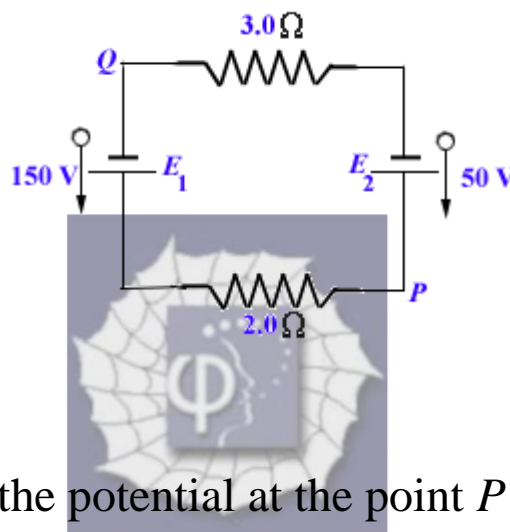**401.**

Problem 33.5 (RHK)

A DC circuit is shown in the figure. The potential at point P is 100 V. *We have to find the potential at the point Q.*

Solution:

It is given that the potential at the point P is 100 V. We have to find the potential at the point Q.

The direction of the current in the circuit will be determined by the source of larger emf. Let us go around the circuit in the counter clockwise direction from the point P. Let the current in the circuit be i A. We will add algebraically the changes in the potential as we trace the circuit from the point P. When we return to the point P the total change in the potential has to be zero. We have the equation

$V_P - E_2 - 3.0i + E_1 - 2.0i = 0,$

$V_P = 100$ V,

$E_1 = 150$ V,

and

$E_2 = 50$ V.

Or,

$(100 - 50 - 3i + 150 - 2i) = 0,$

and

$i = 20$ A.

The potential at the point Q will be

$V_Q = V_P - 50$ V $- 3 \times 20$ V $= (100 - 50 - 60)$ V $= -10$ V.