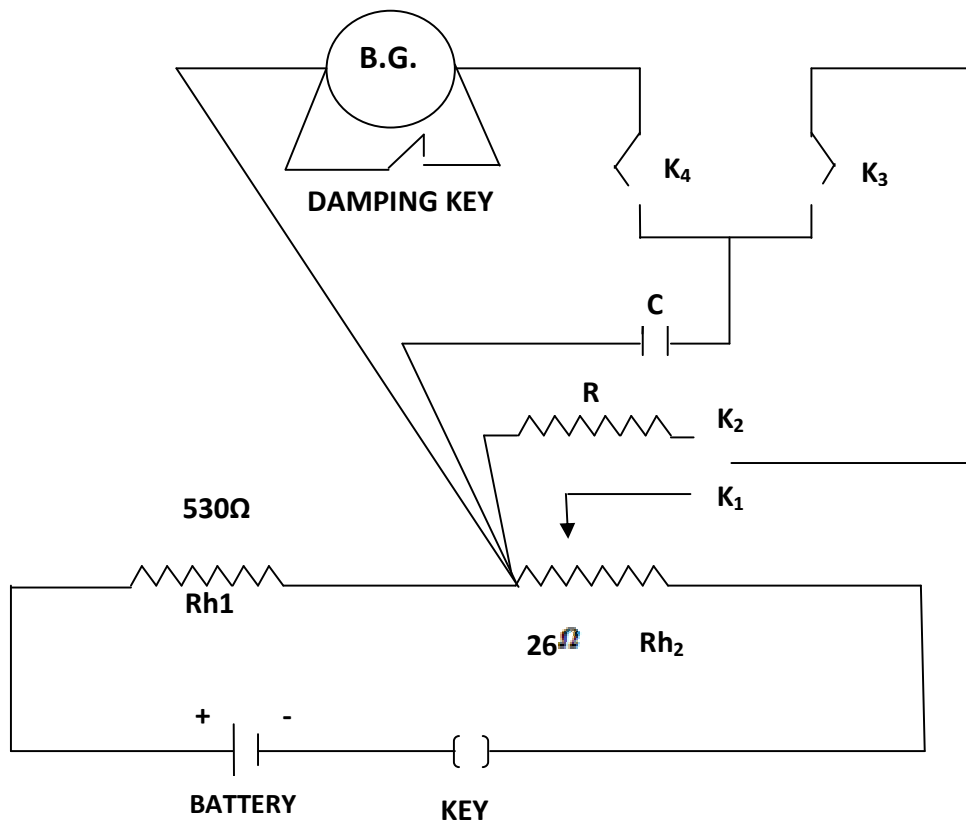# EXPERIMENT NO.8

OBJECT: To determine the high resistance by method of leakage of charge using a Ballistic galvanometer

APPARTUS: A Ballistics galvanometer, a battery, two rheostats, a standard capacitor, stop watch, keys and a resistor whose resistance is to be determined.

DIAGRAM

EXPERIMENTAL   SETUP

FORMULA: The resistance R of the given resistor is given by

$$R = \frac{t}{C.\log_e(\theta_0/\theta_t)} \text{ ohm}$$

Where,

t= time for which the charge on the capacitor is allowed to leak through the high resistance R

θ_0= first throw of the spot of light when the fully charged capacitor is discharged through the Ballistic Galvanometer.

θ_t= first throw of the spot of light when the fully charged capacitor is first discharged through the resistance R for a time t and then discharged through the Ballistics Galvanometer.

C= capacity of the given capacitor in farads.

PROCEDUR:

1. The spot of light of the Galvanometer is adjusted at zero of the scale

2. The connections are made as shown in the figure .Key k_1 is inserted and key k_3 is pressed. It will charge the condenser.

3. The key k_3 is released and k_4 is pressed. The first throw θ_0 is noted. The value of throw θ_0 is adjusted between 30 and 50 divisions with help of rheostat.

4. With the help of the damping key the motion of the spot is stopped. Key k_3 is pressed again to charge the condenser

5. Key k_1 is removed and k_2 is closed. Key $k_3$is pressed for a time t second, say 10 second. k_4 is pressed after releasing k_3. The first throw θ_t is noted.

6. For the same value of θ_0, θ_t is observed for two more values of t.

7. For a different set, the value of θ_0 is changed by varying the resistance of the rheostat and θ_t is observed for three different values of t.

OBSERVATIONS:

S.No.	Initial throw in B.G. θ_0 (degree)	Leakage time t (sec)	Throw θ_t (degree)	θ_0/θ_t	$\log_e(\theta_0/\theta_t)$	$t/\log_e(\theta_0/\theta_t)$ (sec)
1 2 3						
1 2 3						

Mean $t/\log_e(\theta_0/\theta_t)$ =   (sec)

CALCULTION:

C= (μF)   ;   t /$\log_e(\theta_0/\theta_t)$=   (sec)   ;   R=   (Ω)

RESULT:

Resistance of the given resistor=…………. **Ω**

PRECAUTION:

1. The Galvanometer coil should be free to rotate.

2. Damping key should be pressed when the spot is crossing zero of the scale.

3. Both the lower terminals of the high resistance rheostat are to be connected.

4. Charging of capacitor(as in step2)is essential before taking reading of θ_t(as in step5)