DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH
DATE :

Solutions

SUBJECT : PHYSICS
DPP NO. : 3

Topic :- UNITS AND MEASUREMENTS

1 **(b)**

Given, $p = \frac{a - t^2}{bx}$ or $pbx = a - t^2$

By the law of homogeneity of dimensional equation.

Dimensions of $a =$ dimensions of $t^2 = [\mathrm{T}^2]$

Dimensions of $b =$ dimensions of $\frac{t^2}{px} = [\mathrm{M}^{-1}\mathrm{T}^4]$

So, dimensions of $\frac{a}{b}$ is $[\mathrm{MT}^{-2}]$.

2 **(d)**

$$f = \frac{uv}{u+v}, \frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v} + \frac{(u+v)}{u+v}$$

4 **(b)**

$$L = \frac{\emptyset}{I} = \frac{Wb}{A} = Henry$$

6 **(b)**

$r_1 = 10^{-15}\mathrm{m}, r_2 = 10^{26}\mathrm{m}$

Log $r = \frac{1}{2}[\log 10^{-15} + \log 10^{26}]$

$= \frac{1}{2}[-15 + 26] = 5.5 \approx 6 \Rightarrow r = 10^6\mathrm{m}$

7 **(d)**

The dimensions of $x =$ dimensions of $\frac{v_0}{A}$

Therefore, out of the given options v_0 has dimensions equal to $[\mathrm{M}^0\mathrm{LT}^{-1}]$ and A has dimensions equal to $[\mathrm{M}^0\mathrm{L}^0\mathrm{T}^{-1}]$

So, that $\frac{[v_0]}{[A]} = \frac{[\mathrm{M}^0\mathrm{LT}^{-1}]}{[\mathrm{M}^0\mathrm{L}^0\mathrm{T}^{-1}]} = [L]$

$=$ dimension of x

8 **(c)**

$1\ nm = 10^{-9}\ m = 10^{-7} cm$

9 **(c)**

Electric potential $V = IR, [R] = \left[\frac{V}{I}\right] = \left[\frac{\text{Work done}}{\text{Charge } \times \text{I}}\right]$

$= \frac{[\text{ML}^2\text{T}^{-2}]}{[\text{A}^2\text{T}]} = [\text{ML}^2\text{T}^{-3}\text{A}^{-2}]$

10 **(d)**

According to Planck's hypothesis

$$E = hv$$

Or $h = \frac{E}{v}$

Substituting the dimensions of energy E and frequency v, we get

$$[\text{h}] = \frac{[\text{ML}^2\text{T}^{-2}]}{[\text{T}^{-1}]}$$

$\therefore$ $[\text{h}] = [\text{ML}^2\text{T}^{-1}]$

12 **(a)**

The dimension of $y = \frac{e^2}{4\pi\varepsilon_0 \text{h} c}$

Putting the dimensions of

$$[e] = [Q] = [\text{AT}]$$

$$[\varepsilon_0] = [\text{M}^{-1}\text{L}^{-3}\text{T}^4\text{A}^2], h = [\text{ML}^2\text{T}^{-1}], c = [\text{LT}^{-1}]$$

$$y = \frac{[\text{A}^2\text{T}^2]}{[\text{M}^{-1}\text{L}^{-3}\text{T}^4\text{A}^2][\text{ML}^2\text{T}^{-1}][\text{LT}^{-1}]}$$

$$y = [\text{M}^0\text{L}^0\text{T}^0]$$

13 **(b)**

Volume $V = l \times b \times t$

$= 12 \times 6 \times 2.45 = 176.4\ cm^3$

$V = 1.764 \times 10^2\ cm^3$

Since, the minimum number of significant figure is one in breadth, hence volume will also contain only one significant figure. Hence, $V = 2 \times 10^2\ cm^3$

14 **(d)**

Percentage error in

$$A = \left(2\frac{\Delta a}{a} + 3\frac{\Delta b}{b} + \frac{\Delta c}{c} + \frac{1}{2}\frac{\Delta d}{d}\right) \times 100\%$$

$$= 2 \times 1 + 3 \times 3 + 2 + \frac{1}{2} \times 2$$

$$= 2 + 9 + 2 + 1 = 14\%$$

16 **(a)**

The unit of $\frac{1}{2}\varepsilon E^2 = \frac{\mathrm{C}^2}{\mathrm{Nm}^2}\left(\frac{\mathrm{N}}{\mathrm{C}}\right)^2$

$$= \frac{\mathrm{C}^2}{\mathrm{Nm}^2}\frac{\mathrm{N}^2}{\mathrm{C}^2} = \frac{\mathrm{N}}{\mathrm{m}^2} = \frac{\mathrm{Nm}}{\mathrm{m}^3}$$

$= \frac{\mathrm{J}}{\mathrm{m}^3} =$ energy density

17 **(d)**

$v = at + bt^2$

$[v] = [bt^2]$ or $LT^{-1} = bT^2 \Rightarrow [b] = [LT^{-3}]$

18 **(b)**

$6 \times 10^{-5} = 60 \times 10^{-6} = 60\ microns$

19 **(b)**

Surface tension $= \frac{\text{Force}}{\text{Length}} = newton/metre$

20 **(d)**

$$C = \frac{1}{\sqrt{\mu_0\varepsilon_0}} \Rightarrow \frac{1}{\mu_0\varepsilon_0} = c^2 = [L^2T^{-2}]$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	D	B	D	B	D	C	C	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	A	B	D	A	A	D	B	B	D