

Solution

$T_1.$

$$\begin{array}{llll} 1.0751 \rightarrow 1.08 & 0.86249 \rightarrow 0.862 & 27.051 \rightarrow 27.1 & 8.971 \times 10^{-6} \rightarrow 8.97 \times 10^{-6} \\ 3.14501 \rightarrow 3.15 & 52.62 \rightarrow 52.6 & 10.850 \rightarrow 10.8 & 0.46350 \rightarrow 0.464 \end{array}$$

$T_2.$ (1) $L = (12.83 \pm 0.35)cm$

(2) $m = (1.5 \pm 0.1) \times 10^3 kg$

(3) $I = (38.75 \pm 0.02)mA$

(4) $0.50m = 50cm = 5.0 \times 10^2 mm$

(5) $g = (980.125 \pm 0.004)cm/s^2$

(6) $R = 6371km = 6.371 \times 10^6 m$

$T_8.$ (1)

$$\begin{aligned} N &= 382.02 + 5 \times 1.03754 - 3 \times 56.4 \times 0.001036 \\ &= 382.02 + 5.18770 - 168 - 0.004144 \\ &= 219 \end{aligned}$$

(4) $u(x) = 0.0001rad \quad y = \sin x \quad dy = \cos x dx$

$$u(y) = \cos x u(x) = 0.00007$$

$$\therefore \sin x = 0.70583$$

(6) $\frac{(142.2 + 1.08) \times 4.03}{5964 - 4720.0} = \frac{143.3 \times 4.03}{1244} = \frac{577}{1244} = 0.464$

$T_{11}.$ (2)

$$f = \frac{x-y}{x+y}$$

$$\ln f = \ln(x-y) - \ln(x+y)$$

$$\frac{u(f)}{f} = \sqrt{\left(\frac{1}{x-y} - \frac{1}{x+y}\right)^2 u^2(x) + \left(-\frac{1}{x-y} - \frac{1}{x+y}\right)^2 u^2(y)}$$

$$= \sqrt{\left(\frac{2y}{x^2-y^2}\right)^2 u^2(x) + \left(\frac{2x}{x^2-y^2}\right)^2 u^2(y)}$$

$$\therefore u(f) = \frac{x-y}{x+y} * \frac{2}{x^2-y^2} \sqrt{y^2 u^2(x) + x^2 u^2(t)}$$

$$= \frac{2}{(x+y)^2} \sqrt{y^2 u^2(x) + x^2 u^2(y)}$$

(7)

$$\begin{aligned} E &= \frac{MgL}{\pi r^2 L} \\ \ln E &= \ln \frac{g}{\pi} + \ln M + \ln l - 2 \ln r - \ln L \\ \frac{u(E)}{E} &= \sqrt{\left(\frac{1}{M}\right)^2 u^2(M) + \left(\frac{1}{l}\right)^2 u^2(l) - \left(\frac{2}{r}\right)^2 u^2(r) - \left(\frac{1}{L}\right)^2 u^2(L)} \\ \therefore u(E) &= \frac{MgL}{\pi r^2 L} \sqrt{\left(\frac{1}{M}\right)^2 u^2(M) + \left(\frac{1}{l}\right)^2 u^2(l) - \left(\frac{2}{r}\right)^2 u^2(r) - \left(\frac{1}{L}\right)^2 u^2(L)} \end{aligned}$$

$$T_{12}. \quad (1) \quad m = (201.750 \pm 0.001)kg = (201750 \pm 1)g$$

$$(2) \quad \rho = (1.293 \pm 0.005)g/cm^3 = (1.293 \pm 0.005)kg/m^3 = (1.293 \pm 0.005)g/L$$

$$(3) \quad t = (12.9 \pm 0.1)s = (0.214 \pm 0.002)min$$

$$T_{14}. \quad (1) \quad \rho = \frac{m}{V} = \frac{m}{\pi\left(\frac{d}{2}\right)^2 h} = 11.08g/cm^3$$

$$(2) \quad \ln u(\rho) = \ln m - \ln \pi - \ln \frac{d^2}{4} - \ln h \\ \therefore u(\rho) = 0.010 \times 11.08 = 0.11$$

$$(3) \quad \rho = (11.08 \pm 0.11)g/cm^3$$