Yakeen NEET 2.0 (2026)

KPP -(PYQ)

Physics by Saleem Sir

Units and Measurements

Ye PYQ KPP maine aapke future ko dhyan me rakhte huye bnayi hain….Time boundry ko dhyan me rakhte hue jitna samay mile usme jitne ques ho paaye utne keejiyega baaki baad me kr leejiyega bcz yahan number of ques jyada hain….tension nhi lena….

NEET PYQ:

The International System of Units:

1. The unit of thermal conductivity is:

[2019]

(1) $W\ m^{-1}\ K^{-1}$ (2) $J\ m\ K^{-1}$
(3) $J\ m^{-1}\ K^{-1}$ (4) $W\ m\ K^{-1}$

2. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are:

[2012]

(1) $kg\ m\ s^{-1}$ (2) $kg\ m\ s^{-2}$
(3) $kg\ s^{-1}$ (4) $kg\ s$

3. The unit of permittivity of free space, ε_0, is:

[2004]

(1) coulomb/newton-metre
(2) newton-metre^2/coulomb^2
(3) coulomb^2/newton-metre^2
(4) coulomb^2/(newton-metre)^2

Dimensions of Physical Quantities:

4. The quantites which have the same dimensions as those of solid angle are

[2024]

(1) strain and angle
(2) stress and angle
(3) strain and arc
(4) angular speed and stress

5. A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A. It is filled with a gas of density p and takes a spherical shape of radius R. When the gas is allowed to flow freely out of it, its radius changes from R to 0 (zero) in time T. If the speed (r) of gas coming out of the balloon depends on r as r^a and $T \propto S^\alpha, A^\beta, \rho^\gamma, R^\delta$ then.

[NEET 2025]

(1) $a=\frac{1}{2},\alpha=\frac{1}{2},\beta=-1,\gamma=+1,\delta=\frac{3}{2}$
(2) $a=-\frac{1}{2},\alpha=-\frac{1}{2},\beta=-1,\gamma=-\frac{1}{2},\delta=\frac{5}{2}$
(3) $a=-\frac{1}{2},\alpha=-\frac{1}{2},\beta=-1,\gamma=\frac{1}{2},\delta=\frac{7}{2}$
(4) $a=\frac{1}{2},\alpha=\frac{1}{2},\beta=-\frac{1}{2},\gamma=\frac{1}{2},\delta=\frac{7}{2}$

6. Plane angle and solid angle have:

[2022]

(1) Units but no dimensions
(2) Dimensions but no units
(3) No units and no dimensions
(4) Both units and dimension

7. If E and G respectively denote energy and gravitational constant, then E/G has the dimensions of:

[2021]

(1) $[M^2][L^{-2}][T^{-1}]$ (2) $[M^2][L^{-1}][T^0]$
(3) $[M][L^{-1}][T^{-1}]$ (4) $[M][L^0][T^0]$

8. Dimensions of stress are:

[2020]

(1) $[MLT^{-2}]$ (b) $[ML^2T^{-2}]$
(3) $[ML^0T^{-2}]$ (4) $[ML^{-1}T^{-2}]$

9. The pair of quantities having same dimensions is:

[Karnataka NEET 2013]

(1) Impulse and Surface Tension
(2) Angular momentum and Work
(3) Work and Torque
(4) Young's modulus and Energy

10. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are

[Mains 2012, 2011]

(1) $[L^{1/2}T^{-1/2}]$ (2) $[L^{-1}T]$
(3) $[LT^{-1}]$ (4) $[L^{1/2}T^{1/2}]$

11. The dimension of $\frac{1}{2}\varepsilon_0 E^2$, where ε_0 is permittivity of free space and E is electric field, is:

[2010]

(1) ML^2T^{-2} (2) $ML^{-1}T^{-2}$
(3) ML^2T^{-1} (4) MLT^{-1}

12. If the dimensions of a physical quantity are given by $M^aL^bT^c$, then the physical quantity will be:

[2009]

(1) velocity if $a = 1, b = 0, c = -1$
(2) acceleration if $a = 1, b = 1, c = -2$
(3) force if $a = 0, b = -1, c = -2$
(4) pressure if $a = 1, b = -1, c = -2$

13. Which two of the following five physical parameters have the same dimensions?
A. energy density
B. refractive index
C. dielectric constant
D. Young's modulus
E. magnetic field

[2008]

(1) A and D (2) A and E
(3) B and D (4) C and E

14. Dimensions of resistance in an electrical circuit, in terms of dimension of mass M, of length L, of time T and of current I, would be:

[2007]

(1) $[ML^2T^{-2}]$ (2) $[ML^2T^{-1}I^{-1}]$
(3) $[ML^2T^{-3}I^{-2}]$ (4) $[ML^2T^{-3}I^{-1}]$

15. The ratio of the dimensions of Planck's constant and that of moment of inertia is the dimensions of:

[2005]

(1) time
(2) frequency
(3) angular momentum
(4) velocity

16. The dimensions of universal gravitational constant are:

[2004, 1992]

(1) $[M^{-1}L^3T^{-2}]$ (2) $[ML^2T^{-1}]$
(3) $[M^{-2}L^3T^{-2}]$ (4) $[M^{-2}L^2T^{-1}]$

17. The dimensions of Planck's constant equals to that of

[2001]

(1) energy
(2) momentum
(3) angular momentum
(4) power

18. Which pair do not have equal dimensions?

[2000]

(1) Energy and torque
(2) Force and impulse
(3) Angular momentum and Planck's constant
(4) Elastic modulus and pressure

Dimensional Analysis and its Applications:

19. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at a given time t. The factor which is dimensionless, if α and β are constants, is:

[2024]

(1) $\frac{\beta t}{\alpha}$ (2) $\frac{\alpha t}{\beta}$
(3) $\alpha\beta t$ (4) $\frac{\alpha\beta}{t}$

20. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

[2021]

(1) $[F][A^{-1}][T]$ (2) $[F][A][T]$
(3) $[F][A][T^2]$ (4) $[F][A][T^{-1}]$

21. A physical quantity of the dimensions of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is [c is velocity of light, G is universal constant of gravitation and e is charge]:

[2017]

(1) $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

(2) $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{1/2}$

(3) $\frac{1}{c^2}G\frac{e^2}{4\pi\varepsilon_0}$

(4) $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

22. Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length?

[NEET-II 2016]

(1) $\frac{\sqrt{hG}}{c^{3/2}}$ (2) $\sqrt{\frac{hG}{c^{5/2}}}$
(3) $\sqrt{\frac{hc}{G}}$ (4) $\sqrt{\frac{Gc}{h^{3/2}}}$

23. If dimensions of critical velocity v_c of a liquid flowing through a tube are expressed as $[\eta^x \rho^y r^z]$ where η, ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by:

[2015]

(1) $-1, -1, -1$ (2) $1, 1, 1$

(3) $1, -1, -1$ (4) $-1, -1, 1$

24. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are:

[2014]

(1) $[FVT^{-1}]$ (2) $[FVT^{-2}]$

(3) $[FV^{-1}T^{-1}]$ (4) $[FV^{-1}T]$

25. The velocity v of a particle at time t is given by $v = at + \frac{b}{t+c}$, where a, b and c are constants. The dimensions of a, b and c are:

[2006]

(1) [L], [LT] and $[LT^{-2}]$

(2) $[LT^{-2}]$, [L] and [T]

(3) $[L^2]$, [T] and $[LT^{-2}]$

(4) $[LT^{-2}]$, [LT] and [L]

26. The dimension $[MLT^{-2}A^{-2}]$ belong to the:

[2022]

(1) magnetic flux
(2) self inductance
(3) magnetic permeability
(4) electric permittivity

JEE Mains PYQ:

1. Which of the following combination has the dimension of electrical resistance (ε_0 is the permittivity of vacuum and μ_0 is the permeability of vacuum)? **(JEE Main 2019)**

(1) $\sqrt{\frac{\mu_0}{\varepsilon_0}}$ (2) $\frac{\mu_0}{\varepsilon_0}$

(3) $\sqrt{\frac{\varepsilon_0}{\mu_0}}$ (4) $\frac{\varepsilon_0}{\mu_0}$

2. In SI units, the dimensions of $\sqrt{\frac{\in_0}{\mu_0}}$ is **(JEE Main 2019)**

(1) $A^{-1}TML^3$ (2) $AT^2M^{-1}L^{-1}$

(3) $AT^{-3}ML^{3/2}$ (4) $A^2T^3M^{-1}L^{-2}$

3. If speed (V), acceleration (A) and force (F) are considered as fundamental units, the dimension of Young's modulus will be: **(JEE Main 2019)**

(1) $V^{-2}A^2F^{-2}$ (2) $V^{-2}A^2F^2$

(3) $V^{-4}A^{-2}F$ (4) $V^{-4}A^2F$

4. A quantity f is given by $f=\sqrt{\frac{hc^5}{G}}$ where c is speed of light, G universal gravitational constant and h is the Planck's constant. Dimension of f is that of: **(JEE Main 2019)**

(1) Area (2) Energy

(3) Momentum (4) Volume

5. e dimensions of $\frac{B^2}{2\mu_0}$, where B is magnetic field and μ_0 is the magnetic permeability of vacuum is: (use energy density = $\frac{B^2}{2\mu_0}$) **(JEE Main 2019)**

(1) MLT^{-2} (2) ML^2T^{-1}

(3) ML^2T^{-2} (4) $ML^{-1}T^{-2}$

6. The dimension of $\frac{B^2}{2\mu_0}$, where B is magnetic field and μ_0 is the magnetic permeability of vacuum, is: **(JEE Main 2020)**

(1) $ML^{-1}T^{-2}$

(2) ML^2T^{-1}

(3) MLT^{-2}

(4) ML^2T^{-2}

7. A quantity f is given by $f=\sqrt{\frac{hc^5}{G}}$ where c is speed of light, G universal gravitational constant and h is the Planck's constant. Dimension of f is that of: **(JEE Main 2020)**

(1) Momentum (2) Area

(3) Energy (4) Volume

8. If speed V, area A and force F are chosen as fundamental units, then the dimension of Young's modulus will be: **(JEE Main 2020)**

(1) $FA^{-1}V^0$ (2) FA^2V^{-1}

(3) FA^2V^{-3} (4) FA^2V^{-2}

9. Amount of solar energy received on the earth's surface per unit area per unit time is defined a solar constant. Dimension of solar constant is: **(JEE Main 2020)**

(1) ML^2T^{-2} (2) MLT^{-2}

(3) $M^2L^0T^{-1}$ (4) ML^0T^{-3}

10. If momentum (P), area (A) and time (T) are taken to be the fundamental quantities then the dimensional formula for energy is: **(JEE Main 2020)**

(1) $[PA^{-1}T^{-2}]$ (2) $[PA^{1/2}T^{-1}]$

(3) $[P^2AT^{-2}]$ (4) $[P^{1/2}AT^{-1}]$

11. A quantity x is given by (IFv^2/WL^4) in terms of moment of inertia I, force F, velocity v, work W and Length L. The dimensional formula for x is same as that of: **(JEE Main 2020)**

(1) Planck's constant

(2) Force constant

(3) Energy density

(4) Coefficient of viscosity

12. In a typical combustion engine the work done by a gas molecule is given $W=\alpha^2\beta e^{\frac{-\beta x^2}{kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. If α and β are constants, dimensions of α will be: **(JEE Main 2021)**

(1) $[MLT^{-2}]$ (2) $[M^0LT^0]$

(3) $[M^2LT^{-2}]$ (4) $[MLT^{-1}]$

13. Match List-I with List-II:

List-I		List-II	
(a)	h (Planck's constant)	(i)	$[MLT^{-1}]$
(b)	E (kinetic energy)	(ii)	$[ML^2T^{-1}]$
(c)	V (electric potential)	(iii)	$[ML^2T^{-2}]$
(d)	P (linear momentum)	(iv)	$[ML^2I^{-1}T^{-3}]$

Choose the correct answer from the options given below: **(JEE Main 2021)**

(1) (a)→(iii), (b)→(iv), (c)→(ii), (d)→(i)
(2) (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)
(3) (a)→(i), (b)→(ii), (c)→(iv), (d)→(iii)
(4) (a)→(iii), (b)→(ii), (c)→(iv), (d)→(i)

14. If e is the electronic charge, c is the speed of light in free space and h is Planck's constant, the quantity $\frac{1}{4\pi\varepsilon_0}\frac{|e|^2}{hc}$ has dimensions of: **(JEE Main 2021)**

(1) $[M^0L^0T^0]$ (2) $[LC^{-1}]$
(3) $[MLT^{-1}]$ (4) $[MLT^0]$

15. The work-done by a gas molecule in an isolated system is given by, $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature, α and β are constants. Then the dimension of β will be: **(JEE Main 2021)**

(1) $[ML^2T^{-2}]$ (2) $[MLT^{-2}]$
(3) $[M^2LT^{-2}]$ (4) $[M^0LT^0]$

16. If 'C' and 'V' represent capacity and voltage respectively then what are the dimensions of λ, where $C/V = \lambda$? **(JEE Main 2021)**

(1) $[M^{-2}L^{-3}I^2T^6]$
(2) $[M^{-3}L^{-4}I^3T^7]$
(3) $[M^{-1}L^{-3}I^{-2}T^{-7}]$
(4) $[M^{-2}L^{-4}I^3T^7]$

17. If time (t), velocity (v), and angular momentum (ℓ) are taken as the fundamental units. Then the dimension of mass (m) in terms of t, v and l is: **(JEE Main 2021)**

(1) $[t^{-1}v^1\ell^{-2}]$
(2) $[t^1v^2\ell^{-1}]$
(3) $[t^{-2}v^{-1}\ell^1]$
(4) $[t^{-1}v^{-2}\ell^1]$

18. If E, L, M and G denote the quantities as energy, angular momentum, mass and constant of gravitation respectively, then the dimensions of P in the formula $P = EL^2M^{-5}G^{-2}$ are: **(JEE Main 2021)**

(1) $[M^0L^1T^0]$ (2) $[M^{-1}L^{-1}T^2]$
(3) $[M^1L^1T^{-2}]$ (4) $[M^0L^0T^0]$

19. The force is given in terms of time t and displacement x by the equation $F = A\cos Bx + C\sin Dt$. The dimensional formula of AD/B is: **(JEE Main 2021)**

(1) $[M^0LT^{-1}]$ (2) $[ML^2T^{-3}]$
(3) $[M^1L^1T^{-2}]$ (4) $[M^2L^2T^{-3}]$

20. Match List-I with List-II:

List-I		List-II	
(a)	Magnetic Induction	(i)	$ML^2T^{-2}A^{-1}$
(b)	Magnetic Flux	(ii)	$M^0L^{-1}A$
(c)	Magnetic Permeability	(iii)	$MT^{-2}A^{-1}$
(d)	Magnetization	(iv)	$MLT^{-2}A^{-2}$

Choose the correct answer from the options given below: **(JEE Main 2021)**

(1) (a)→(ii), (b)→(iv), (c)→(i), (d)→(iii)
(2) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
(3) (a)→(iii), (b)→(ii), (c)→(iv), (d)→(i)
(4) (a)→(iii), (b)→(i), (c)→(iv), (d)→(ii)

21. If force (F), length (L) and time (T) are taken as the fundamental quantities. Then what will be the dimension of density: **(JEE Main 2021)**

(1) $[FL^{-4}T^2]$ (2) $[FL^{-3}T^2]$
(3) $[FL^{-5}T^2]$ (4) $[FL^{-3}T^3]$

22. Match List-I with List-II:

List-I		List-II	
(a)	R_H (Rydberg constant)	(i)	kg m^{-1} s^{-1}
(b)	h (Planck's constant)	(ii)	kg m^2 s^{-1}
(c)	μ_B (Magnetic field energy density)	(iii)	m^{-1}
(d)	η (coefficient of viscosity)	(iv)	kg m^{-1} s^{-2}

Choose the most appropriate answer from the options given below: **(JEE Main 2021)**

(1) (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)
(2) (a)→(iii), (b)→(ii), (c)→(iv), (d)→(i)
(3) (a)→(iv), (b)→(ii), (c)→(i), (d)→(iii)
(4) (a)→(iii), (b)→(ii), (c)→(i), (d)→(iv)

23. If E and H represents the intensity of electric field and magnetizing field respectively, then the unit of E/H will be: **(JEE Main 2021)**

(1) ohm (2) mho
(3) joule (4) newton

24. Which of the following equations is dimensionally incorrect?
Where t = time, h = height, s = surface tension, θ = angle, ρ = density, a, r = radius, g = acceleration due to gravity, v = volume, p = pressure, W = work done, Γ = torque, $\in$ = permittivity, E = electric field, J = current density, L = length. **(JEE Main 2021)**

(1) $v = \frac{\pi p a^4}{8\eta L}$ (2) $h = \frac{2s\cos\theta}{\rho r g}$
(3) $J = \in \frac{\partial E}{\partial t}$ (4) $W = \Gamma\theta$

25. If momentum [P], area [A] and time [T] are taken as fundamental quantities, then the dimensional formula for coefficient of viscosity is: **(JEE Main 2022)**

(1) $[PA^{-1}T^0]$ (2) $[PAT^{-1}]$
(3) $[PA^{-1}T]$ (4) $[PA^{-1}T^{-1}]$

26. Match List-I with List-II:

List-I		List-II	
(a)	Torque	(i)	MLT^{-1}
(b)	Impulse	(ii)	MT^{-2}
(c)	Tension	(iii)	ML^2T^{-2}
(d)	Surface Tension	(iv)	MLT^{-2}

Choose the most appropriate answer from the option given below: **(JEE Main 2021)**

(1) (a)→(iii), (b)→(i), (c)→(iv), (d)→(ii)
(2) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
(3) (a)→(i), (b)→(iii), (c)→(iv), (d)→(ii)
(4) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)

27. An expression of energy density is given by $u = \alpha/\beta \sin(\alpha x/kt)$, where α, β are constants, x is displacement, k is Boltzmann constant and t is the temperature. The dimensions of β will be: **(JEE Main 2022)**

(1) $[ML^2T^{-2}]$ (2) $[M^0L^2T^{-2}]$
(3) $[M^0L^0T^0]$ (4) $[M^0L^2T^0]$

28. The dimensions of $\left(\frac{B^2}{\mu_0}\right)$ will be

(if μ_0: permeability of free space and B: magnetic field) **(JEE Main 2022)**

(1) $[ML^2T^{-2}]$
(2) $[MLT^{-2}]$
(3) $[ML^{-1}T^{-2}]$
(4) $[ML^2T^{-2}A^{-1}]$

29. Consider the efficiency of Carnot's engine is given by $\eta = \frac{\alpha\beta}{\sin\theta}\log_e\frac{\beta x}{kT}$, where α and β are constants. If T is temperature, k is Boltzman constant, θ is angular displacement and x has the dimensions of length. Then, choose the incorrect option. **(JEE Main 2022)**

(1) Dimensions of β is same as that of force.
(2) Dimensions of $\alpha^{-1}x$ is same as that of energy.
(3) Dimensions of $\eta^{-1}\sin\theta$ is same as that of $\alpha\beta$
(4) Dimensions of α is same as that of β

30. Match List-I with List-II:

List-I		List-II	
(a)	Torque	(i)	Nms^{-1}
(b)	Stress	(ii)	$J\,kg^{-1}$
(c)	Latent Heat	(iii)	Nm
(d)	Power	(iv)	Nm^{-2}

Choose the correct answer from the options given below: **(JEE Main 2022)**

(1) (a)→(iii), (b)→(ii), (c)→(i), (d)→(iv)
(2) (a)→(iii), (b)→(iv), (c)→(ii), (d)→(i)
(3) (a)→(iv), (b)→(i), (c)→(iii), (d)→(ii)
(4) (a)→(ii), (b)→(iii), (c)→(i), (d)→(iv)

31. In Vander Waals equation $\left[P + \frac{a}{V^2}\right][V - b] = RT$; P is pressure, V is volume, R is universal gas constant and T is temperature. The ratio of constants a/b is dimensionally equal to: **(JEE Mains 2022)**

(1) P/V (2) V/P
(3) PV (4) PV^3

32. Identify the pair of physical quantities that have same dimensions: **(JEE Main 2022)**

(1) velocity gradient and decay constant
(2) wien's constant and Stefan constant
(3) angular frequency and angular momentum
(4) wave number and Avogadro number

33. An expression for a dimensionless quantity P is given by $P=\frac{\alpha}{\beta}\log_e\left(\frac{kt}{\beta x}\right)$; where α and β are constants, x is distance; k is Boltzmann constant and t is the temperature. Then the dimensions of α will be: **(JEE Main 2022)**

(1) $[M^0L^{-1}T^0]$ (2) $[ML^0T^{-2}]$
(3) $[MLT^{-2}]$ (4) $[ML^2T^{-2}]$

34. The dimension of mutual inductance is: **(JEE Main 2022)**

(1) $[ML^2T^{-2}A^{-1}]$
(2) $[ML^2T^{-3}A^{-1}]$
(3) $[ML^2T^{-2}A^{-2}]$
(4) $[ML^2T^{-3}A^{-2}]$

35. The SI unit of a physical quantity is pascal-second. The dimensional formula of this quantity will be **(JEE Main 2022)**

(1) $[ML^{-1}T^{-1}]$ (2) $[ML^{-1}T^{-2}]$
(3) $[ML^2T^{-1}]$ (4) $[M^{-1}L^3T^0]$

36. If L, C and R are the self-inductance, capacitance and resistance respectively, which of the following does not have the dimension of time? **(JEE Main 2022)**

(1) RC (2) L/R
(3) $\sqrt{LC}$ (4) L/C

37. Match the list-I with List-II.

List-I		List-II	
(a)	Planck's constant (h)	(i)	$[M^1L^2T^{-2}]$
(b)	Stopping potential (Vs)	(ii)	$[M^1L^2T^{-1}]$
(c)	Work function (ϕ)	(iii)	$[M^1L^2T^{-1}]$
(d)	Momentum (p)	(iv)	$[M^1L^2T^{-3}A^{-1}]$

Choose the correct answer from the options given below: **(24 January 2023 – Shift 1)**

(1) (a)→(iii), (b)→(i), (c)→(ii), (d)→(iv)
(2) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)
(3) (a)→(ii), (b)→(iv), (c)→(iii), (d)→(i)
(4) (a)→(i), (b)→(iii), (c)→(iv), (d)→(ii)

38. The frequency (v) of an oscillating liquid drop may depend upon radius (r) of the drop, density (ρ) of liquid and the surface tension (s) of the liquid as: $v = r^a\rho^b s^c$. The values of a, b and c respectively are **(24 January 2023 – Shift 2)**

(1) $\left(-\frac{3}{2},-\frac{1}{2},\frac{1}{2}\right)$
(2) $\left(\frac{3}{2},-\frac{1}{2},\frac{1}{2}\right)$
(3) $\left(\frac{3}{2},\frac{1}{2},-\frac{1}{2}\right)$
(4) $\left(-\frac{3}{2},\frac{1}{2},\frac{1}{2}\right)$

39. Match the list-I with List-II.

List-I		List-II	
(a)	Surface tension	(i)	Kg $m^{-1}s^{-1}$
(b)	Pressure	(ii)	Kg ms^{-1}
(c)	Viscosity	(iii)	Kg $m^{-1}s^{-2}$
(d)	Impulse	(iv)	Kg s^{-2}

Choose the correct answer from the options given below: **(25 January 2023 – Shift 1)**

(1) (a)→(iv), (b)→(iii), (c)→(ii), (d)→(i)
(2) (a)→(iv), (b)→(iii), (c)→(i), (d)→(ii)
(3) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)
(4) (a)→(ii), (b)→(i), (c)→(iii), (d)→(iv)

40. Match the list-I with List-II.

List-I		List-II	
(a)	Young's Modulus (Y)	(i)	$[ML^{-1}T^{-1}]$
(b)	Co-efficient of Viscosity (η)	(ii)	$[ML^2T^{-1}]$
(c)	Planck's Constant (h)	(iii)	$[ML^{-1}T^{-2}]$
(d)	Work Function (ϕ)	(iv)	$[ML^2T^{-2}]$

Choose the correct answer from the options given below: **(25 January 2023 – Shift 2)**

(1) (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)
(2) (a)→(iii), (b)→(i), (c)→(ii), (d)→(iv)
(3) (a)→(i), (b)→(iii), (c)→(iv), (d)→(ii)
(4) (a)→(i), (b)→(ii), (c)→(iii), (d)→(iv)

41. Match the list-I with List-II.

List-I (Physical Quantity)		**List-II (Dimensional Formula)**	
(a)	Pressure gradient	(i)	$[M^0L^2T^{-2}]$
(b)	Energy density	(ii)	$[M^1L^{-1}T^{-2}]$
(c)	Electric Field	(iii)	$[M^1L^{-2}T^{-2}]$
(d)	Latent heat	(iv)	$[M^1L^1T^{-3}A^{-1}]$

Choose the correct answer from the options given below: **(29 January 2023 – Shift 1)**

(1) (a)→(iii), (b)→(ii), (c)→(i), (d)→(iv)

(2) (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)

(3) (a)→(iii), (b)→(ii), (c)→(iv), (d)→(i)

(4) (a)→(ii), (b)→(iii), (c)→(i), (d)→(iv)

42. The equation of a circle is given by $x^2 + y^2 = a^2$, where a is the radius. If the equation is modified to change the origin other than (0, 0), then find out the correct dimensions of A and B in a new equation: $(x - At)^2 + \left(y - \frac{t}{B}\right)^2 = a^2$.

The dimensions of t is given as $[T^{-1}]$. **(29 January 2023 – Shift 2)**

(1) $A = [L^{-1}T]$, $B = [LT^{-1}]$

(2) $A = [LT]$, $B = [L^{-1}T^{-1}]$

(3) $A = [L^{-1}T^{-1}]$, $B = [LT^{-1}]$

(4) $A = [L^{-1}T^{-1}]$, $B = [LT]$

43. Electric field in a certain region is given by $E = \left(\frac{A}{x^2}\hat{i} + \frac{B}{y^3}\hat{j}\right)$. The SI unit of A and B are: **(30 January 2023 – Shift 1)**

(1) Nm^3C^{-1}; Nm^2C^{-1} (2) Nm^2C^{-1}; Nm^3C^{-1}

(3) Nm^3C; Nm^2C (4) Nm^2C; Nm^3C

44. Match the list-I with List-II.

List-I		**List-II**	
(a)	Torque	(i)	kg m^{-1} s^{-2}
(b)	Energy density	(ii)	kg ms^{-1}
(c)	Pressure gradient	(iii)	kg m^{-2} s^{-2}
(d)	Impulse	(iv)	kg m^2 s^{-2}

Choose the correct answer from the options given below: **(30 January 2023 – Shift 2)**

(1) (a)→(iv), (b)→(iii), (c)→(i), (d)→(ii)

(2) (a)→(i), (b)→(iv), (c)→(iii), (d)→(ii)

(3) (a)→(iv), (b)→(i), (c)→(ii), (d)→(iii)

(4) (a)→(iv), (b)→(i), (c)→(iii), (d)→(ii)

45. Match the list-I with List-II.

List-I		**List-II**	
(a)	Angular momentum	(i)	$[ML^2T^{-2}]$
(b)	Torque	(ii)	$[ML^{-2}T^{-2}]$
(c)	Stress	(iii)	$[ML^2T^{-1}]$
(d)	Pressure gradient	(iv)	$[ML^{-1}T^{-2}]$

Choose the correct answer from the options given below: **(31 January 2023 – Shift 2)**

(1) (a)→(i), (b)→(iv), (c)→(iii), (d)→(ii)

(2) (a)→(iii), (b)→(i), (c)→(iv), (d)→(ii)

(3) (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)

(4) (a)→(iv), (b)→(ii), (c)→(i), (d)→(iii)

46. $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ represents the equation of state of some gases. Where P is the pressure, V is the volume, T is the temperature and a, b, R are the constants. The physical quantity, which has dimensional formula as that of $\frac{b^2}{a}$, will be: **(01 February 2023 – Shift 1)**

(1) Bulk modulus

(2) Modulus of rigidity

(3) Compressibility

(4) Energy density

47. If the velocity of light c, universal gravitational constant G and planck's constant h are chosen as fundamental quantities. The dimensions of mass in the new system is: **(01 February 2023 – Shift 2)**

(1) $\left[h^{\frac{1}{2}}c^{-\frac{1}{2}}G^1\right]$ (2) $\left[h^1c^1G^{-1}\right]$

(3) $\left[h^{-\frac{1}{2}}c^{\frac{1}{2}}G^{\frac{1}{2}}\right]$ (4) $\left[h^{\frac{1}{2}}c^{\frac{1}{2}}G^{-\frac{1}{2}}\right]$

48. Dimension of $\frac{1}{\mu_0\varepsilon_0}$ should be equal to **(08 April 2023 – Shift 1)**

(1) LT^{-1} (2) T^2L^{-2}

(3) L^2T^{-2} (4) TL^{-1}

49. Match the list-I with List-II.

List-I		List-II	
(a)	Torque	(i)	$ML^{-2}T^{-2}$
(b)	Stress	(ii)	$ML^{2}T^{-2}$
(c)	Pressure gradient	(iii)	$ML^{-1}T^{-1}$
(d)	Coefficient of viscosity	(iv)	$ML^{-1}T^{-2}$

Choose the correct answer from the options given below: **(08 April 2023 – Shift 2)**

(1) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
(2) (a)→(iv), (b)→(ii), (c)→(iii), (d)→(i)
(3) (a)→(ii), (b)→(iv), (c)→(i), (d)→(iii)
(4) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)

50. Given below are two statements:
Statement I: Astronomical unit (*Au*), Parsec (*Pc*) and Light year (*ly*) are units for measuring astronomical distances.
Statement II: *Au* < Parsec (*Pc*) < *ly*
In the light of the above statements, choose the most appropriate answer from the options given below: **(11 April 2023 – Shift 1)**

(1) Both Statements I and Statements II are incorrect
(2) Statements I is correct but Statements II is incorrect
(3) Both Statements I and Statements II are correct
(4) Statements I is incorrect but Statements II is correct

51. If force (*F*), velocity (*V*) and time (*T*) are considered as fundamental physical quantity, then dimensional formula of density will be: **(11 April 2023 – Shift 2)**

(1) FV^4T^{-6} (2) $FV^{-4}T^{-2}$
(3) $F^2V^{-2}T^6$ (4) $FV^{-2}T^2$

52. Match the list-I with List-II.

List-I		List-II	
(a)	Spring constant	(i)	$[T^{-1}]$
(b)	Angular speed	(ii)	$[MT^{-2}]$
(c)	Angular momentum	(iii)	$[ML^2]$
(d)	Moment of Inertia	(iv)	$[ML^{-2}T^{-1}]$

Choose the correct answer from the options given below: **(12 April 2023 – Shift 1)**

(1) (a)→(i), (b)→(iii), (c)→(ii), (d)→(iv)
(2) (a)→(iv), (b)→(i), (c)→(iii), (d)→(ii)
(3) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
(4) (a)→(ii), (b)→(iii), (c)→(i), (d)→(iv)

53. In the equation $\left[X+\frac{a}{Y^2}\right]\left[Y-b\right]=RT$, X is pressure, Y is volume, R is universal gas constant and T is temperature. The physical quantity equivalent to the ratio $\frac{a}{b}$ is: **(13 April 2023 – Shift 2)**

(1) Pressure gradient
(2) Energy
(3) Impulse
(4) Coefficient of viscosity

54. The speed of a wave produced in water is given by $v=\lambda^a g^b \rho^c$. Where λ, g and ρ are wavelength of wave, acceleration due to gravity and density of water respectively. The values of a, b and c respectively, are **(15 April 2023 – Shift 1)**

(1) 1, –1, 0 (2) $\frac{1}{2}, 0, \frac{1}{2}$
(3) 1, 1, 0 (4) $\frac{1}{2}, \frac{1}{2}, 0$

55. Given below are two statements:
Statement (I): Planck's constant and angular momentum have same dimensions.
Statement (II): Linear momentum and moment of force have same dimensions.
In the light of the above statements, choose the correct answer from the options given below: **(27 January 2024 – Shift 1)**

(1) Statement I is true but Statement II is false
(2) Both Statement I and Statement II are false
(3) Both Statement I and Statement II are true
(4) Statement I is false but Statement II is true

56. The equation of state of a real gas is given by $\left(P+\frac{a}{V^2}\right)\left(V-b\right)=RT$, where P, V and T are pressure. volume and temperature respectively and R is the universal gas constant. The dimensions of $\frac{a}{b^2}$ is similar to that of: **(27 January 2024 – Shift 2)**

(1) PV
(2) P
(3) RT
(4) R

57. Match the list-I with List-II.

List-I		List-II	
A.	Coefficient of viscosity	I.	$[ML^2T^{-2}]$
B.	Surface Tension	II.	$[ML^2T^{-1}]$
C.	Angular momentum	III.	$[ML^{-1}T^{-1}]$
D.	Rotational kinetic energy	IV.	$[ML^0T^{-2}]$

Choose the correct answer from the options given below: **(30 January 2024 – Shift 1)**

(1) A – II, B – I, C – IV, D – III
(2) A – I, B – II, C – III, D – IV
(3) A – III, B – IV, C – II, D – I
(4) A – IV, B – III, C – II, D – I

58. If mass is written as $m = kc^P\, G^{-1/2}\, h^{1/1}$ then the value of P will be: (Constants have their usual meaning with k a dimensionless constant) **(30 January 2024 – Shift 2)**

(1) 1/2 (2) 1/3
(3) 2 (4) –1/3

59. A force is represented by $F = ax^2 + bt^{1/2}$
Where x = distance and t = time. The dimensions of b^2/a are: **(31 January 2024 – Shift 1)**

(1) $[ML^3\, T^{-3}]$ (2) $[MLT^{-2}]$
(3) $[ML^{-1}\, T^{-1}]$ (4) $[ML^2\, T^{-3}]$

60. Consider two physical quantities A and B related to each other as $E = \frac{B - x^2}{At}$ where E, x and t have dimensions of energy, length and time respectively. The dimension of AB is **(31 January 2024 – Shift 2)**

(1) $L^{-2}\, M^1\, T^0$ (2) $L^2\, M^{-1}\, T^1$
(3) $L^{-2}\, M^{-1}\, T^1$ (4) $L^0\, M^{-1}\, T^1$

61. The dimensional formula of angular impulse is: **(01 February 2024 – Shift 1)**

(1) $[ML^{-2}\, T^{-1}]$ (2) $[ML^2\, T^{-2}]$
(3) $[MLT^{-1}]$ (4) $[ML^2\, T^{-1}]$

62. The equation of stationary wave is:

$$y = 2a\sin\left(\frac{2\pi nt}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right)$$

Which of the following is NOT correct: **(04 April 2024 – Shift 1)**

(1) The dimensions of n/λ is $[T]$
(2) The dimensions of n is $[LT^{-1}]$
(3) The dimensions of x is $[L]$
(4) The dimensions of nt is $[L]$

63. Applying the principle of homogeneity of dimensions, determine which one is correct, where T is time period, G is gravitational constant, M is mass, r is radius of orbit. **(04 April 2024 – Shift 2)**

(1) $T^2 = \frac{4\pi^2 r^2}{GM}$ (2) $T^2 = \frac{4\pi^2 r}{GM^2}$

(3) $T^2 = \frac{4\pi^2 r^3}{GM}$ (4) $T^2 = 4\pi^2 r^3$

64. If G be the gravitational constant and u be the energy density then which of the following quantity have the dimensions as that of the $\sqrt{uG}$. **(05 April 2024 – Shift 1)**

(1) pressure gradient per unit mass
(2) Gravitational potential
(3) Energy per unit mass
(4) Force per unit mass

65. What is the dimensional formula of ab^{-1} in the equation $\left(P + \frac{a}{V^2}\right)(V - b) = RT$, where letters have their usual meaning. **(05 April 2024 – Shift 2)**

(1) $[M^{-1}\, L^5\, T^3]$ (2) $[M^6\, L^7\, T^4]$
(3) $[M\, L^2\, T^{-2}]$ (4) $[M^0\, L^3\, T^{-2}]$

66. Match the list-I with List-II.

List-I		List-II	
A.	Torque	I.	$[M^1L^1T^{-2}A^{-2}]$
B.	Magnetic field	II.	$[L^2A^1]$
C.	Magnetic moment	III.	$[M^1T^{-2}A^{-1}]$
D.	Permeability of free space	IV.	$[M^1L^2T^{-2}]$

Choose the correct answer from the options given below: **(06 April 2024 – Shift 1)**

(1) A – III, B – I, C – II, D – IV
(2) A – IV, B – II, C – III, D – I
(3) A – IV, B – III, C – II, D – I
(4) A – I, B – III, C – II, D – IV

67. Given below are two statements:
Statement (I): Dimensions of specific heat is $[L^2T^{-2}K^1]$
Statement (II): Dimensions of gas constant is $[ML^2T^{-1}K^{-1}]$
In the light of the above statements, choose the most appropriate answer from the options given below: **(06 April 2024 – Shift 2)**
(1) Both statement (I) and statement (II) are correct
(2) Statement (I) is correct but statement (II) is incorrect
(3) Both statement (I) and statement (II) are incorrect
(4) Statement (I) is incorrect but statement (II) is correct

68. If $\in_0$ is the permittivity of free space and E is the electric field, then $\in_0 E^2$ has the dimensions: (use energy density = $0.5 \in_0 E^2$) **(08 April 2024 – Shift 2)**
(1) $[M^{-1}L^{-3}T^4A^2]$ (2) $[ML^2T^{-2}]$
(3) $[M^0L^{-2}TA]$ (4) $[ML^{-1}T^{-2}]$

69. The dimensional formula of latent heat is: **(09 April 2024 – Shift 1)**
(1) $[ML^2T^{-2}]$ (2) $[M^0L^2T^{-2}]$
(3) $[MLT^{-2}]$ (4) $[M^0LT^{-2}]$

70. The de-Broglie wavelength associated with a particle of mass m and energy E is $\frac{h}{\sqrt{2mE}}$. The dimensional formula for Planck's constant is: **(09 April 2024 – Shift 2)**
(1) $[ML^2T^{-1}]$ (2) $[ML^{-1}T^{-2}]$
(3) $[MLT^{-2}]$ (4) $[M^2L^2T^{-2}]$

71. If B is magnetic field and μ_0 is permeability of free space, then the dimensions of (B/μ_0) is: **(22 Jan. 2025 – Shift 1)**
(1) $[ML^2T^{-2}A^{-1}]$ (2) $[MT^{-2}A^{-1}]$
(3) $[L^{-1}A]$ (4) $[LT^{-2}A^{-1}]$

72. Which one of the following is the correct dimensional formula for the capacitance in F? M, L, T and C stand for unit of mass, length, time and charge, **(22 Jan. 2025 – Shift 2)**
(1) $[F] = [C^2M^{-2}L^2T^2]$
(2) $[F] = [CM^{-2}L^{-2}T^{-2}]$
(3) $[F] = [CM^{-1}L^{-2}T^2]$
(4) $[F] = [C^2M^{-1}L^{-2}T^2]$

73. The position of a particle moving on x-axis is given by $x(t) = A\sin t + B\cos 2t + Ct^2 + D$, where t is time. The dimension of $\frac{ABC}{D}$ is: **(22 Jan. 2025 – Shift 2)**
(1) $[L]$ (2) $[L^3T^{-2}]$
(3) $[L^2T^{-2}]$ (4) $[L^2]$

74. The electric flux is $\phi = \alpha\sigma + \beta\lambda$.
where λ and σ are linear and surface charge density, respectively, $\left(\frac{\alpha}{\beta}\right)$ represents: **(23 Jan. 2025 – Shift 1)**
(1) charge (2) electric field
(3) displacement (4) area

75. Match the list-I with List-II.

	List-I		List-II
A.	Permeability of free space	I.	$[ML^2T^{-2}]$
B.	Magnetic field	II.	$[MT^{-2}A^{-1}]$
C.	Magnetic moment	III.	$[MLT^{-2}A^{-2}]$
D.	Torsional constant	IV.	$[L^2A]$

Choose the correct answer from the options given below: **(23 Jan. 2025 – Shift 2)**
(1) A – IV, B – III, C – I, D – II
(2) A – III, B – II, C – IV, D – I
(3) A – I, B – IV, C – II, D – III
(4) A – II, B –I, C – III, D – IV

76. In a measurement, it is asked to find modulus of elasticity per unit torque applied on the system. The measured quantity has dimension of $[M^a L^b T^c]$. If $b = 3$, the value of c is _____. **(28 Jan. 2025 – Shift 1)**
(1) 2 (2) 0
(3) 1 (4) 3

77. Match the list-I with List-II.

	List-I		List-II
A.	Angular Impulse	I.	$[M^0L^2T^{-2}]$
B.	Latent Heat	II.	$[ML^2T^{-3}A^{-1}]$
C.	Electrical resistivity	III.	$[ML^2T^{-1}]$
D.	Electromotive force	IV.	$[ML^3T^{-3}A^{-2}]$

Choose the correct answer from the options given below: **(28 Jan. 2025 – Shift 2)**
(1) A – II, B – I, C – IV, D – III
(2) A – I, B – III, C – IV, D – II
(3) A – III, B – I, C – II, D – IV
(4) A – III, B –I, C – IV, D – II

78. The expression given below shows the variation of velocity (v) with time (t), $v = At^2 + \frac{Bt}{C+t}$. The dimension of ABC is: **(29 Jan. 2025 – Shift 1)**

(1) $[M^0L^2T^{-3}]$

(2) $[M^0L^1T^{-3}]$

(3) $[M^0L^1T^{-2}]$

(4) $[M^0L^2T^{-2}]$

79. The pair of physical quantities not having same dimensions is: **(29 Jan. 2025 – Shift 1)**

(1) Torque and energy

(2) Surface tension and impulse

(3) Angular momentum and Planck's constant

(4) Pressure and Young's modulus

80. Match the list-I with List-II.

List-I		List-II	
A.	Young's Modulus	I.	$[ML^{-1}T^{-1}]$
B.	Torque	II.	$[ML^{-1}T^{-2}]$
C.	Coefficient of Viscosity	III.	$[M^{-1}L^3T^{-2}]$
D.	Gravitational Constant	IV.	$[ML^2T^{-2}]$

Choose the correct answer from the options given below: **(29 Jan. 2025 – Shift 2)**

(1) A – I, B – III, C – II, D – IV

(2) A – IV, B – II, C – III, D – I

(3) A – II, B – IV, C – I, D – III

(4) A – II, B –I, C – IV, D – III

81. Match the list-I with List-II.

List-I		List-II	
A.	Magnetic induction	I.	Ampere meter^2
B.	Magnetic intensity	II.	Weber
C.	Magnetic flux	III.	Gauss
D.	Magnetic mometn	IV.	Ampere meter

Choose the correct answer from the options given below: **(29 Jan. 2025 – Shift 2)**

(1) A – I, B – II, C – III, D – IV

(2) A – III, B – IV, C – I, D – II

(3) A – III, B – II, C – I, D – IV

(4) A – III, B – IV, C – II, D – I

82. An ideal gas enclosed in a vertical cylindrical container supports a freely moving piston of mass M. The piston and the cylinder have equal cross sectional area A. When the piston is in equilibrium, the volume of the gas is V_0, and its pressure is P_0. The piston is slightly displaced from the equilibrium position and released. Assuming that the system is completely isolated from its surrounding, the piston executes a simple harmonic motion with frequency. **(JEE Mains-2013)**

(1) $\frac{1}{2\pi}\frac{A_yP_0}{V_0M}$ (2) $\frac{1}{2\pi}\frac{V_0MP_0}{A^2\gamma}$

(3) $\frac{1}{2\pi}\sqrt{\frac{A^2\gamma P_0}{MV_0}}$ (4) $\frac{1}{2\pi}\sqrt{\frac{MV_0}{A\gamma P_0}}$

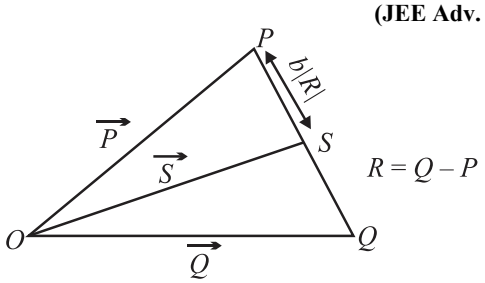
83. Expression for time in terms of G(Universal gravitational constant), h (Planck constant) and c(speed of light) is proportional to. **(JEE Main 2019)**

(1) $\sqrt{\frac{Gh}{c^5}}$ (2) $\sqrt{\frac{c^3}{Gh}}$

(3) $\sqrt{\frac{Gh}{c^3}}$ (4) $\sqrt{\frac{hc^5}{G}}$

JEE Advanced PYQ:

1. Three vectors P, Q and R are shown in the figure. Let S be any point on the vector R. The distance between the points P and S is $b[R]$. The general relation among vectors P, Q and S is: **(JEE Adv. 2017)**



(1) $S = (1 - b^2)P + bQ$
(2) $S = (b - 1)P + bQ$
(3) $S = (1 - b)P + bQ$
(4) $S = (1 - b)P + b^2Q$

2. A physical quantity $\vec{S}$ is defined as $\vec{S} = (\vec{E} \times \vec{B})/\mu_0$, where $\vec{E}$ is electric field, $\vec{B}$ is magnetic field and μ_0 is the permeability of free space. The dimensions of $\vec{S}$ are the same as the dimensions of which of the following quantity (ies)? **(JEE Adv.2021)**

(1) $\dfrac{\text{Energy}}{\text{Charge} \times \text{Current}}$
(2) $\dfrac{\text{Force}}{\text{Length} \times \text{Time}}$
(3) $\dfrac{\text{Energy}}{\text{Volume}}$
(4) $\dfrac{\text{Power}}{\text{Area}}$

3. Two vectors A and B are defined as $A = a\hat{i}$ and $B = a(\cos\omega t\hat{i} + \sin\omega t\hat{j})$, where a is a constant and $\omega = \pi/6 \text{ rad s}^{-1}$. If $|A+B| = \sqrt{3}|A-B|$ at time $t = \tau$ for the first time, the value of τ, in seconds, is _____. **(JEE Adv.2018)**

4. Which of the following sets have different dimensions? **(IIT-JEE 2005)**
(1) Pressure, Young's modulus, Stress
(2) Emf, Potential difference, Electric potential
(3) Heat, Work done, Energy
(4) Dipole moment, Electric flux, Electric field

5. A length-scale (l) depends on the permittivity (ε) of a dielectric material, Boltzmann's constant (k_B), the absolute temperature (T), the number per unit volume (n) of certain charged particles and the charge (q) carried by each of the particles. Which of the following expression(s) for l is (are) dimensionally correct? **(JEE Adv. 2016)**

(1) $l = \sqrt{\left(\dfrac{nq^2}{\varepsilon k_B T}\right)}$
(2) $l = \sqrt{\left(\dfrac{Ek_E T}{nq^2}\right)}$
(3) $l = \sqrt{\left(\dfrac{q^2}{\varepsilon h^{2/3} k_B T}\right)}$
(4) $l = \sqrt{\left(\dfrac{q^2}{\varepsilon n^{1/3} k_B T}\right)}$

6. Planck's constant h, speed of light c and gravitational constant G are used to form a unit of length L and a unit of mass M. Then, the correct options is/are. **(JEE Adv. 2015)**

(1) $M \propto \sqrt{c}$
(2) $M \propto \sqrt{G}$
(3) $L \propto \sqrt{h}$
(4) $L \propto \sqrt{G}$

7. In terms of potential difference V, electric current I, permittivity ε_0, permeability μ_0 and speed of light c the dimensionally correct equations is/are: **(JEE Adv. 2015)**

(1) $\mu_0 I^2 = E_0 V^2$ (2) $\varepsilon_0 I = \mu_d V$
(3) $I = E_0 cV$ (4) $\mu_0 cI = \varepsilon_0 V$

8. Young's modulus of elasticity Y is expressed in terms of three derived quantities, namely, the gravitational constant G. Planck's constant h and the speed of light c, as $Y = c^\alpha h^\beta G^\gamma$. Which of the following is the correct option? **(JEE Adv. 2023)**

(1) $\alpha = 7, \beta = -1, \gamma = -2$
(2) $\alpha = -7, \beta = -1, \gamma = -2$
(3) $\alpha = 7, \beta = -1, \gamma = 2$
(4) $\alpha = -7, \beta = 1, \gamma = -2$

Paragraph (Q. 9 – 10) : In electromagnetic theory, the electric and magnetic phenomena are related to each other. Therefore, the dimensions of electric and magnetic quantities must also be related to each other. In the questions below, $[E]$ and $[B]$ stand for dimensions of electric and magnetic fields respectively, while $[\varepsilon_0]$ and $[\mu_0]$ stand for dimensions of the permittivity and permeability of free space, respectively. $[L]$ and $[T]$ are dimensions of length and time, respectively. All the quantities are given in SI units. (There are two questions based on PARAGRAPH "*X*", the question given below is one of them).

9. The relation between $[E]$ and $[B]$ is:
(JEE Adv. 2018)

(1) $[E] = [B][L][T]$ (2) $[E] = [B][L]^{-1}[T]$
(3) $[E] = [B][L][T]^{-1}$ (4) $[E] = [B][L]^{-1}[T]^{-1}$

10. The relation between $[\varepsilon_0]$ and $[\mu_0]$ is:
(JEE Adv. 2018)

(1) $[\mu_0] = [\varepsilon_0][L]^2[T]^{-2}$
(2) $[\mu_0] = [\varepsilon_0][L]^{-2}[T]^2$
(3) $[\mu_0] = [\varepsilon_0]^{-1}[L]^2[T]^{-2}$
(4) $[\mu_0] = [\varepsilon_0]^{-1}[L]^{-2}[T]^2$

Paragraph (Q. 11): A dense collection of equal number of electrons and positive ions is called neutral plasma. Certain solids containing fixed positive ions surrounded by free electrons can be treated as neutral plasma. Let N be the number density of free electrons, each of mass m. When the electrons are subjected to an electric field, they are displaced relatively away from the heavy positive ions. If the electric field becomes zero, the electrons begin to oscillate about the positive ions with a natural angular frequency ω_p, which is called the plasma frequency. To sustain the oscillations, a time varying electric field needs to be applied that has an angular frequency w, where a part of the energy is absorbed and a part of it is reflected. As ω approaches ω_p, all the free electrons are set to resonance together and all the energy is reflected. This is the explanation of high reflectivity of metals.

11. Taking the electronic charge as e and the permittivity as ε_0, use dimensional analysis to determine the correct expression for ω_p
(IIT-JEE 2011)

(1) $\sqrt{\frac{Ne}{m\varepsilon_0}}$ (2) $\sqrt{\frac{m\varepsilon_0}{Ne}}$
(3) $\sqrt{\frac{Ne^2}{m\varepsilon_0}}$ (4) $\sqrt{\frac{m\varepsilon_0}{Ne^2}}$

12. Let us consider a system of units in which mass and angular momentum are dimensionless. If length has dimension of L, which of the following statement(s) is/are correct? **(JEE Adv, 2019)**

(1) The dimension of force is L^{-3}.
(2) The dimension of energy of L^{-2}.
(3) The dimension of power is L^{-5}.
(4) The dimension of linear momentum is L^{-1}.

13. To find the distance d over which a signal can be seen clearly in foggy conditions, a railway engineer uses dimensional analysis and assumes that the distance depends on the mass density p of the fog, intensity (power/area) S of the light from the signal and its frequency f. The engineer finds that d is proportional to $S^{1/n}$. The value of n is:
(JEE Adv. 2014)

14. In a particular system of units, a physical quantity can be expressed in terms of the electric charge e, electron mass m_e, Planck's constant h, and coulomb's constant $k = \frac{1}{4\pi\varepsilon_0}$, where ε_0 is the permittivity of vacuum. In terms of these physical constants, the dimension of the magnetic field is $[B] = [e]^{\alpha}[m_e]^{\beta}[h]^{\gamma}[k]^{\delta}$. The value of $\alpha + \beta + \gamma + \delta$ is _____.
(JEE Adv. 2022)

15. A dimensionless quantity is constructed in terms of electronic charge e, permittivity of free space ε_0, Planck's constant h, and speed of light c. If the dimensionless quantity is written as $e^{\alpha}\varepsilon_0{}^{\beta}h^{\gamma}{}_C{}^{\delta}$ and n is an non-zero integer, then $(\alpha, \beta, \gamma, \delta)$ is given by:
(JEE Adv. 2024)

(1) $(2n, -n, -n, -n)$
(2) $(n, -n, -2n, -n)$
(3) $(n, -n, -n, -2n)$
(4) $(2n, -n, -2n, -2n)$

16. A temperature difference can generate e.m.f. in some materials. Let S be the e.m.f. produced per unit temperature difference between the ends of a wire, σ the electrical conductivity and k the thermal conductivity of the material of the wire. Taking M, L, T, I and K as dimensions of mass, length, time, current and temperature, respectively, the dimensional formula of the quantity $Z = \frac{S^2\sigma}{\kappa}$ is:
[JEE Adv. 2025]

(1) $[M^0L^0T^0I^0K^0]$ (2) $[M^0L^0T^0I^0K^{-1}]$
(3) $[M^1L^2T^{-2}I^{-1}K^{-1}]$ (4) $[M^1L^2T^{-4}I^{-1}K^{-1}]$

17. Match list I with List – II and select the correct answer given below this list. **(JEE Adv. 2013)**

List – I		List – II	
P.	Boltzmann constant	1.	$[ML^2T^{-1}]$
Q.	Coefficient of viscosity	2.	$[ML^{-1}T^{-1}]$
R.	Planck constant	3.	$[MLT^{-3}K^{-1}]$
S.	Thermal conductivity	4.	$[ML^2T^{-2}K^{-1}]$

18. In the relation, $p=\frac{\alpha}{\beta}e^{-\left(\frac{\alpha z}{k\theta}\right)}$ is pressure, z is distance, k is Boltzmann's constant and θ is the temperature. The dimensional formula of β will be: **(IIT-JEE 2004)**

(1) $\left[M^0L^2T^0\right]$ (2) $\left[ML^2T\right]$

(3) $\left[ML^0T^{-1}\right]$ (4) $\left[M^0L^2T^{-1}\right]$

19. In terms of potential difference V, electric current I, permittivity ε_0, permeability μ_0 and speed of light c the dimensionally correct equations is/are: **(JEE Adv. 2015)**

(1) $\mu_0 I^2 = E_0 V^2$

(2) $\varepsilon_0 I = \mu_d V$

(3) $I = E_0 cV$

(4) $\mu_0 cI = \varepsilon_0 V$

NEET Answer Key

1. (1)
2. (3)
3. (3)
4. (1)
5. (3)
6. (1)
7. (2)
8. (4)
9. (3)
10. (3)
11. (2)
12. (4)
13. (1)
14. (3)
15. (2)
16. (1)
17. (3)
18. (2)
19. (2)
20. (3)
21. (4)
22. (1)
23. (3)
24. (4)
25. (2)
26. (3)

JEE Mains Answer Key

1. (1)
2. (4)
3. (4)
4. (2)
5. (4)
6. (1)
7. (3)
8. (1)
9. (4)
10. (2)
11. (3)
12. (2)
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14. (1)
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77. (4)
78. (1)
79. (2)
80. (3)
81. (4)
82. (3)
83. (1)

JEE Advanced Answer Key

1. (3)
2. (2, 4)
3. (2)
4. (4)
5. (2, 4)
6. (1, 3, 4)
7. (1, 3)
8. (1)
9. (3)
10. (4)
11. (3)
12. (1, 2, 4)
13. (3)
14. (4)
15. (1)
16. (2)
17. P–4, Q–2, R–1, S–3
18. (1)
19. (1, 3)