DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH
DATE :

Solutions

SUBJECT : PHYSICS
DPP NO. : 10

Topic :- UNITS AND MEASUREMENTS

1 **(c)**

$R_s = \frac{R_1 R_2}{R_1 + R_2}$,

$\frac{\Delta R_s}{R_s} \times 100$

$= \frac{\Delta R_1}{R_1} \times 100 + \frac{\Delta R_2}{R_2} \times 100 + \frac{\Delta(R_1 + R_2)}{R_1 + R_2} = 100$

Now, $\Delta R_1 = \frac{10}{100} \times 4\text{k}\Omega = 0.4\text{k}\Omega$,

$\Delta R_2 = \frac{10}{100} \times 6\text{k}\Omega = 0.6\text{k}\Omega$

Again, $\frac{\Delta R_s}{R_s} \times 100 = \frac{0.4}{4} \times 100 + \frac{0.6}{6} \times 100$

$+ \frac{0.4 + 0.6}{10} \times 100$

$= 10 + 10 + 10 = 30$

2 **(d)**

Note carefully that every alterative has $G\text{h}$ and c^5.

$[G\text{h}] = [\text{M}^{-1}\text{L}^3\text{T}^{-2}][\text{ML}^2\text{T}^{-1}] = [\text{M}^0\text{L}^5\text{T}^3]$

$[c] = [\text{LT}^{-1}]$

$\therefore \quad \left(\frac{G\text{h}}{c^5}\right)^{1/2} = [\text{T}]$

3 **(b)**

$C^2LR = [C^2L^2] \times \left[\frac{R}{L}\right] = [T^4] \times \left[\frac{1}{T}\right] = [T^3]$

As $\left[\frac{L}{R}\right] = T$ and $\sqrt{LC} = T$

4 **(d)**

Unit of $e.m.f. = \ volt = \ joule/coulomb$

5 **(b)**

% error in $g = \frac{\Delta g}{g} \times 100 = \left(\frac{\Delta l}{l}\right) \times 100 + 2\left(\frac{\Delta T}{T}\right) \times 100$

$E_I = \frac{0.1}{64} \times 100 + 2\left(\frac{0.1}{128}\right) \times 100 = 0.3125\%$

$$E_{II} = \frac{0.1}{64} \times 100 + 2\left(\frac{0.1}{64}\right) \times 100 = 0.4687\%$$

$$E_{III} = \frac{0.1}{20} \times 100 + 2\left(\frac{0.1}{36}\right) \times 100 = 1.055\%$$

6 **(b)**

$1\ MeV = 10^6 eV$

7 **(c)**

[Energy] = $[ML^2T^{-2}]$. Increasing M and L by a factor of 3 energy is increased 27 times.

8 **(a)**

Dimensionally. $\left[\frac{b}{t}\right] = [v]$ or $[b] = [vt] = [L]$.

9 **(a)**

$M =$ Pole strength $\times$ length

$= amp\text{-}metre \times metre = amp\text{-}metre^2$

10 **(b)**

$$\therefore \left(\frac{\Delta R}{R} \times 100\right)_{\max} = \frac{\Delta V}{V} \times 100 + \frac{\Delta I}{I} \times 100$$

$$= \frac{5}{100} \times 100 + \frac{0.2}{10} \times 100 = (5+2)\% = 7\%$$

11 **(c)**

$$\frac{0.2}{25} \times 100 = 0.8$$

13 **(c)**

$\left[\frac{1}{2} \in_0 E^2\right] =$ [Energy density]

$$= \frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$$

14 **(c)**

Dimensions of L and R

$$[R] = [ML^2T^{-3}A^{-2}]$$

$$[L] = [ML^2T^{-2}A^{-2}]$$

$$\left[\frac{L}{R}\right] = \frac{[ML^2T^{-2}A^{-2}]}{[ML^2T^{-3}A^{-2}]}$$

$$= [T]$$

15 **(d)**

$$\frac{[E][J]^2}{[M]^5[G]^2} \frac{[ML^2T^{-2}][ML^2T^{-1}]^2}{[M^5][M^{-1}L^3T^{-2}]^2} = [M^0L^0T^0]$$

16 **(d)**

As $v = \frac{4}{3}\pi r^3$

$$\frac{dv}{v} = 3\left(\frac{dr}{r}\right)$$

$\therefore$ Percentage error in determination of volume $= 3$

(Percentage error in measurement of radius) $= 3(2\%) = 6\%$

17 **(c)**

Least count $= \frac{0.5}{50} = 0.01\ mm$

Diameter of ball $D = 2.5\ mm + (20)(0.01)$

$D = 2.7\ mm$

$$\rho = \frac{M}{vol} = \frac{M}{\frac{4}{3}\pi\left(\frac{D}{2}\right)^3} \Rightarrow \left(\frac{\Delta\rho}{\rho}\right)_{\max} = \frac{\Delta M}{M} + 3\frac{\Delta D}{D}$$

$$\left(\frac{\Delta\rho}{\rho}\right)_{\max} = 2\% + 3\left(\frac{0.01}{2.7}\right) \times 100\% \Rightarrow \frac{\Delta\rho}{\rho} = 3.1\%$$

18 **(a)**

From Newton's second law

Force $(F) =$ Mass $(M) \times$ acceleration

Dimensions of $[F] = [\mathrm{MLT^{-2}}]$

$\therefore \quad [M] = [\mathrm{FL^{-1}T^{2}}]$

19 **(d)**

For best results amplitude of oscillation should be as small as possible and more oscillations should be taken

20 **(b)**

Intensity of radiation $= \frac{\text{Radiation Energy}}{\text{Area} \times \text{time}}$

$$\Rightarrow I = \frac{[ML^2T^{-2}]}{[L^2 \times T]} = [ML^0T^{-3}]$$

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