17-21

Home Assignment

1. When the sliding contact is in middle, of resistance of $\frac{R_0}{2}$ is connected in series with a parallel combination of R and $\frac{R_0}{2}$

net resistance

$$R_{eq} = \frac{R_0}{2} + \frac{R_0}{2} \parallel R$$

current flowing through circuit is given by

$$I = \frac{V}{R_{eq}}$$

* Potential across R is given by:-

$$V_R = I\left(\frac{R_0}{2} \parallel R\right)$$

$$V_R = \frac{V}{R_{eq}}\left(\frac{R_0}{2} \parallel R\right)$$

$$k = \frac{R}{4R+R_0} V$$

Q.2

a) By increasing 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) By decreasing resistance S, the current through AB remains the same, potential gradient does not change As k is open so there is no effect of S on null point

Q.3

a)

Q.3

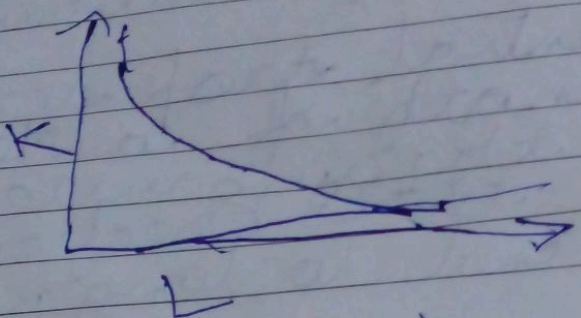
a) Principle of potentiometer:
The potential drop across the length of a steady current carrying wire of uniform cross-section is proportional to length of wire

i) We use a long wire to have a lower value of potential gradient it'll be 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 principle of the potentiometer

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

b) Potential gradient $\frac{V}{L} = V$
the required graph:-



Now as length increases, potential gradient will start decreasing.

Q.

a) The purpose of high resistance R is to reduce the current 2 through the galvanometer. When jockey is far from balance point this saves the galvanometer and the cell of Emf from being damaged.

b) When resistance R is decreased the potential gradient of potentiometer wire increases so balance point shift to longer length of wire

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

ii) When key (K) is closed the terminal potential difference of cell is zero, so balance point cannot be between A and B (since $V = K I$ & $I = 0$ for V/C)

Q.

a) Decreases (The potential gradient would increase)

b) Increases
Reason → The terminal potential difference across the cell would increase