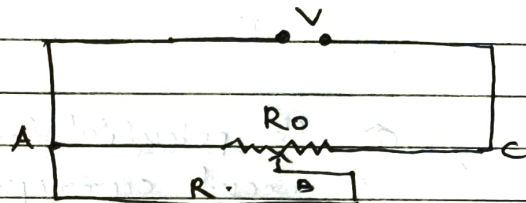


Potentiometer - Principle and its applications to measure P.D and for comparing EMF of two cells :-
(Current Electricity)

Home Assignment :-

Q1) $\frac{1}{R_1} = \frac{1}{R} + \frac{1}{R_0/2}$

$R_1 = \frac{RR_0}{2R+R_0}$



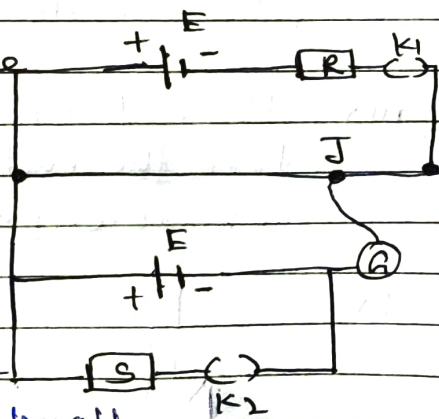
$I = \frac{V}{R_1 + \frac{R_0}{2}} = \frac{2V}{2R_1 + R_0}$

$V_1 = IR_1 = \frac{2V}{2R_1 + R_0} \times R_1 = \frac{2V}{2R_0 + R_0} \times \frac{RR_0}{2R+R_0} = \frac{2VR}{R_0+4R}$

Q2) X increases the value of resistance R in the setup by keeping the key K_1 closed and the key K_2 open?

Ans - By increasing the resistance R the current through AB decreases, so potential gradient decreases. Hence a greater length

of wire would be needed for balancing the same potential difference. So the null point would shift towards B.



(b) γ decreases the value of resistance S in the setup, while the key K_2 remains open and then K_1 closed.

Ans- By decreasing resistance S , the current through AB remains the same, potential gradient does not change. As K_2 is open so there is no effect of S on null point.

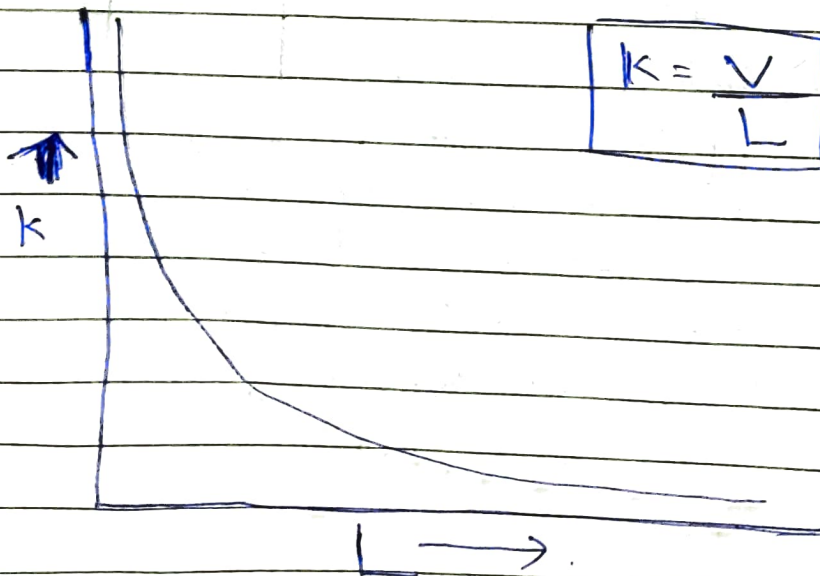
Q3(a) The potential drop across the length of a steady current carrying wire of uniform cross section is proportional to the length of the wire.

(i) we use a long wire to have a lower value of potential gradient i.e. a lower 'least count or greater sensitivity of the potentiometer.

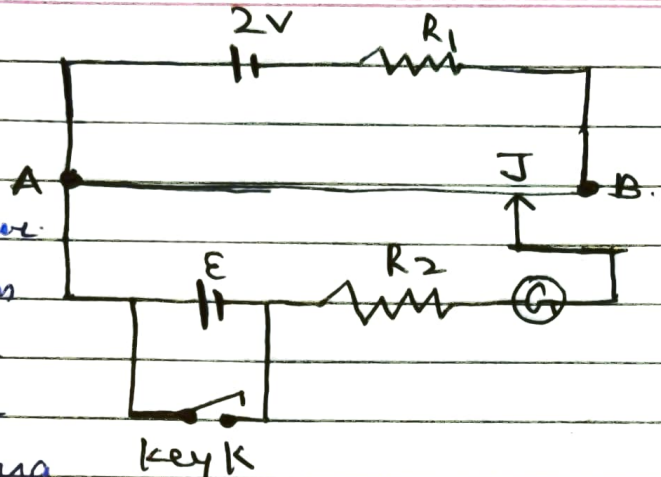
(ii) The area of cross-section has to be uniform to get a 'uniform wire' as per the principle of the potentiometer.

(iii) The emf of the driving cell has to be greater than the emf of the primary cells as otherwise no balance point would be obtained.

(b)



Q4) (a) The purpose of high resistance R_1 is to reduce the current through the galvanometer when key is far from the balance point, this saves the galvanometer and the cell from being damaged.



(b) When resistance R_1 is increased, the potential gradient of potentiometer wire decreases.

(c) (i) The balance point is not obtained because maximum emf across potentiometer wire is 2V.

(ii) When key is closed, the terminal potential difference of cell is zero, so balance point cannot be between A and B.

Q5) (i) Decreases (The potential gradient would increase)

(ii) Increases (The terminal across the cell would increase)

