Physicsaholics

DPP – 1 (Unit & Dimension)

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/49

Video Solution on YouTube:- https://youtu.be/sHxBTYqcM0A

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/69

Q 1. Which of the following physical quantities has neither dimensions nor unit?
(Hint:- f = μN; where, μ = coefficient of friction, f = friction force & N = Normal force)
(a) Angle
(b) Luminous intensity
(c) Coefficient of friction
(d) Current

Q 2. Dimensional formula for coefficient of viscosity (η)[use $F = 6\pi\eta r v$ (r=radius; v=velocity; F=viscous force]:
(a) $ML^{-2}T^{-1}$
(b) $M^{-1}L^{1}T^{-1}$
(c) $M^{1}L^{1}T^{-2}$
(d) $ML^{-1}T^{-1}$

Q 3. The dimensions of radian per second are:
(a) $[M^0L^0T^0]$
(b) $[M^0L^0T^1]$
(c) $[M^0L^0T^{-1}]$
(d) $[M^0L^2T^{-1}]$

Q 4. The dimensional formula of radius of gyration is:
(a) $[M^0\,L^0T^0]$
(b) $[M^0\,L^0\,T]$
(c) $[M^0\,L\,T^0]$
(d) $[M\,L\,T^{-1}]$

Q 5. From the following pairs of physical quantities, in which group dimensions are not same:
[Hint:- Linear momentum = mass × velocity, Torque = Force × perpendicular distance, Impulse = Change in momentum]
(a) Linear Momentum and impulse
(b) Torque and energy
(c) Energy and work
(d) Light year and minute

Q 6. The dimensional formula for Planck's constant (h) is
(Hint:- Unit of planks constant = J-sec)
(a) $[ML^{-2}T^{-3}]$
(b) $[M^0L^2T^{-2}]$
(c) $[ML^2T^{-1}]$
(d) $[ML^{-2}T^{-2}]$

Q 7. An atmosphere:
(a) is a unit of pressure
(b) is a unit of force
(c) gives an idea of the composition of air
(d) is the height above which there is no atmosphere

Q 8. The dimensions of wavelength (λ) is:
(Wavelength = Distance travelled by wave in one time period)
(a) $[M^0 L^0 T^0]$ (b) $[M^0 L T^0]$
(c) $[M^0 L^{-1} T^0]$ (d) none of these

Q 9. State which of the following is correct?
(Hint:- When a charge q is accelerated by a Voltage V then its energy = qV)
(a) joule = coulomb × volt (b) joule = coulomb/volt
(c) joule = volt + coulomb (d) joule = volt/coulomb

Q 10. Of the following quantities, which one has dimensions different from the remaining three?
(Hint:- Angular Momentum = mass × velocity × perpendicular distance,
& When a charge q is accelerated by a voltage V then its energy = qV)
(a) Energy per unit volume
(b) Force per unit area
(c) Product of voltage and charge per unit volume
(d) Angular momentum

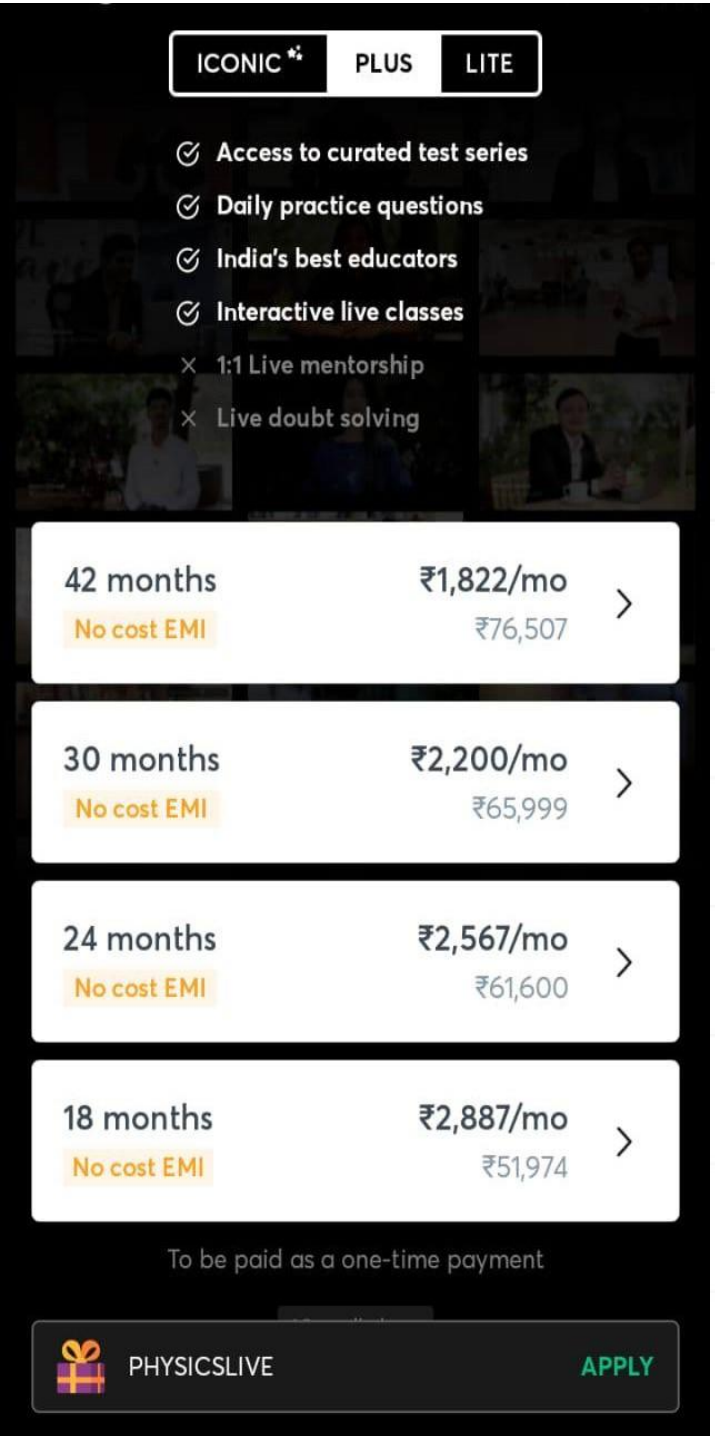
Q 11. The dimensions of frequency is:
(Hint:- frequency (f) = $\frac{1}{T}$; T = Time period)
(a) $[T^{-1}]$ (b) $[M^0L^0T^0]$
(c) $[M^0L^0T^{-2}]$ (d) None of these

Q 12. Young's modulus (Y) of a material has the same unit as
(Y = $\frac{Stress}{Strain}$; where, Stress = $\frac{Force}{Area}$ & Strain = $\frac{Change\ in\ length}{original\ length}$)
(a) Pressure (b) Strain
(c) Density (d) Force

Q 13. The unit of impulse is the same as that of
(Hint:- Impulse = Force × time, Momentum = mass × velocity, Power = Energy per unit time)
(a) Energy (b) Power
(c) Momentum (d) Velocity

Answer Key

Q.1 c	Q.2 d	Q.3 c	Q.4 c	Q.5 d
Q.6 c	Q.7 a	Q.8 b	Q.9 a	Q.10 d
Q.11 a	Q.12 a	Q.13 c		



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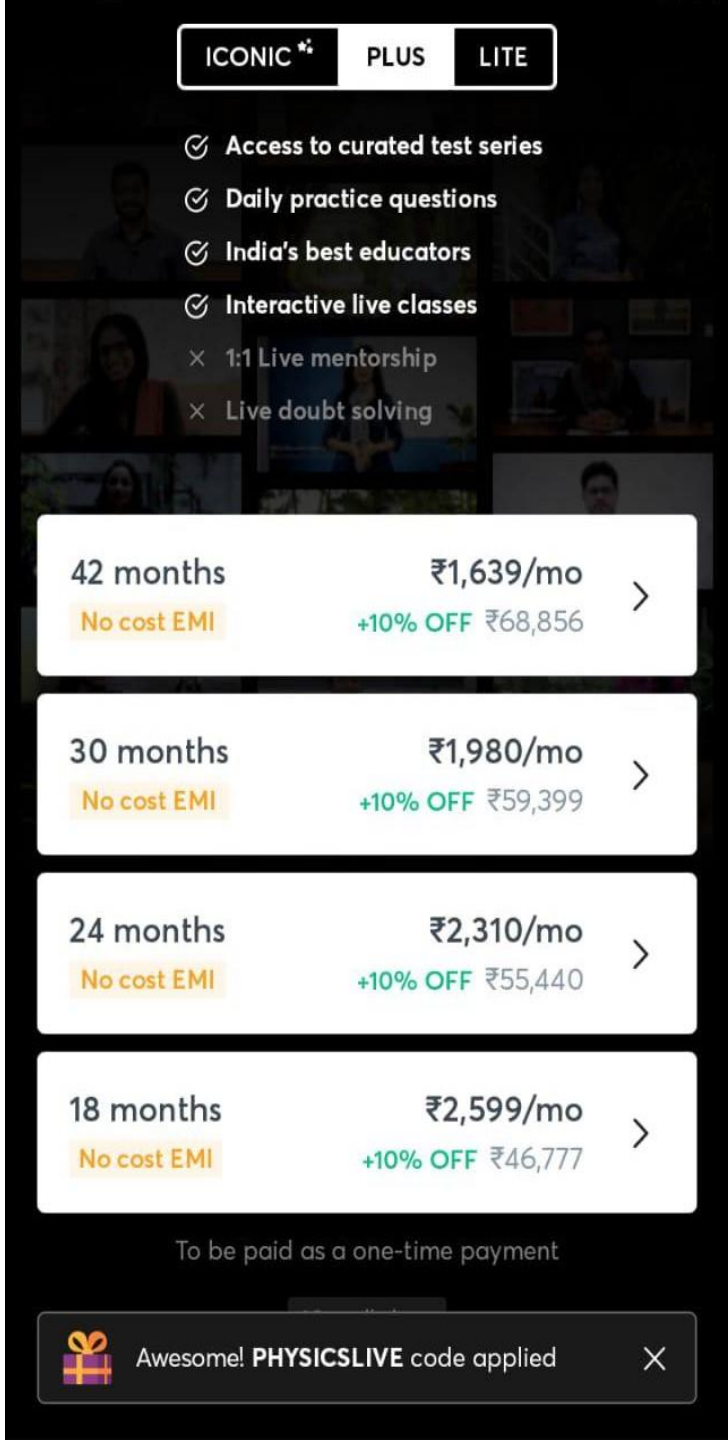


Written Solution

DPP-1 Units & Dimensions

By Physicsaholics Team

Solution: 1

Luminous intensity
↳ cd

Current
↳ Amp.

Angle
↳ rad

Coefficient of friction $\mu = \frac{f}{N} = \frac{\text{Force}}{\text{Force}}$
↳ No unit
No dimension.

Ans. c

Solution: 2

$$F = G x^{\alpha} y^{\beta} v$$

$$[F] = MLT^{-2}$$

$$[x] = L$$

$$[v] = LT^{-1}$$

$$[G] = \frac{[F]}{[x^{\alpha}][y^{\beta}][v]} = \frac{MLT^{-2}}{L \cdot LT^{-1}}$$

$$= ML^{-1}T^{-1}$$

Ans. d

Solution: 3

radian Per sec = rad/sec

rad → Angle → dimensionless

$$[\text{Radian Per sec}] = \frac{1}{[\text{sec}]} = \frac{1}{T} = T^{-1}$$

Ans. c

Solution: 4

Radius of gyration is measure of distance.
(You will study this in the chapter “Rotational Motion.”

Ans. c

Solution: 5

(a) Linear Momentum (P)
Impulse (I)

$P = mv$

$I = \Delta P$

So, $[I] = [P]$

(b) Torque & Energy
(τ) (E)

$\tau = F \times r_1$

$E = F \times x$

Energy or work.

$[\tau] = [E]$

(c) Energy & work

$[E] = [W]$

(d) Light year is length
Minute is time

$[L] \neq [T]$

Ans. d

Solution: 6

$[h] = ?$

Unit of h = Joule - Sec

Joule → Energy

$[E] = ML^2T^{-2}$

$[h] = [E][t]$

$= ML^2T^{-2} \cdot T$

$= ML^2T^{-1}$

Ans. c

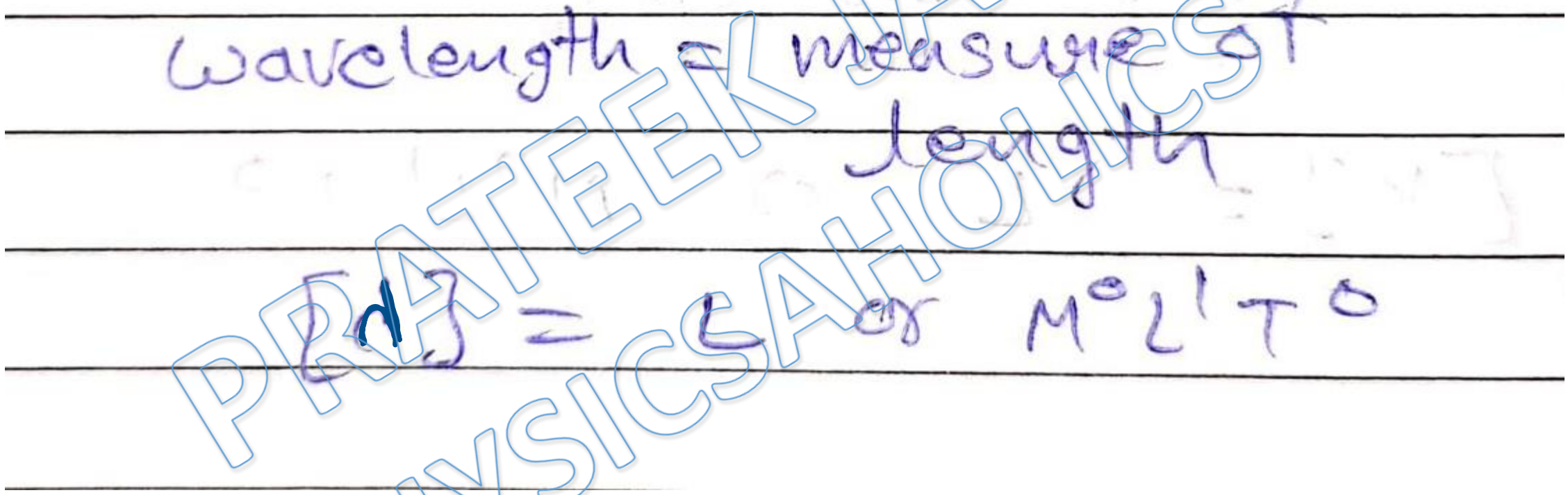
Solution: 7

atmosphere (atm) is the unit of pressure.

$$1\ atm = 10^5\ Pascal$$

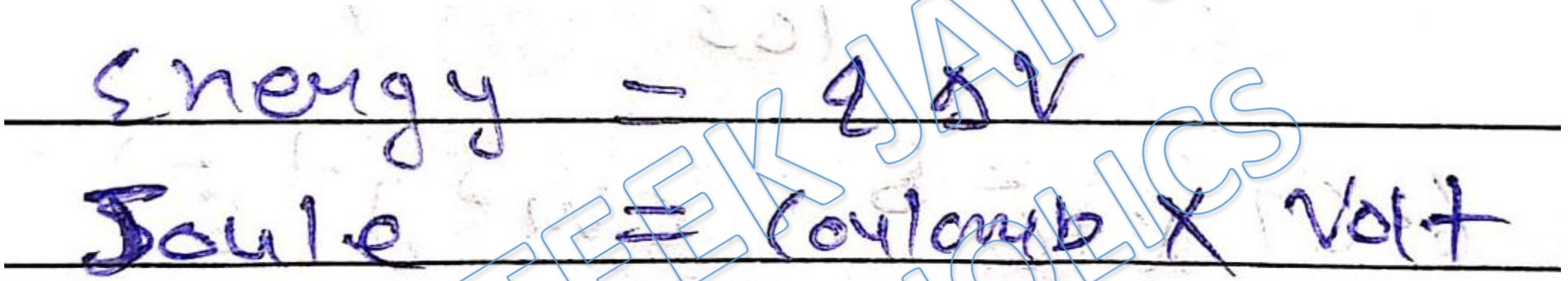
Ans. a

Solution: 8



Ans. b

Solution: 9



Ans. a

Solution: 10

(a) $\left[\frac{E}{V}\right] = \frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$

(b) $\left[\frac{F}{A}\right] = \frac{MLT^{-2}}{L^2} = ML^{-1}T^{-2}$

(c) $[\text{Volt} \times \text{Coulamb}] = \text{Joule} = \frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$

$= \text{Energy/Volume}$ (Volume)

(d) $[L] = [mvr] = MLT^{-1}L = ML^2T^{-1}$

(angular momentum is denoted by = L)

Ans. d

Solution: 11

Frequency, $f = \frac{1}{T}$

T = Time period

$[T] = T$

$[f] = \left[\frac{1}{T}\right] = T^{-1}$

$[f] = T^{-1}$ or $M^0 L^0 T^{-1}$

Ans. a

Solution: 12

$$Y = \frac{\frac{F}{A}}{\frac{\Delta l}{l}} = \text{Youngs Modulus}$$

$$[Y] = \frac{\left[\frac{F}{A}\right]}{\left[\frac{\Delta l}{l}\right]} \quad \left[\because \frac{\Delta l}{l} \rightarrow \text{Dimensionless}\right]$$

$$\therefore [Y] = \left[\frac{F}{A}\right]$$

$$\text{Pressure} = P = \frac{F}{A}$$

$$[P] = \left[\frac{F}{A}\right]$$

$$\therefore [Y] = [P]$$

Ans. a

Solution: 13

Impulse = Force x time

$= MLT^{-2} \times T = MLT^{-1}$

Momentum = mass x velocity

$= M \times LT^{-1} = MLT^{-1}$

Ans. c

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