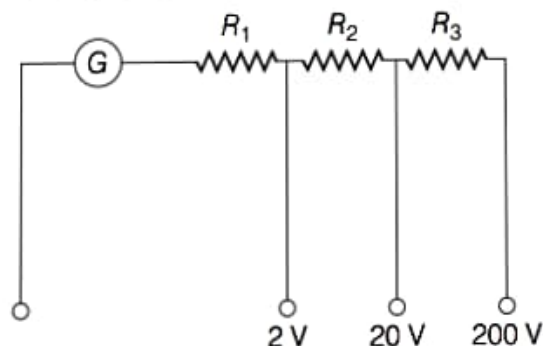


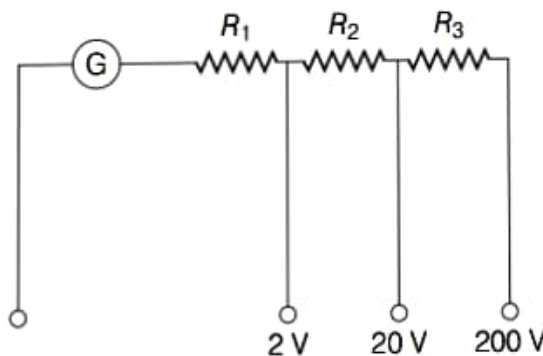
Q. 21A multirange voltmeter can be constructed by using a galvanometer circuit as shown in figure. We want to construct a voltmeter that can measure 2V, 20V and 200V using a galvanometer of resistance 10Ω and that produces maximum deflection for current of 1 mA. Find R_1 , R_2 and R_3 that have to be used.



K Thinking Process

A galvanometer can be converted into voltmeter by connecting a very high resistance wire connected in series with galvanometer. The relationship is given by $I_g (G + R) = V$ where I_g is range of galvanometer, G is resistance of galvanometer and R is resistance of wire connected in series with galvanometer.

Ans.



Applying expression in different situations

For $i_G (G + R_1) = 2$ for 2V range

For $i_G (G + R_1 + R_2) = 20$ for 20V range

and For $i_G (G + R_1 + R_2 + R_3) = 200$ for 200V range

On solving, we get $R_1 = 1990\Omega$, $R_2 = 18\text{k}\Omega$ and $R_3 = 180\text{k}\Omega$.