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## PHYSICS

## BOOKS - DISHA PHYSICS (HINGLISH)

## PHYSICAL WORLD, UNITS \&

## DIMENSION

Physics

1. $L, C$ and $R$ represent the physical quantities
inductance, capacitance and resistance
respectively. Which of the following combinations have dimensions of frequency?
A. $\frac{1}{R C}$
B. $\frac{R}{L}$
C. $\frac{1}{\sqrt{L C}}$
D. $\frac{C}{L}$

Answer:
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2. The number of particles is given by
$n=-D \frac{n_{2}-n_{1}}{x_{2}-x_{1}} \quad$ crossing a unit area
perpendicular to $X$ - axis in unit time, where
$n_{1}$ and $n_{2}$ are particles per unit volume for
the value of $x$ meant to $x_{2}$ and $x_{1}$. Find the dimensions of $D$ called diffusion constant.
A. $\left[M^{0} L T^{2}\right]$
B. $\left[M^{0} L^{2} T^{-4}\right]$
C. $\left[M^{0} L T^{-3}\right]$
D. $\left[M^{0} L^{2} T^{-1}\right]$

## Answer:

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3. In the formula $X=3 Y Z^{2}, X$ and $Z$ have dimensions of capacitance and magnetic induction respectively . When are the dimensions of Y in MLTQ system ?
A. $\left[M^{-3} L^{-2} T^{-4} A^{-1}\right]$
B. $\left[M L^{-2}\right]$
C. $\left[M^{-3} L^{-2} T^{4} A^{4}\right]$

$$
\text { D. }\left[M^{-3} L^{-2} T^{8} A^{4}\right]
$$

## Answer:

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4. In the relation $p=\frac{a}{\beta} e^{\frac{a Z}{k \theta}}, \mathrm{p}$ is pressure Z is distance. k is Boltzman constant and $\theta$ is the temperature . The dimensional formula of $\beta$ will be
A. $\left[M^{0} L^{2} T^{0}\right]$
B. $\left[M^{1} L^{2} T^{1}\right]$
C. $\left[M^{1} L^{0} T^{-1}\right]$
D. $\left[M^{0} L^{32} T^{-1}\right]$

## Answer:

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5. The frequency of vibration of string is given
by $v=\frac{p}{2 l}\left[\frac{F}{m}\right]^{1 / 2}$. Here $p$ is number of segment is the string and $l$ is the length. The dimension formula for $m$ will be
A. $\left[M^{0} L T^{-1}\right]$
B. $\left[M L^{0} T^{-1}\right]$
C. $\left[M L^{-1} T^{0}\right]$
D. $\left[M^{0} L^{0} T^{0}\right]$

Answer:

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6. Convert Newton into dyne.
A. 1 dyne $=10^{5}$ newton
B. 1 dyne $=10^{-7}$ newton
C. 1 dyne $=10^{5}$ newton
D. 1 dyne $=10^{7}$ newton

## Answer:

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7. If the velocity of light $(c)$, gravitational constant $(G)$, and Planck's constant $(h)$ are chosen as fundamental units, then find the dimensions of mass in new system.
A. $G^{\frac{1}{2}} h^{\frac{1}{2}} c^{-\frac{5}{2}}$
B. $G^{-\frac{1}{2}} h^{\frac{1}{2}} c^{\frac{1}{2}}$
C. $G^{\frac{1}{2}} h^{\frac{1}{2}} c^{-\frac{3}{2}}$
D. $G^{\frac{1}{2}} h^{\frac{1}{2}} c^{\frac{1}{2}}$

## Answer:

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8. If the constant of gravitation $(G)$, Planck's
constant $(h)$ and the velocity of light $(c)$ be
chosen as fundamental units. The dimension of the radius of gyration is
A. $h^{\frac{1}{2}} c^{-\frac{3}{2}} G^{\frac{1}{2}}$
B. $h^{\frac{1}{2}} c^{\frac{3}{2}} G^{\frac{1}{2}}$
C. $h^{\frac{1}{2}} c^{-\frac{3}{2}} G^{-\frac{1}{2}}$
D. $h^{-\frac{1}{2}} c^{-\frac{3}{2}} G^{\frac{1}{2}}$

## Answer:

## 9. A physical quantity which has a direction:-

A. (a) depends on the method of measurement
B. (b) does not depend on the method of
measurement
C. (c) is more in SI system than in CGS
system
D. (d) directly proportional to the
fundamental units of mass, length and

## Answer:

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## 10. The unit of Stefan's constant $\sigma$ is

A. $W m^{-2} K^{-1}$
B. $W m^{2} K^{-4}$
C. $W m^{-2} K^{-4}$
D. $W m^{-2} K^{4}$

## Answer:

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11. In $S=a+b t+c t^{2}$. S is measured in metres and $t$ in seconds. The unit of $c$ is
A. $m s^{-2}$
B. $m$
C. $m s^{-1}$
D. None

## Answer:

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12. Wavelength of ray of light is 0.00006 m . It is equal to
A. 6 microns
B. 60 microns
C. 600 mocrons
D. 0.6 mocrons

## Answer:

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13. The unit of permittivity of free space $\varepsilon_{0}$ is:
A. $C^{2} m^{2} N^{-2}$
B. $C^{-1} m^{2} N^{-2}$
C. $C^{2} m^{2} N^{-2}$

$$
\text { D. } C^{2} m^{-2} N^{-1}
$$

14. The dimension of $\left(\frac{1}{2}\right) \varepsilon_{0} E^{2} \quad\left(\varepsilon_{0} \quad:\right.$ permittivity of free space, E electric field

> A. $M L T^{-1}$
> B. $M L^{2} T^{-2}$
> C. $M L^{-1} T^{-2}$
> D. $M L^{2} T^{-1}$

Answer:
15. Which of the following pairs is wrong
A. (a) Pressure-Baromter
B. (b) Relative density-Pyrometer
C. (c) Temperature-Thermometer
D. (d) Earthquake-Seismograph

## Answer:

16. A physical quantity $x$ depends on
quantities
$y$ and $z$
as follows
$x=A y+B \tan (C z)$, where $A, B$ and $C$ are
constants. Which of the followings do not
have the same dimensions?
A. (a) $x$ and $B$
B. (b) C and $z^{-1}$
C. (c) y and $B / A$
D. (d) $x$ and A

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17. If the time period $(T)$ of vibration of a liquid drop depends on surface tension $(S)$, radius $(r)$ of the drop, and density ( $\rho$ ) of the liquid, then find the expression of $T$.

> A. $T=k \sqrt{\rho r^{3} / s}$
> B. $T=k \sqrt{\rho \frac{r^{1}}{2} r^{3} / s}$
> C. $T=k \sqrt{\rho r^{3} / S^{1 / 2}}$
D. None of these

## Answer:

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18. The dimensional formula for Planck's constant ( h ) is
A. $\left[M L^{-2} T^{-3}\right]$
B. $\left[M L^{0} L^{2} T^{-2}\right]$
C. $\left[M L^{0} L^{2} T^{-1}\right]$
D. $\left[M L^{-2} T^{2}\right]$

## Answer:

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## 19. Dimensions of permeability are

A. $\left[M L T^{-2}\right]^{2}$
B. $\left[M L T^{-2}\right]^{-2}$
C. $\left[M L T^{-1} T^{-2}\right]^{2}$
D. $\left[M L T^{-1} T_{-2}\right]^{-2}$

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20. A small steel ball of radius $r$ is allowed to
fall under gravity through a column of a viscous liquid of coefficient of viscosity $\eta$. After some time the velocity of the ball attains a constant value known as terminal velocity $v_{T}$.

The terminal velocity depends on (i) the mass of the ball $m$ (ii) $\eta$, (iii) $r$ and (iv) acceleration due to gravity g. Which of the following relations is dimensionally correct?
A. $v_{T} \propto \frac{\eta r}{m g}$
B. $v_{T} \propto \eta r m g$
C. $v_{T} \propto \frac{m g r}{\eta}$
D.

## Answer:

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21. The van der Waal's equation of state for some gases can be expressed as :
$\left(P+\frac{a}{V^{2}}\right)(V-b)=R T$
Where $P$ is the pressure, $V$ is the molar
volume, and $T$ is the absolute temperature of
the given sample of gas and $a, b$, and $R$ are constants.

The dimensions of $a$ are
A. $M L^{5} T^{-2}$
B. $M L^{-1} T^{-2}$
C. $M L^{0} L^{3} T^{0}$
D. $M L^{0} L^{6} T^{0}$

## Answer:

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22. The frequency $f$ of vibrations of a mass $m$ suspended from a spring of spring constant $k$
is given by $f=C m^{x} k^{y}$, where $C$ is a dimensionnless constant. The values of $x$ and $y$ are, respectively,

$$
\begin{aligned}
& \text { А. } x=\frac{1}{2} \\
& \text { B. } x=-\frac{1}{2}
\end{aligned}
$$

C. $x=-\frac{1}{2}$
D. $y=\frac{1}{2}$

## Answer:

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23. If $P$ represents radiation pressure, $C$ represents the speed of light and q represents the radiation energy per unit area per second, then calculate non - zero integres such that $p^{x} q^{y} c^{z}$ is dimensionless.
A. $x=1$
B. $y=-1$
C. $z=1$
D. $x=-1$

Answer:

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24. Which of the following pairs have same dimensions?
A. Angular momentum and work
B. Torque and work
C. Energy and Yong's modulus
D. Light year and wavelength

## Answer:

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25. Find a combination of these three constants that has the dimensions of time.

This time is called the Planck time and
represents the age of the universe before which the laws of physics as presently understood cannot be applied.
A. $\sqrt{\frac{h G}{c^{4}}}$
B. $\sqrt{\frac{h G}{c^{3}}}$
C. $\sqrt{\frac{h G}{C}}$.
D. $\sqrt{\frac{h G}{c^{5}}}$

## Answer:

26. Find the value of Planck time in seconds
A. $1.3 \times 10^{-33} s$
B. $1.3 \times 10^{-43} s$
C. $2.3 \times 10^{-13} s$
D. $0.3 \times 10^{-23} s$

Answer:
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27. The energy of a photon is given by $E$
$=\frac{h c}{\lambda}$
If $\lambda=4 \times 10^{-7}$ )m,the energy of photon is
A. 3.0 eV
B. 4.5 ev
C. 2.10 eV
D. 3.95 eV

Answer:

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28. Assertion : Units of Rydberge constant R are $m^{-1}$.

Reason : It follows from Bohr's formula

$$
\left[\bar{V}=R\left(\frac{1}{n_{1}^{2}}-\frac{1}{n_{2}^{2}}\right)\right], \text { where the symbole }
$$

have their usual meaning.

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29. Assertion : The time period of a pendulum
is given by the formula, $T=2 \pi \sqrt{g / l}$.
Reason : According to the principle of
homogeneity of dimensions, only that formula is correct in which the dimensions of L.H.S. is equal to dimensions of R.H.S.

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30. Assertion : $L / R$ and $C R$ both have same dimensions

Reason $L / R$ and $C R$ both have dimensions of time

