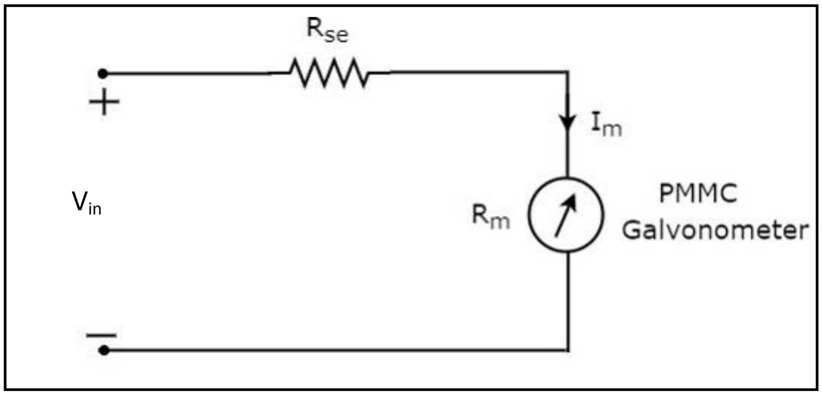
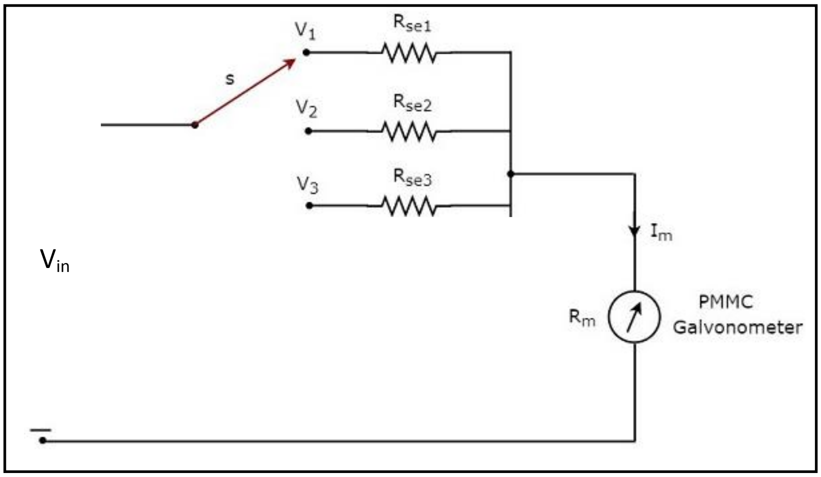
Title: Multi-range voltmeter.

Aim: To design, build, and test multi –range voltmeter.

Components: Resistors: 1KΩ, 10KΩ, 20KΩ, Galvanometer, breadboard etc.

Circuit diagram:





Theory:

R_{se} is the series multiplier resistance

$V = I_mR_m$ is the full range DC voltage that is to be measured

I_m is the full scale deflection current (0.5 to 0.7mA)

R_m is the internal resistance of galvanometer

If **I_m = 0.7mA**, then

$$V = I_m \times R_{in}$$

If Rin = 1KΩ, then maximum voltage the Galvanometer (PMMC) will can indicate for full scale deflection will be

$$V = (0.7 \times 10^{-3}) \times (1\times 10^{3}) = 0.7 \text{ Volt}$$

This means that 0.7V causes the full scale deflection of PMMC. If the range scale has to be changed, the input resistor value should be changed..

Thus by calibrating the face of the PMMC in volts, a dc voltmeter with a full-scale voltage range of 1 to 10 volt can be constructed. Only V_{in} and R_S determines value of Io i.e. full scale deflection.

Observation table:

Sr. No.	**Range 1**			**Range 2**			**Range 3**		
	For Voltage Range 0.7V R=1000Ω = 1KΩ L.C.= 0.028V/div.			For Voltage Range 5.5V R= 10000 Ω = 10KΩ L.C.= 0.22V/div.			For Voltage Range 10V R= 20000 Ω = 20KΩ L.C.= 0.4V/div.		
	Input voltage (Volt)	Current meter deflection (mA)	Output voltage (Volt) L.C.×Div.	Current meter deflection (mA)	Output voltage (Volt)	Output voltage (Volt) L.C.×Div.	Input voltage (Volt)	Current meter deflection (mA)	Output voltage (Volt) L.C.×Div.
1									
2									
3									
4									
5									
6									
7									
8									
9									

Result: Multi-range voltmeter is designed, built, and tested.