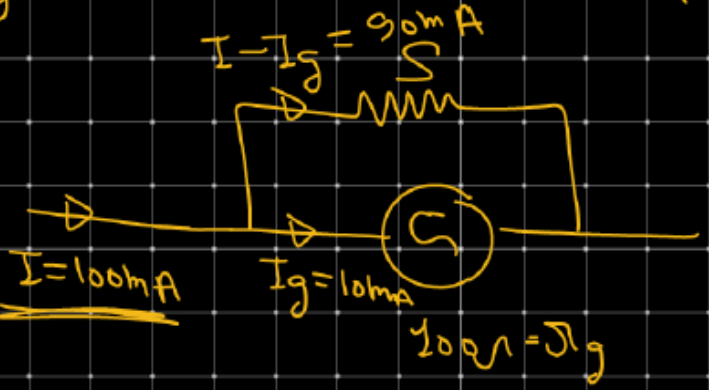
Q1: A galvanometer of 100Ω resistance yields Complete deflection when 10mA Current flows. What should be the value of Shunt so that it can measure Currents upto 100mA?

(a) 9.9Ω.

(b) 9.9Ω.

(c) 11.11Ω.

(d) 11Ω.



$$(I-I_g)S = I_g R_g$$

$$(100-10)S = 10mA \times 100$$

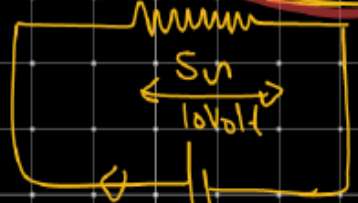
$$9mA \times S = 10mA \times 100$$

$$S = \frac{100}{9}\ \Omega$$

$$S = 11.11\ \Omega$$

(#) Conversion of Galvanometer into voltmeter :-

↳ for ideal voltmeter resistance is ∞



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⇒ Voltmeter Connected with resistance in parallel.

$$R_{eq} = \frac{R_V \times 5}{R_V + 5} = \frac{5}{\frac{R_V + 5}{R_V}}$$

$R_{eq} < 5\Omega$

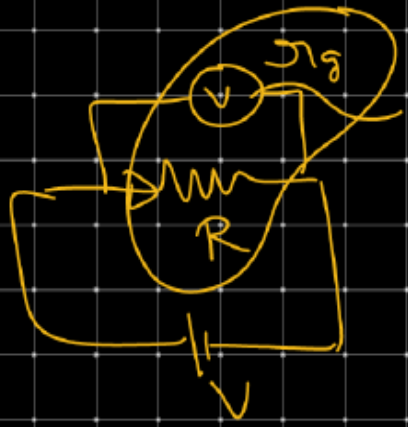
⇒ R_V ⇒

$$R_{eq} = \frac{5}{\frac{R_V + 5}{R_V}} = \frac{5}{1 + \frac{5}{R_V}}$$

$R_V \to \infty$

$$R_{eq} = \frac{5}{1 + \frac{5}{\infty}} = \frac{5}{1 + 0} = 5\Omega$$

(#)



$r_g = \infty$ ⇒ ideal voltmeter

$$R_{eq} = \frac{r_v \times R}{r_v + R}$$

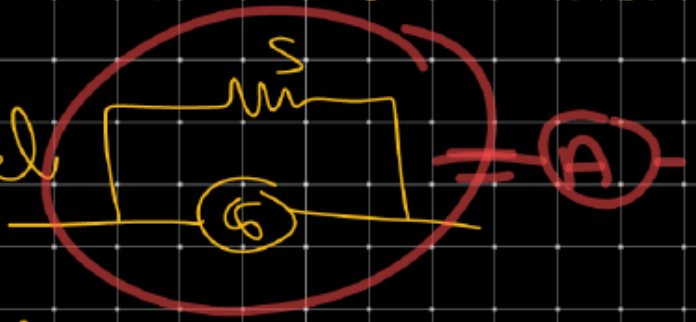
$$R_{eq} = \frac{R}{\frac{r_v + R}{r_v}}$$

$$R_{eq} = \frac{R}{\frac{r_v}{r_v} + \frac{R}{r_v}} = \frac{R}{1 + \frac{R}{r_v}} = \frac{R}{1 + 0} = R$$

$r_v = \infty$ ⇒ $\frac{R}{R_v} = \frac{R}{\infty} = 0$

Q [AIPMT] To convert a galvanometer into a ammeter, one has needs to convert a.

(a) Low resistance in Parallel



(b) high resistance in Parallel

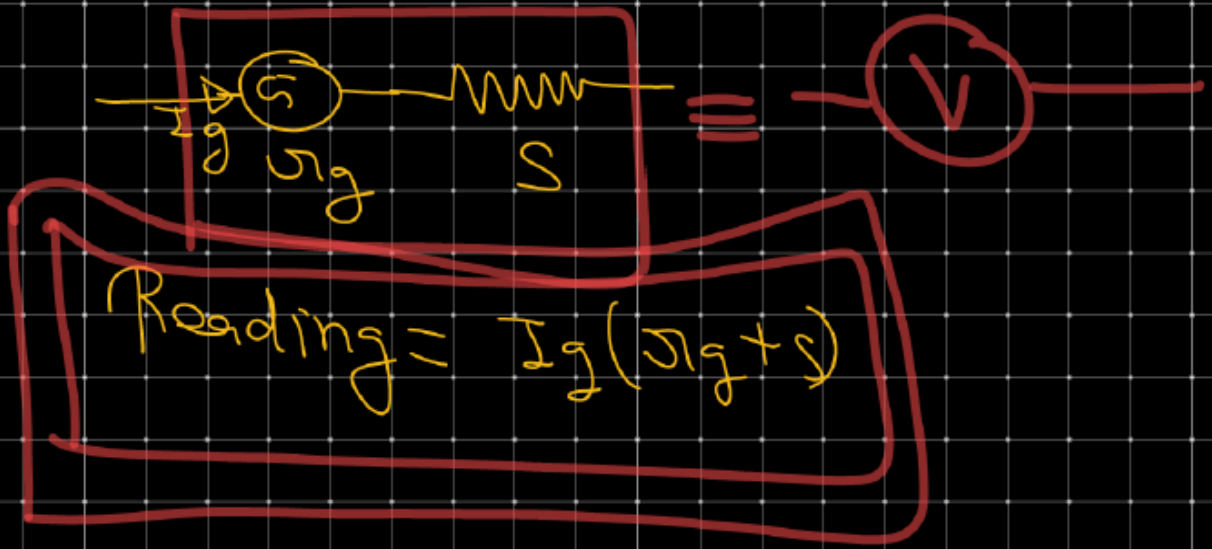
(c) low resistance in Series.

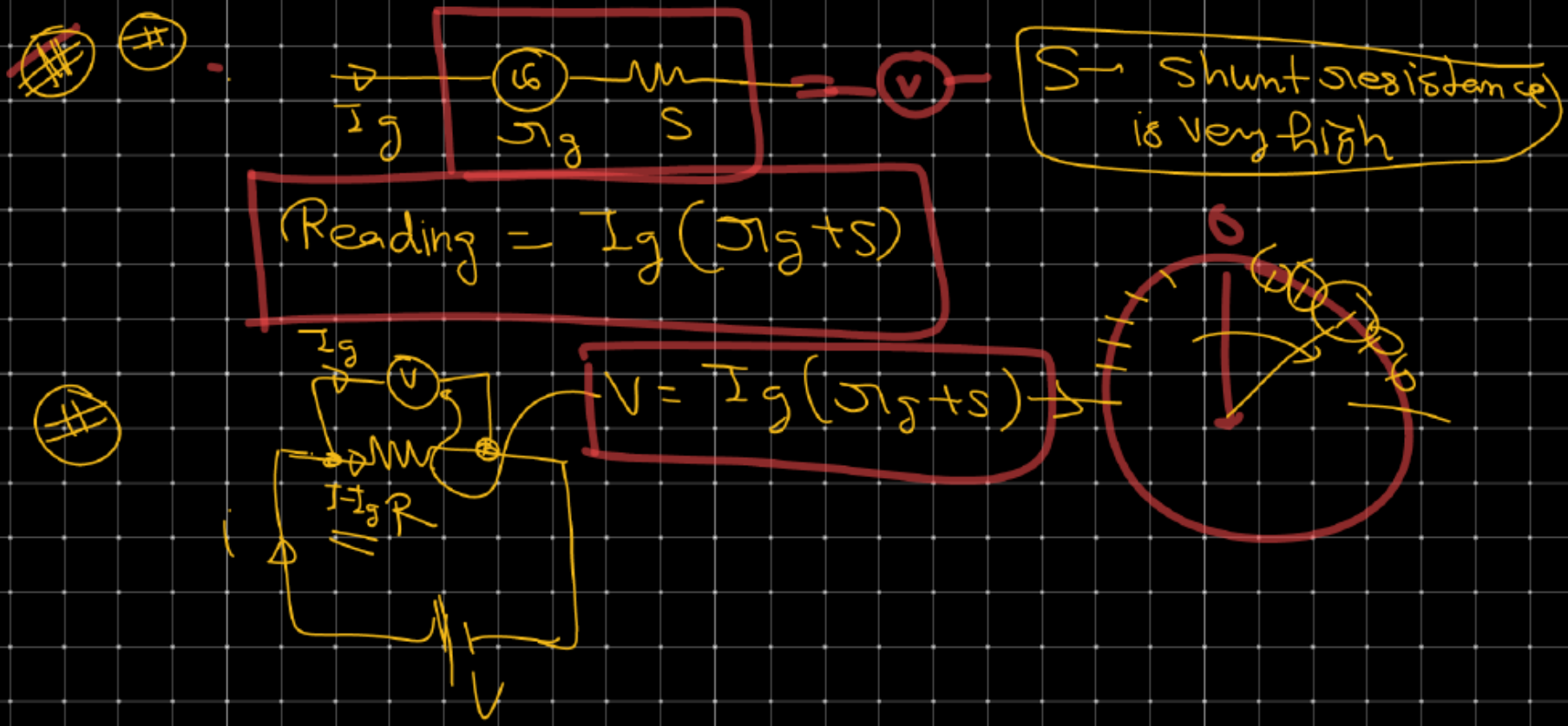
(d) high resistance in Series.

⇒ Conversion of Galvanometer into voltmeter

↳ **For ideal** Voltmeter resistance is ∞

↳ If practical voltmeter resistance is very high.




Ig
G
Rg
S
V
S → Shunt resistance is very high
Reading = Ig(Rg+S)
Ig
V
I-Ig
R
V = Ig(Rg+S)

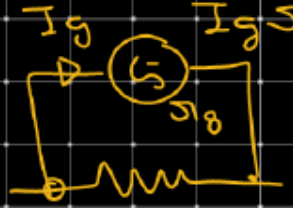
9) The resistance of galvanometer is G ohms & the range is 1 Volt. The value of resistance (in Ω) used to convert it into voltmeter of range 10 Volt is

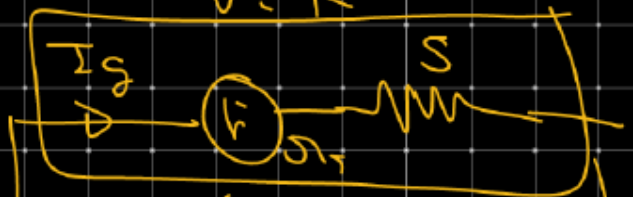
(a) 9G

(b) G

(c) $\frac{1}{9}$G

(d) 10G





$I_g(R_g + S) = 10\,Volt$

$\frac{1}{G}(G + S) = 10$

$(G + S) = 10G$

$S = 9G$

Q) 1 Ω Voltmeter has a range of 1V. find the additional resistance which has to be joined with the series in voltmeter to increase the range of Voltmeter to 100V.

(a) 10 Ω.

(b) $\frac{1}{99}$ Ω.

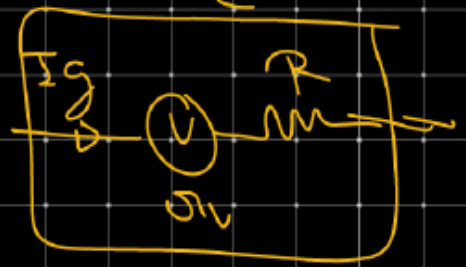
(c) 99 Ω

(d) 100 Ω.

≡

$S_V = 1\Omega$

$I_g \times S_V = 1$ Volt. $I_g = \frac{1}{S_V}$



$I_g \times (S_V + R) = 100$ Volt

$\frac{1}{S_V}(1+R) = 100$

$\Rightarrow (1+R) = 100 \quad R = 99\Omega$