Problem 11

(I) Write the following as full (decimal) numbers with standard units: (a) 286.6 mm, (b) 85 μV, (c) 760 mg, (d) 60.0 ps, (e) 22.5 fm, (f) 2.50 gigavolts.

Solution

Part (a)

Convert millimeters to meters using dimensional analysis.

$$286.6 \text{ mm} = 286.6 \cancel{\text{mm}} \times \frac{1 \text{ m}}{1000 \cancel{\text{mm}}} = 0.2866 \text{ m}$$

Part (b)

Convert microvolts to volts using dimensional analysis.

$$85 \ \mu\text{V} = 85 \cancel{\mu\text{V}} \times \frac{1 \text{ V}}{10^6 \cancel{\mu\text{V}}} = 0.000085 \text{ V}$$

Part (c)

Convert milligrams to kilograms using dimensional analysis.

$$760 \text{ mg} = 760 \cancel{\text{mg}} \times \frac{1 \cancel{\text{g}}}{1000 \cancel{\text{mg}}} \times \frac{1 \text{ kg}}{1000 \cancel{\text{g}}} = 0.000760 \text{ kg}$$

Part (d)

Convert picoseconds to seconds using dimensional analysis.

$$60.0 \text{ ps} = 60.0 \cancel{\text{ps}} \times \frac{1 \text{ s}}{10^{12} \cancel{\text{ps}}} = 0.0000000000600 \text{ s}$$

Part (e)

Convert femtometers to meters using dimensional analysis.

$$22.5 \text{ fm} = 22.5 \cancel{\text{fm}} \times \frac{1 \text{ m}}{10^{15} \cancel{\text{fm}}} = 0.0000000000000225 \text{ m}$$

Part (f)

Convert gigavolts to volts using dimensional analysis.

$$2.50 \text{ GV} = 2.50 \cancel{\text{GV}} \times \frac{10^9 \text{ V}}{1 \cancel{\text{GV}}} = 2\,500\,000\,000 \text{ V}$$