Answer on Question #60574, Physics / Other

The value of G in cgs system is 6.67multiplied by 10 rise to -8. Find its value in mks system by dimensional analysis

Solution:

The dimensions of the universal gravitational constant is $[M^{-1} L^3 T^{-2}]$.

The centimetre–gram–second system of units (abbreviated CGS or cgs) is a variant of the metric system based on the centimetre as the unit of length, the gram as the unit of mass, and the second as the unit of time.

The value of G in cgs system is $6.67 \cdot 10^{-8}$ $g^{-1}cm^3s^{-2}$.

To find its value im mks units, we have to write

$$6.67 \cdot 10^{-8} \text{ g}^{-1}\text{cm}^3\text{s}^{-2} = x \text{ kg}^{-1}\text{m}^3\text{s}^{-2}$$

$$x = 6.67 \cdot 10^{-8} \frac{\text{kg}}{\text{g}} \left(\frac{\text{cm}}{\text{m}}\right)^3 = 6.67 \cdot 10^{-8} \cdot \frac{1000}{1} \cdot \left(\frac{1}{100}\right)^3 = 6.67 \cdot 10^{-8} \cdot \frac{1}{1000} = 6.67 \cdot 10^{-11}$$

$$G = 6.67 \cdot 10^{-11} \text{ mks units}$$

Answer: $G = 6.67 \cdot 10^{-11}$ mks units