Density of copper is 8.92 x 10^3 kg/m^3 and resistivity is 1.7 x 10^{-8}Ωm.
3. A copper wire has a square cross section of 6 mm on a side. The wire is 1 m long and carries a current of 3.6 Amp. the density of free electrons is 8. X 10^{28}/m^3. Calculate the magnitude of (a) the current density in the wire; (b) the electric field in the wire. (c) how much time is required for an electron to travel the length of the wire? (ρ= 1.72 x 10^{-8} Ωm)
4. Consider a wire of length 0.1 m with an area of cross section 1 mm^2 connected to 5 V. Evaluate the current flowing through the metallic wire where μ= 5 x 10^{-6} $m^2V^{-1}s^{-1}$, e=1.6 x 10^{-19}C and n=8 x $10^{28}m^{-3}$.
5. A resistance thermometer measures temperature with the increase in resistance of a wire of high temperature. If the wire is platinum and has a resistance of 10 Ω at 20° C and a resistance of 35 Ω in a hot furnace, find is the temperature of the furnace. ($\alpha_{platinum}$=0.0036°C^{-1})
6. The range of a voltmeter is 10 V and its internal resistance is 50Ω. To convert it to a voltmeter of range 15V, how much resistance needs to be added?
7. Find the equivalent resistance across the two points as shown in figure.



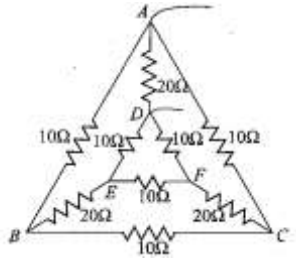
8. The charge flowing through a resistance R varies with time t as Q= at-bt^2, where a and b are positive constants. What is the total heat produced in in the resistance R?
9. What is the potential difference V_A-V_B between the points A and B as shown in figure?



10. In the given circuits calculate the resistance between the points M and M'



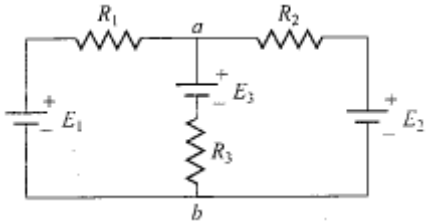
11. In fig the resistance are connected as shown. Determine the equivalent resistance between points A and D as shown in figure.



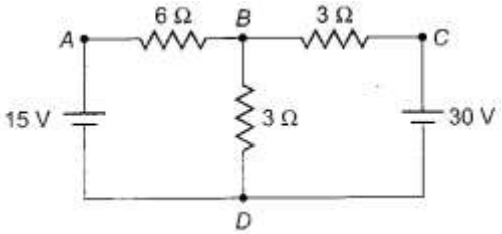
12. Calculate the current through each resistance in the given circuit. Also calculate the potential difference (p.d.) between the points a and b. (Apply mesh current)

$E_1 = 6\,V,$ $E_2 = 8\,V,$ $E_3 = 10\,V,$
$R_1 = 5\,\Omega,$ $R_2 = 10\,\Omega,$ $R_3 = 4\,\Omega$

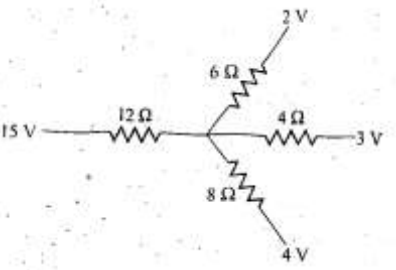
assume that all the cells have no internal resistance.



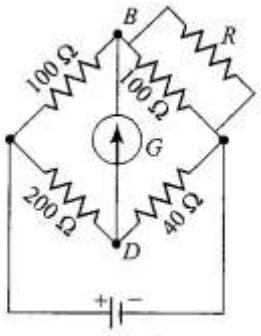
13. In the circuit shown in figure find the current through BD (Apply mesh current)



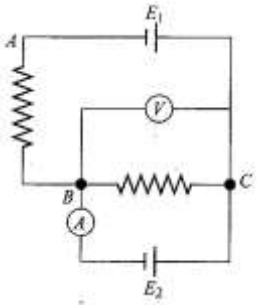
14. Find the current through the 12 Ω resistor as shown in figure.



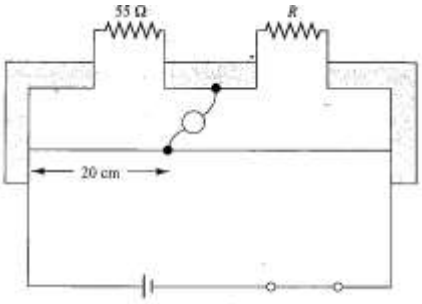
15. The given wheatstone bridge is showing no deflection in the galvanometer joined between points B and D in figure. Calculate the value of R. (Apply balance condition)



16. Two ideal batteries having emfs E_1 and E_2 are connected as shown in figure. The values of resistances are chosen in such a way that ammeter reading is zero. Determine will be the reading of voltmeter?



17. Figure shows a meter bridge set up with null deflection in the galvanometer. What is the value of the unknown resistor R in the figure?



18. Find the potential drop across the capacitor in the given circuit long time after switching on.