QUES 03:-

Two moving coil meters, M_1 and M_2 have the following particulars: $R_1 = 10\Omega$; $N_1 = 30$, $A_1 = 3.6 \times 10^{-3} m^2$, $B_1 = 0.25T$, $R_2 = 14\Omega$, $N_2 = 42$, $A_2 = 1.8 \times 10^{-3} m^2$, $B_2 = 0.50T$

(The spring constants k are identical for the two meters).

Determine the ratio of

a. current sensitivity and

b. voltage sensitivity of M_2 and M_1.

Sol.

a. Current sensitivity of first meter,

$$A = \frac{\theta}{I} = \frac{B_1 A_1 N_1}{k} = \frac{0.25 \times 3.6 \times 10^{-3} \times 30}{k}$$

$$= \frac{27 \times 10^{-3}}{k} \text{ ...(i)}$$

Current sensitivity of second meter,

$$B = \frac{\theta}{I} = \frac{B_2 A_2 N_2}{k} = \frac{0.50 \times 1.8 \times 10^{-3} \times 42}{k}$$

$$= \frac{37.8 \times 10^{-3}}{k} \text{ ...(ii)}$$

Ratio of current sensitivity $\left(\frac{B}{A}\right) = \frac{37.8 \times 10^{-3}}{k} \times \frac{k}{27 \times 10^{-3}}$ = 1.4

b. Voltage sensitivity of first meter

$$= \frac{\theta}{V} = \frac{\theta}{I \cdot R} = \frac{27 \times 10^{-3}}{k \times 10} = \frac{2.7 \times 10^{-3}}{k}$$

Voltage sensitivity of second meter

$$= \frac{\theta}{R \cdot I} = \frac{37.8 \times 10^{-3}}{k \times 10} = \frac{2.7 \times 10^{-3}}{k}$$

Hence, the ratio of voltage sensitivity = 1