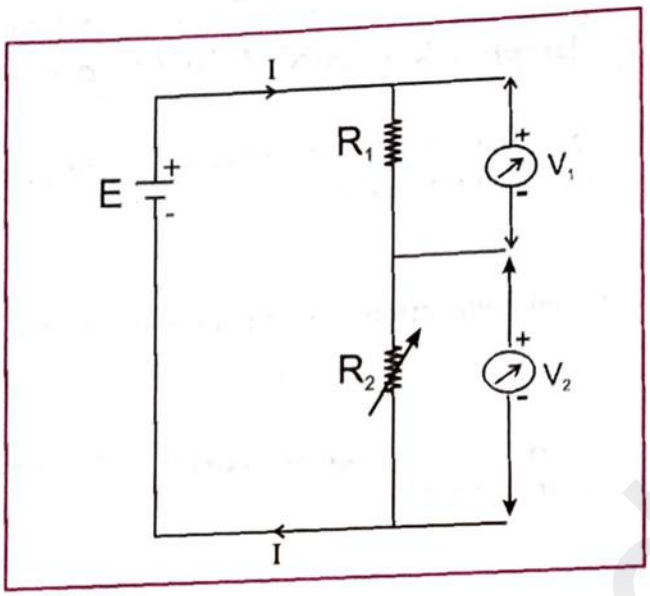
ACTIVITY NO. 8
STUDY OF POTENTIAL DIVIDER CIRCUIT

Aim: To study a potential divider circuit

Apparatus : 5 volts d.c. power supply with least count 0.1volt, 100 Ω, carbon resistor (1/4 watt ± 20% tolarence) and standard variable resistance box.

Circuit Diagram :



Theory:

The current in the above circuit is

$$I = \frac{E}{(R_1+R_2)}$$

Potential difference across resistor R_1 (100 Ω) is given as

$$V_1 = IR_1 = \frac{(E\,R_1)}{(R_1+R_2)}$$

Potential difference across the variable resistor is,

$$V_2 = IR_2 = \frac{(E\,R_2)}{(R_1+R_2)}$$

(R_2 is suitable resistance from resistance box)

Procedure :

1. Initially the resistance in the resistance box (R_2) is kept 0.
2. The voltmeter is connected across R_1 (100 Ω)and potential difference V_1 is noted.
3. The voltmeter is then connected across R_2 and potential difference V_2 is noted.
4. The steps (2) & (3) are repeated for 2 more values of R_2 (preferably 20 Ω and 40 Ω)

Observation :

R_1 = ~~0.007 Ω~~ 100 Ω

Observation table :

Obs. no.	Resistor R_2 Ω	Theoretical value of P.D.		Observed value of P.D.	
		Across $R_1 = \frac{(E R_1)}{(R_1+R_2)}$	Across $R_2 = \frac{(E R_2)}{(R_1+R_2)}$	Across R_1	Across R_2
1	0	5	0	0·5	0
2	20	4·1	0·1	4·2	0·8
3	40	3·5	3	3·5	1·5

Result : Theoretical and actually measured values of V_1 and V_2 nearly same.
Study of potential divider circuit is done.

Precautions:
Check that positive terminal connection of voltmeter with positive terminal of battery.

FOR NOTES

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 100}{100+0}$

$= \frac{500}{100}$

$= 5$

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 100}{100+20}$

$= \frac{500}{120}$

$= 4$

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 100}{100+40}$

$= \frac{500}{140} = 3.5$

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 0}{100+0}$

$= 0$

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 20}{100+20}$

$= \frac{100}{200}$

$= 0.9$

$R_1 = \left(\frac{E R_1}{R_1+R_2}\right)$

$= \frac{5 \times 40}{100+40} = \frac{200}{140}$

$= 1.5$

Remark and sign of teacher: .....