

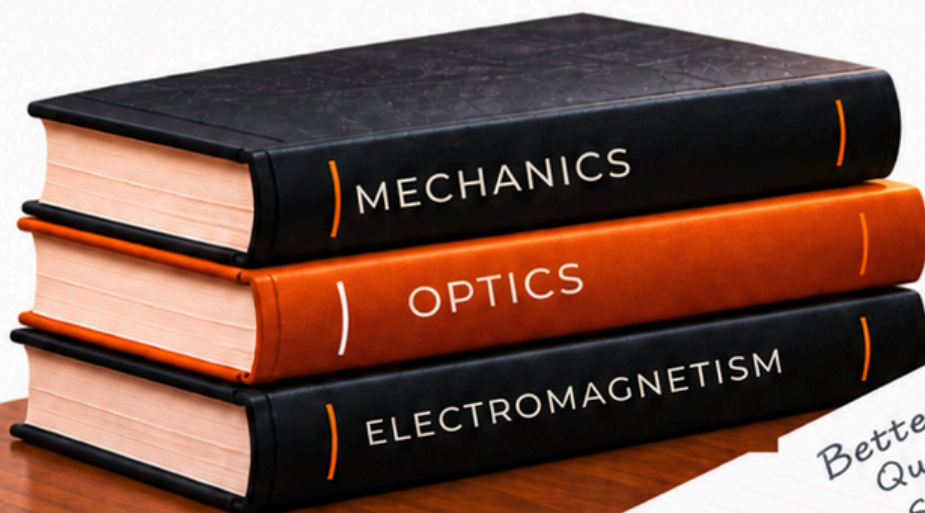
JEE Main Physics

Dimensional Analysis PYQ

$$F = ma$$



$$v = u + at$$



Better
Questions
Stronger
Concepts
Brighter Future

Subject: Physics

Years: 2026-2002

Total Questions: 138

About this PYQ collection

What is inside

A complete topic-wise set of **138 previous year questions** on **Dimensions of physics quantities, dimensional analysis and its applications** from **JEE Main (2026-2013)** and its predecessor **AIEEE (2012-2002)**, across **21 exam years**. **116 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Dimensional analysis	138	100%

Question types

TYPE	QS	%
Single-correct MCQ	135	98%
Multiple-correct MCQ	1	1%
Numerical value	2	1%

Numerical-value questions have no options; all 2 are from 2025 onwards.

How these questions help you

- **Know where the marks are:** dimensional analysis make up **138 of 138 questions (about 100%)**.
- **Build speed and accuracy:** short, formula-driven questions ideal for quick practice.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** dimensions and error estimation are used across Physics.

Questions – Dimensions of physics quantities, dimensional analysis and its applications

1. Consider the equation $H = \frac{x^p \epsilon^q E^r}{t^s}$
 Where H = magnetic field; E = electric field, ϵ = permittivity, x = distance, t = time
 The values of p, q, r and s respectively are : (8 Apr 2026 | Shift 2)
- (A) 1, 1, 1, 1 (B) -1, 1, 2, 1
 (C) 1, -1, -2, 1 (D) -1, -2, -2, 1

2. The potential energy of a particle changes with distance x from a fixed origin as $V = \frac{A\sqrt{x}}{x+B}$, where A and B are constant with appropriate dimensions. The dimensions of AB are _____ (6 Apr 2026 | Shift 1)
- (A) $[M^1 L^{5/2} T^{-2}]$ (B) $[M^{3/2} L^{5/2} T^{-2}]$
 (C) $[M^1 L^2 T^{-2}]$ (D) $[M^1 L^{7/2} T^{-2}]$

3. Match List - I with List - II.

List - I		List - II	
A.	Boltzmann constant	I.	$[M^{-1} L^3 T^{-2}]$
B.	Stefan's constant	II.	$[M L^2 T^{-1}]$
C.	Planck's constant	III.	$[ML^2 T^{-2} K^{-1}]$
D.	Gravitational constant	IV.	$[M L^0 T^{-3} K^{-4}]$

- Choose the correct answer from the options given below : (6 Apr 2026 | Shift 2)
- (A) A-I, B-II, C-III, D-IV (B) A-IV, B-III, C-II, D-I
 (C) A-III, B-IV, C-II, D-I (D) A-II, B-I, C-IV, D-III

4. L, C and R represents physical quantities inductance, capacitance and resistance respectively. The dimensional formula $ML^2 T^{-4} A^{-2}$ corresponds to _____. (5 Apr 2026 | Shift 1)
- (A) $\frac{R}{\sqrt{LC}}$ (B) $\frac{R}{LC}$
 (C) $\frac{C}{\sqrt{LR}}$ (D) $\frac{1}{R} \sqrt{\frac{L}{C}}$

5. Match List - I with List - II.

List - I		List - II	
A.	Meter (L)	I.	$\sqrt{\frac{hc}{G}}$
B.	Second (S)	II.	$\sqrt{\frac{Gh}{c^5}}$
C.	Kilogram (M)	III.	$\sqrt{\frac{K^2 L^2 c^3}{Gh}}$
D.	Kelvin (K)	IV.	$\sqrt{\frac{Gh}{c^3}}$

where h (Planck's constant), G (gravitational constant) and c (speed of light in vacuum) as fundamental units.

Choose the correct answer from the options given below :

(5 Apr 2026 | Shift 2)

(A) A-II, B-IV, C-I, D-III

(B) A-IV, B-II, C-I, D-III

(C) A-IV, B-I, C-II, D-III

(D) A-III, B-I, C-II, D-IV

6. Match the LIST - I with LIST - II

List - I		List - II	
A.	Planck's constant	I.	$ML^2 T^{-2}$
B.	Stopping potential	II.	T^{-1}
C.	Work function	III.	$ML^2 T^{-1}$
D.	Threshold frequency	IV.	$ML^2 T^{-3} A^{-1}$

Choose the correct answer from the options given below:

(4 Apr 2026 | Shift 2)

(A) A-III, B-IV, C-I, D-II

(B) A-I, B-II, C-III, D-IV

(C) A-IV, B-III, C-I, D-II

(D) A-I, B-IV, C-III, D-II

7. The dimensional formula of $\frac{1}{2}\epsilon_0 E^2$ (ϵ_0 = permittivity of vacuum and E = electric field) is $M^a L^b T^c$.

The value of $2a - b + c =$ _____.

(2 Apr 2026 | Shift 1)

(A) 0

(B) 1

(C) -1

(D) 2

8. Dimensions of universal gravitational constant (G) in terms of Planck's constant (h), distance (L), mass (M) and time (T) are _____. (2 Apr 2026 | Shift 2)

- (A) $[hTLM^{-2}]$ (B) $[hT^{-1}LM^{-2}]$
(C) $[hTL^2M^{-2}]$ (D) $[h^{-1}T^{-1}LM^{-2}]$

9. Match List - I with List - II.

List - I	List - II
A. Coefficient of viscosity	I. $[ML^{-1}T^{-2}]$
B. Surface tension	II. $[ML^2T^{-2}]$
C. Pressure	III. $[ML^0T^{-2}]$
D. Surface energy	IV. $[ML^{-1}T^{-1}]$

Choose the **correct** answer from the options given below : (28 Jan 2026 | Shift 2)

- (A) A-I, B-II, C-IV, D-III (B) A-IV, B-III, C-I, D-II
(C) A-IV, B-I, C-II, D-III (D) A-I, B-III, C-II, D-IV

10. Match the LIST - I with LIST - II

List-I	List-II
A. Magnetic induction	I. $MLT^{-2}A^{-2}$
B. Magnetic flux	II. $ML^2T^{-2}A^{-2}$
C. Magnetic permeability	III. $ML^0T^{-2}A^{-1}$
D. Self inductance	IV. $ML^2T^{-2}A^{-1}$

Choose the correct answer from the options given below: (24 Jan 2026 | Shift 1)

- (A) A-III, B-IV, C-II, D-I (B) A-I, B-III, C-IV, D-II
(C) A-IV, B-III, C-I, D-II (D) A-III, B-IV, C-I, D-II

11. A ball of radius r and density ρ dropped through a viscous liquid of density σ and viscosity η attains its terminal velocity at time t , given by $t = A\rho^a r^b \eta^c \sigma^d$, where A is a constant and a, b, c and d are integers. The value of $\frac{b+c}{a+d}$ is _____. (23 Jan 2026 | Shift 2)

12. 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)

13. Match the LIST – I with LIST – II

List-I		List-II	
A.	Spring constant	I.	$\text{ML}^2 \text{T}^{-2} \text{K}^{-1}$
B.	Thermal conductivity	II.	$\text{ML}^0 \text{T}^{-2}$
C.	Boltzmann constant	III.	$\text{ML}^2 \text{T}^{-3} \text{A}^{-2}$
D.	Inductive reactance	IV.	$\text{MLT}^{-3} \text{K}^{-1}$

Choose the correct answer from the options given below:

(22 Jan 2026 | Shift 1)

(A) A-III, B-II, C-IV, D-I

(B) A-I, B-IV, C-II, D-III

(C) A-II, B-I, C-IV, D-III

(D) A-II, B-IV, C-I, D-III

14. Consider a modified Bernoulli equation.

$$\left(P + \frac{A}{Bt^2}\right) + \rho g(h + Bt) + \frac{1}{2}\rho V^2 = \text{constant}$$

If t has the dimension of time then the dimensions of A and B are _____, _____ respectively.

(21 Jan 2026 | Shift 1)

(A) $[\text{ML}^0 \text{T}^{-1}]$ and $[\text{M}^0 \text{LT}]$

(B) $[\text{ML}^0 \text{T}^{-2}]$ and $[\text{M}^0 \text{LT}^{-1}]$

(C) $[\text{ML}^0 \text{T}^{-2}]$ and $[\text{M}^0 \text{LT}^{-2}]$

(D) $[\text{ML}^0 \text{T}^{-1}]$ and $[\text{M}^0 \text{LT}^{-1}]$

15. If ϵ_0 denotes the permittivity of free space and Φ_E is the flux of the electric field through the area bounded by the closed surface, then dimensions of $\left(\epsilon_0 \frac{d\Phi_E}{dt}\right)$ are that of :

(7 Apr 2025 | Shift 1)

(A) electric charge

(B) electric field

(C) electric current

(D) electric potential

16. The dimension of $\sqrt{\frac{\mu_0}{\epsilon_0}}$ is equal to that of:

(μ_0 = Vacuum permeability and ϵ_0 = Vacuum permittivity)

(7 Apr 2025 | Shift 2)

(A) Voltage

(B) Inductance

(C) Resistance

(D) Capacitance

17. Given a charge q , current I and permeability of vacuum μ_0 . Which of the following quantity has the dimension of momentum ?

(2 Apr 2025 | Shift 2)

(A) qI/μ_0

(B) $q^2\mu_0 I$

(C) $q\mu_0/I$

(D) $q\mu_0 I$

18. Match List - I with List - II.

List - I	List - II
(A) Mass density	(I) $[ML^2T^{-3}]$
(B) Impulse	(II) $[MLT^{-1}]$
(C) Power	(III) $[ML^2T^0]$
(D) Moment of inertia	(IV) $[ML^{-3}T^0]$

Choose the **correct** answer from the options given below :

(7 Apr 2025 | Shift 2)

- (A) (A)-(IV), (B)-(II), (C)-(III), (D)-(I) (B) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
 (C) (A)-(IV), (B)-(III), (C)-(I), (D)-(II) (D) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)

19. The unit of $\sqrt{\frac{2I}{\epsilon_0 c}}$ is :

(I = intensity of an electromagnetic wave, c = speed of light)

(7 Apr 2025 | Shift 2)

- (A) Vm (B) NC^{-1}
 (C) NC (D) Nm

20. In an electromagnetic system, the quantity representing the ratio of electric flux and magnetic flux has dimension of $M^P L^Q T^R A^S$, where value of 'Q' and 'R' are

(4 Apr 2025 | Shift 1)

- (A) (3, -5) (B) (-2, 1)
 (C) (-2, 2) (D) (1, -1)

21. In an electromagnetic system, a quantity defined as the ratio of electric dipole moment and magnetic dipole moment has dimension of $[M^P L^Q T^R A^S]$. The value of P and Q are :

(4 Apr 2025 | Shift 2)

- (A) -1, 0 (B) 0, -1
 (C) -1, 1 (D) 1, -1

22. The equation for real gas is given by $(P + \frac{a}{V^2})(V - b) = RT$, where P, V, T and R are the pressure, volume, temperature and gas constant, respectively. The dimension of ab^{-2} is equivalent to that of :

(2 Apr 2025 | Shift 1)

- (A) Compressibility (B) Planck's constant
 (C) Energy density (D) Strain

23. Match the LIST – I with LIST – II

List - I		List - II	
A.	Gravitational constant	I.	$[LT^{-2}]$
B.	Gravitational potential energy	II.	$[L^2 T^{-2}]$
C.	Gravitational potential	III.	$[ML^2 T^{-2}]$
D.	Acceleration due to gravity	IV.	$[M^{-1} L^3 T^{-2}]$

Choose the correct answer from the options given below:

(3 Apr 2025 | Shift 1)

(A) A-IV, B-III, C-II, D-I

(B) A-II, B-IV, C-III, D-I

(C) A-I, B-III, C-IV, D-II

(D) A-III, B-II, C-I, D-IV

24. Match the LIST – I with LIST – II

LIST-I		LIST-II	
A.	Boltzmann constant	I	$ML^2 T^{-1}$
B	Coefficient of viscosity	II	$MLT^{-3} K^{-1}$
C	Planck's constant	III	$ML^2 T^{-2} K^{-1}$
D	Thermal conductivity	IV	$ML^{-1} T^{-1}$

Choose the correct answer from the options given below:

(3 Apr 2025 | Shift 2)

(A) A - III, B - IV, C - I, D - II

(B) A - III, B - IV, C - II, D - I

(C) A - III, B - II, C - I, D - IV

(D) A - II, B - III, C - IV, D - I

25. If μ_0 and ϵ_0 are the permeability and permittivity of free space, respectively, then the dimension of $\left(\frac{1}{\mu_0 \epsilon_0}\right)$ is :

(2 Apr 2025 | Shift 2)

(A) T^2/L

(B) L^2/T^2

(C) T^2/L^2

(D) L/T^2

26. Match List I with List II.

	List - I		List - II
(A)	Coefficient of viscosity	(I)	$[ML^0 T^{-3}]$
(B)	Intensity of wave	(II)	$[ML^{-2} T^{-2}]$
(C)	Pressure gradient	(III)	$[M^{-1}LT^2]$
(D)	Compressibility	(IV)	$[ML^{-1} T^{-1}]$

Choose the correct answer from the options given below:

(2 Apr 2025 | Shift 1)

- (A) (A)-(II), (B)-(III), (C)-(IV), (D)-(I) (B) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
 (C) (A)-(IV), (B)-(I), (C)-(II), (D)-(III) (D) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

27. The pair of physical quantities not having the same dimensions is : (29 Jan 2025 | Shift 1)

- (A) Angular momentum and Planck's constant (B) Torque and energy
 (C) Surface tension and impulse (D) Pressure and Young's modulus

28. 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)

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

29. The position of a particle moving on x -axis is given by
 $x(t) = A \sin t + B \cos^2 t + Ct^2 + D$, where t is time. The dimension of $\frac{ABC}{D}$ is

(23 Jan 2025 | Shift 1)

- (A) L (B) $L^3 T^{-2}$
 (C) $L^2 T^{-2}$ (D) L^2

30. 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)

- (A) displacement (B) charge
 (C) electric field (D) area

31. Match List - I with List - II.

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

Choose the **correct** answer from the options given below :

(29 Jan 2025 | Shift 2)

- (A) (A)-(I), (B)-(III), (C)-(II), (D)-(IV) (B) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)
 (C) (A)-(II), (B)-(I), (C)-(IV), (D)-(III) (D) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

32. Match List - I with List - II.

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

Choose the correct answer from the options given below:

(28 Jan 2025 | Shift 2)

- (A) (A)-(II), (B)-(I), (C)-(IV), (D)-(III) (B) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)
 (C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II) (D) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

33. 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)

- (A) $MT^{-2} A^{-1}$ (B) $L^{-1} A$
 (C) $ML^2 T^{-2} A^{-1}$ (D) $LT^{-2} A^{-1}$

34. The dimensional formula of latent heat is :

(9 Apr 2024 | Shift 1)

- (A) $[M^0 L T^{-2}]$ (B) $[MLT^{-2}]$
 (C) $[M^0 L^2 T^{-2}]$ (D) $[ML^2 T^{-2}]$

35. Match List - I with List - II

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

Choose the correct answer from the options given below :

(23 Jan 2025 | Shift 2)

- (A) (A)-(III), (B)-(II), (C)-(IV), (D)-(I) (A) – (I), (B) – (IV), (C) –
 (B) (II), (D) – (III)
 (A) – (II), (B) – (I), (C) –
 (C) (III), (D) – (IV) (D) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

36. 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)

- (A) $[F] = [CM^{-1} L^{-2} T^2]$ (B) $[F] = [C^2 M^{-2} L^2 T^2]$
 (C) $[F] = [C^2 M^{-1} L^{-2} T^2]$ (D) $[F] = [CM^{-2} L^{-2} T^{-2}]$

37. The de-Broglie wavelength associated with a particle of mass m and energy E is $h/\sqrt{2mE}$. The dimensional formula for Planck's constant is :

(9 Apr 2024 | Shift 2)

- (A) $[M^2 L^2 T^{-2}]$ (B) $[ML^{-1} T^{-2}]$
 (C) $[ML^2 T^{-1}]$ (D) $[MLT^{-2}]$

38. If ϵ_0 is the permittivity of free space and E is the electric field, then $\epsilon_0 E^2$ has the dimensions :

(8 Apr 2024 | Shift 2)

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

39. 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 $\sqrt{uG}$:

(5 Apr 2024 | Shift 1)

- (A) Gravitational potential (B) pressure gradient per unit mass
 (C) Energy per unit mass (D) Force per unit mass

40. Match List I with List II

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

Choose the correct answer from the options given below:

(6 Apr 2024 | Shift 1)

(A) A-I, B-III, C-II, D-IV

(B) A-IV, B-II, C-III, D-I

(C) A-III, B-I, C-II, D-IV

(D) A-IV, B-III, C-II, D-I

41. Given below are two statements:

Statement (I) : Dimensions of specific heat is $[L^2 T^{-2} K^{-1}]$.

Statement (II) : Dimensions of gas constant is $[ML^2 T^{-1} K^{-1}]$.

In the light of the above statements, choose the most appropriate answer from the options given below.

(6 Apr 2024 | Shift 2)

(A) Statement (I) is incorrect but statement (II) is correct

(B) Both statement (I) and statement (II) are incorrect

(C) Both statement (I) and statement (II) are correct

(D) Statement (I) is correct but statement (II) is incorrect

42. 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.

(5 Apr 2024 | Shift 2)

(A) $[M^6 L^7 T^4]$

(B) $[M^{-1} L^5 T^3]$

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

(D) $[ML^2 T^{-2}]$

43. 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 :

(4 Apr 2024 | Shift 1)

(A) The dimensions of nt is $[L]$

(B) The dimensions of n is $[LT^{-1}]$

(C) The dimensions of x is $[L]$

(D) The dimensions of n/λ is $[T]$

44. 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.

(4 Apr 2024 | Shift 2)

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

45. The dimensional formula of angular impulse is :

(1 Feb 2024 | Shift 1)

(A) $[ML^2 T^{-2}]$ (B) $[ML^{-2} T^{-1}]$
 (C) $[ML^2 T^{-1}]$ (D) $[MLT^{-1}]$

46. A force is represented by $F = ax^2 + bt^{\frac{1}{2}}$ where x = distance and t = time. The dimensions of b^2/a are:

(31 Jan 2024 | Shift 1)

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

47. 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 Jan 2024 | Shift 2)

(A) $L^{-2}M^1T^0$ (B) $L^2M^{-1}T^1$
 (C) $L^0M^{-1}T^1$ (D) $L^{-2}M^{-1}T^1$

48. Match List I with List II.

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

Choose the correct answer from the options given below :

(30 Jan 2024 | Shift 1)

- (A) (A)-(II), (B)-(I), (C)-(IV), (D)-(III) (B) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
 (C) (A)-(IV), (B)-(III), (C)-(II), (D)-(I) (D) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

49. If mass is written as $m = kc^P G^{-1/2} h^{1/2}$ then the value of P will be : (Constants have their usual meaning with k a dimensionless constant) (30 Jan 2024 | Shift 2)
- (A) $1/3$ (B) $-1/3$
(C) $1/2$ (D) 2

50. 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 Jan 2024 | Shift 1)
- (A) Statement I is true but Statement II is false (B) Both Statement I and Statement II are false
(C) Both Statement I and Statement II are true (D) Statement I is false but Statement II is true

51. The equation of state of a real gas is given by $\left(P + \frac{a}{V^2}\right)(V - b) = RT$, 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 Jan 2024 | Shift 2)
- (A) P (B) RT
(C) PV (D) R

52. 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 Apr 2023 | Shift 1)
- (A) $\frac{1}{2}, 0, \frac{1}{2}$ (B) $1, 1, 0$
(C) $1, -1, 0$ (D) $\frac{1}{2}, \frac{1}{2}, 0$

53. In the equation $\left[X + \frac{a}{Y^2}\right][Y - b] = RT$, 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 Apr 2023 | Shift 2)
- (A) Impulse (B) Energy
(C) Pressure gradient (D) Coefficient of viscosity

54. Match 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.	$[ML^2T^{-1}]$

Choose the correct answer from the options given below:

(12 Apr 2023 | Shift 1)

(A) A-IV, B-I, C-III, D-II

(B) A-II, B-III, C-I, D-IV

(C) A-II, B-I, C-IV, D-III

(D) A-I, B-III, C-II, D-IV

55. If force (F), velocity (V) and time (T) are considered as fundamental physical quantity, then dimensional formula of density will be :

(11 Apr 2023 | Shift 2)

(A) $FV^{-2} T^2$

(B) $FV^4 T^{-6}$

(C) $F^2 V^{-2} T^6$

(D) $FV^{-4} T^{-2}$

56. Dimension of $\frac{1}{\mu_0 \epsilon_0}$ should be equal to

(8 Apr 2023 | Shift 1)

(A) T^2/L^2

(B) T/L

(C) L^2/T^2

(D) L/T

57. Match List I with List II

	LIST I		LIST II
A.	Torque	I.	$ML^{-2}T^{-2}$
B.	Stress	II.	ML^2T^{-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:

(8 Apr 2023 | Shift 2)

(A) A-II, B-I, C-IV, D-III

(B) A-II, B-IV, C-I, D-III

(C) A-IV, B-II, C-III, D-I

(D) A-III, B-IV, C-I, D-II

58. $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ 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:

(1 Feb 2023 | Shift 1)

- (A) Energy density (B) Bulk modulus
(C) Modulus of rigidity (D) Compressibility

59. 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 :

(1 Feb 2023 | Shift 2)

- (A) $[h^1 c^1 G^{-1}]$ (B) $[h^{-1/2} c^{1/2} G^{1/2}]$
(C) $[h^{1/2} c^{1/2} G^{-1/2}]$ (D) $[h^{1/2} c^{-1/2} G^1]$

60. If R , X_L , and X_C represent resistance, inductive reactance and capacitive reactance. Then which of the following is dimensionless :

(31 Jan 2023 | Shift 1)

- (A) $\frac{R}{X_L X_C}$ (B) $R X_L X_C$
(C) $\frac{R}{\sqrt{X_L X_C}}$ (D) $R \frac{X_L}{X_C}$

61. Match List I with List II

LIST I		LIST II	
A.	Angular momentum	I.	$[ML^2 T^{-2}]$
B.	Torque	II.	$[ML^{-2} T^{-2}]$
C.	Stress	III	$[ML^2 T^{-1}]$
D.	Pressure gradient	IV.	$[ML^{-1} T^{-2}]$

Choose the correct answer from the options given below:

(31 Jan 2023 | Shift 2)

- (A) A - I, B - IV, C - III, D - II (B) A - III, B - I, C - IV, D - II
(C) A - IV, B - II, C - I, D - III (D) A - II, B - III, C - IV, D - I

62. Electric field in a certain region is given by $\vec{E} = \left(\frac{A}{x^2} \hat{i} + \frac{B}{y^3} \hat{j} \right)$. The SI unit of A and B are : (30 Jan 2023 | Shift 1)
- (A) $\text{Nm}^2\text{C}; \text{Nm}^3\text{C}$ (B) $\text{Nm}^3\text{C}^{-1}; \text{Nm}^2\text{C}^{-1}$
 (C) $\text{Nm}^3\text{C}; \text{Nm}^2\text{C}$ (D) $\text{Nm}^2\text{C}^{-1}; \text{Nm}^3\text{C}^{-1}$

63. Match List I with List II :

	List I (Physical Quantity)		List II (Dimensional Formula)
A.	Pressure gradient	I.	$[\text{M}^0 \text{L}^2 \text{T}^{-2}]$
B.	Energy density	II.	$[\text{M}^1 \text{L}^{-1} \text{T}^{-2}]$
C.	Electric Field	III.	$[\text{M}^1 \text{L}^{-2} \text{T}^{-2}]$
D.	Latent heat	IV.	$[\text{M}^1 \text{L}^1 \text{T}^{-3} \text{A}^{-1}]$

Choose the correct answer from the options given below:

(29 Jan 2023 | Shift 1)

- (A) A-III, B-II, C-IV, D-I (B) A-III, B-II, C-I, D-IV
 (C) A-II, B-III, C-IV, D-I (D) A-II, B-III, C-I, D-IV

64. 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 $[\text{T}^{-1}]$. (29 Jan 2023 | Shift 2)
- (A) $A = [\text{L}^{-1}\text{T}^{-1}], B = [\text{LT}^{-1}]$ (B) $A = [\text{L}^{-1}\text{T}^{-1}], B = [\text{LT}]$
 (C) $A = [\text{LT}], B = [\text{L}^{-1}\text{T}^{-1}]$ (D) $A = [\text{L}^{-1}\text{T}], B = [\text{LT}^{-1}]$

65. The frequency (ν) 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 $\nu = r^a \rho^b s^c$. The values of a, b and c respectively are (24 Jan 2023 | Shift 2)
- (A) $\left(\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}\right)$ (B) $\left(-\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$
 (C) $\left(\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$ (D) $\left(-\frac{3}{2}, \frac{1}{2}, \frac{1}{2}\right)$

66. Match List I with List II

	List I		List II
A.	Surface tension	I.	$\text{kg m}^{-1} \text{s}^{-1}$
B.	Pressure	II.	kg ms^{-1}
C.	Viscosity	III.	$\text{kg m}^{-1} \text{s}^{-2}$
D.	Impulse	IV.	kg s^{-2}

Choose the correct answer from the options given below :

(25 Jan 2023 | Shift 1)

(A) A-IV, B-III, C-I, D-II

(B) A-IV, B-III, C-II, D-I

(C) A-I, B-I, C-III, D-IV

(D) A-III, B-IV, C-I, D-II

67. Match List I with List II

	List I		List II
A.	Young's Modulus (Y)	I.	$[\text{ML}^{-1}\text{T}^{-1}]$
B.	Co-efficient of Viscosity (η)	II.	$[\text{ML}^2\text{T}^{-1}]$
C.	Planck's Constant (h)	III.	$[\text{ML}^{-1}\text{T}^{-2}]$
D.	Work function (ϕ)	IV.	$[\text{ML}^2\text{T}^{-2}]$

Choose the correct answer from the options given below :

(25 Jan 2023 | Shift 2)

(A) A-II, B-III, C-IV, D-I

(B) A-I, B-II, C-III, D-IV

(C) A-I, B-III, C-IV, D-II

(D) A-III, B-I, C-II, D-IV

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

(if μ_0 : permeability of free space and B : magnetic field)

(28 Jul 2022 | Shift 1)

(A) $[\text{ML}^2 \text{T}^{-2}]$

(B) $[\text{ML} \text{T}^{-2}]$

(C) $[\text{ML}^{-1} \text{T}^{-2}]$

(D) $[\text{ML}^2 \text{T}^{-2} \text{A}^{-1}]$

69. If momentum [P], area [A] and time [T] are taken as fundamental quantities, then the dimensional formula for coefficient of viscosity is :

(25 Jul 2022 | Shift 1)

(A) $[\text{P A}^{-1} \text{T}^0]$

(B) $[\text{P A T}^{-1}]$

(C) $[\text{P A}^{-1} \text{T}]$

(D) $[\text{P A}^{-1} \text{T}^{-1}]$

70. Match List I with List II

	List-I		List-II
A.	Planck's constant (h)	I.	$[M^1 L^2 T^{-2}]$
B.	Stopping potential (Vs)	II.	$[M^1 L^1 T^{-1}]$
C.	Work function (ϕ)	III.	$[M^1 L^2 T^{-1}]$
D.	Momentum (p)	IV.	$[M^1 L^2 T^{-3} A^{-1}]$

Choose the correct answer from the options given below :

(24 Jan 2023 | Shift 1)

(A) A-I, B-III, C-IV, D-II

(B) A-III, B-IV, C-I, D-II

(C) A-II, B-IV, C-III, D-I

(D) A-III, B-I, C-II, D-IV

71. Given below are two statements : One is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A) : Time period of oscillation of a liquid drop depends on surface tension (S), if density of the liquid is ρ and radius of the drop is r, then $T = K\sqrt{\rho r^3/S^{3/2}}$ is dimensionally correct, where K is dimensionless.

Reason (R) : Using dimensional analysis we get R.H.S. having different dimension than that of time period.

In the light of above statements, choose the correct answer from the options given below.

(29 Jul 2022 | Shift 1)

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) is false but (R) is true

72. 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 Boltzmann constant, θ is angular displacement and x has the dimensions of length. Then, choose the incorrect option :

(28 Jul 2022 | Shift 2)

(A) Dimensions of β is same as that of force.

(B) Dimensions of $\alpha^{-1}x$ is same as that of energy.

(C) Dimensions of $\eta^{-1} \sin\theta$ is same as that of $\alpha\beta$.

(D) Dimensions of α is same as that of β .

73. An expression of energy density is given by $u = \frac{\alpha}{\beta} \sin\left(\frac{\alpha x}{kt}\right)$, where α, β are constants, x is displacement, k is Boltzmann constant and t is the temperature. The dimensions of β will be : (27 Jul 2022 | Shift 2)

- (A) $[ML^2 T^{-2} \theta^{-1}]$ (B) $[M^0 L^2 T^{-2}]$
(C) $[M^0 L^0 T^0]$ (D) $[M^0 L^2 T^0]$
-

74. Which of the following physical quantities have the same dimensions? (25 Jul 2022 | Shift 1)

- (A) Electric displacement ($\vec{D}$) and surface charge density (B) Displacement current and electric field
(C) Current density and surface charge density (D) Electric potential and energy
-

75. In van der Waal 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 $\frac{a}{b}$ is dimensionally equal to : (29 Jun 2022 | Shift 1)

- (A) $\frac{P}{V}$ (B) $\frac{V}{P}$
(C) PV (D) PV^3
-

76. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : Product of Pressure (P) and time (t) has the same dimension as that of coefficient of viscosity.

Reason R : Coefficient of viscosity = $\frac{\text{Force}}{\text{Velocity gradient}}$

Choose the correct answer from the options given below : (28 Jun 2022 | Shift 1)

- (A) Both A and R are true, and R is the correct explanation of A. (B) Both A and R are true but R is NOT the correct explanation of A.
(C) A is true but R is false. (D) A is false but R is true.
-

77. The SI unit of a physical quantity is pascal-second. The dimensional formula of this quantity will be : (27 Jun 2022 | Shift 2)

- (A) $[ML^{-1}T^{-1}]$ (B) $[ML^{-1}T^{-2}]$
(C) $[ML^2T^{-1}]$ (D) $[M^{-1}L^3T^0]$
-

78. If L, C and R are the self inductance, capacitance and resistance respectively, which of the following does not have the dimension of time? (27 Jun 2022 | Shift 2)
- (A) RC (B) $\frac{L}{R}$
(C) $\sqrt{LC}$ (D) $\frac{L}{C}$

79. 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 : (26 Jun 2022 | Shift 1)
- (A) $[M^0 L^{-1} T^0]$ (B) $[M L^0 T^{-2}]$
(C) $[M L T^{-2}]$ (D) $[M L^2 T^{-2}]$

80. The dimension of mutual inductance is : (26 Jun 2022 | Shift 2)
- (A) $[ML^2T^{-2}A^{-1}]$ (B) $[ML^2T^{-3}A^{-1}]$
(C) $[ML^2T^{-2}A^{-2}]$ (D) $[ML^2T^{-3}A^{-2}]$

81. Identify the pair of physical quantities which have different dimensions: (24 Jun 2022 | Shift 1)
- (A) Wave number and Rydberg's constant (B) Stress and Coefficient of elasticity
(C) Coercivity and Magnetisation (D) Specific heat capacity and Latent heat

82. Identify the pair of physical quantities that have same dimensions: (24 Jun 2022 | Shift 2)
- (A) velocity gradient and decay constant (B) Wien's constant and Stefan constant
(C) angular frequency and angular momentum (D) wave number and Avogadro number

83. Which of the following equations is dimensionally incorrect? (31 Aug 2021 | Shift 1)
- 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, T = torque, ϵ = permittivity, E = electric field, J = current density, L = length.
- (A) $v = \frac{\pi p a^4}{8 \eta L}$ (B) $h = \frac{2s \cos \theta}{\rho r g}$
(C) $J = \epsilon \frac{\partial E}{\partial t}$ (D) $W = \Gamma \theta$

84. 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 : (31 Aug 2021 | Shift 1)

- (A) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii) (B) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
 (C) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii) (D) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

85. If velocity [V], time [T] and force [F] are chosen as the base quantities, the dimensions of the mass will be : (31 Aug 2021 | Shift 2)

- (A) $[FT^{-1} V^{-1}]$ (B) $[FTV^{-1}]$
 (C) $[FT^2 V]$ (D) $[FVT^{-1}]$

86. Which of the following is not a dimensionless quantity? (27 Aug 2021 | Shift 1)

- (A) Relative magnetic permeability (μ_r) (B) Power factor
 (C) Permeability of free space (μ_0) (D) Quality factor

87. If force (F), length (L) and time (T) are taken as the fundamental quantities. Then what will be the dimension of density : (27 Aug 2021 | Shift 2)

- (A) $[FL^{-4}T^2]$ (B) $[FL^{-3}T^2]$
 (C) $[FL^{-5}T^2]$ (D) $[FL^{-3}T^3]$

88. 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 : (26 Aug 2021 | Shift 1)

- (A) $[M^0 L^1 T^0]$ (B) $[M^{-1} L^{-1} T^2]$
 (C) $[M^1 L^1 T^{-2}]$ (D) $[M^0 L^0 T^0]$

89. 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 most appropriate answer from the options given below : (26 Aug 2021 | Shift 2)

- (A) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii) (B) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
 (C) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i) (D) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

90. Match List I with List II.

	List - I		List - II
(a)	Capacitance, C	(i)	$M^1L^1T^{-3}A^{-1}$
(b)	Permittivity of free space, ϵ_0	(ii)	$M^{-1}L^{-3}T^4A^2$
(c)	Permeability of free space, μ_0	(iii)	$M^{-1}L^{-2}T^4A^2$
(d)	Electric field, E	(iv)	$M^1L^1T^{-2}A^{-2}$

Choose the correct answer from the options given below

(27 Jul 2021 | Shift 2)

- (A) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i) (B) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)
 (C) (a) $\rightarrow$ (iv), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iii), (d) $\rightarrow$ (i) (D) (a) $\rightarrow$ (iv), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

91. 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 $\frac{AD}{B}$ is :

(25 Jul 2021 | Shift 2)

- (A) $[M^0LT^{-1}]$ (B) $[ML^2T^{-3}]$
 (C) $[M^1L^1T^{-2}]$ (D) $[M^2L^2T^{-3}]$

92. 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 : (20 Jul 2021 | Shift 2)

- (A) $[t^{-1}v^1l^{-2}]$ (B) $[t^1v^2l^{-1}]$
(C) $[t^{-2}v^{-1}l^1]$ (D) $[t^{-1}v^{-2}l^1]$

93. In a typical combustion engine the workdone by a gas molecule is given by $W = \alpha^2 \beta e^{-\frac{\beta x^2}{kT}}$, 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 : (26 Feb 2021 | Shift 1)

- (A) $[M^0LT^0]$ (B) $[MLT^{-1}]$
(C) $[MLT^{-2}]$ (D) $[M^2LT^{-2}]$

94. If 'C' and 'V' represent capacity and voltage respectively then what are the dimensions of λ where $C/V = \lambda$? (26 Feb 2021 | Shift 2)

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

95. 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 : (25 Feb 2021 | Shift 1)

- (A) (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i) (B) (a) $\rightarrow$ (i), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (iii)
(C) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i) (D) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

96. The physical quantities not having same dimensions are (26 Apr 2003 | Single sitting)

- (A) torque and work (B) momentum and Planck's constant
(C) stress and Young's modulus (D) speed and $(\mu_0\epsilon_0)^{-1/2}$

97. If e is the electronic charge, c is the speed of light in free space and h is Planck's constant, the quantity $\frac{1}{4\pi\epsilon_0} \frac{|e|^2}{hc}$ has dimensions of : (25 Feb 2021 | Shift 2)
- (A) $[MLT^{-1}]$ (B) $[MLT^0]$
 (C) $[M^0L^0T^0]$ (D) $[LC^{-1}]$
-
98. 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 dimensions of β will be : (24 Feb 2021 | Shift 1)
- (A) $[M^0LT^0]$ (B) $[ML^2T^{-2}]$
 (C) $[MLT^{-2}]$ (D) $[M^2LT^2]$
-
99. Assume that the displacement(s) of air is proportional to the pressure difference (Δp) created by a sound wave. Displacement (s) further depends on the speed of sound (v), density of air (ρ) and the frequency (f). If $\Delta p \sim 10$ Pa, $v \sim 300$ m/s, $\rho \sim 1$ kg/m³ and $f \sim 1000$ Hz, then s will be of the order of (take the multiplicative constant to be 1) : (5 Sept 2020 | Shift 1)
- (A) 1 mm (B) $\frac{3}{100}$ mm
 (C) 10 mm (D) $\frac{1}{10}$ mm
-
100. The quantities $x = \frac{1}{\sqrt{\mu_0\epsilon_0}}$, $y = \frac{E}{B}$ and $z = \frac{l}{CR}$ are defined where C -capacitance, R -Resistance, l -length, E -Electric field, B -magnetic field and ϵ_0 , μ_0 , - free space permittivity and permeability respectively. Then : (5 Sept 2020 | Shift 2)
- (A) Only y and z have the same dimension (B) x , y and z have the same dimension
 (C) Only x and y have the same dimension (D) Only x and z have the same dimension
-
101. Dimensional formula for thermal conductivity is (here K denotes the temperature): (4 Sept 2020 | Shift 1)
- (A) $MLT^{-3}K^{-1}$ (B) $MLT^{-2}K^{-2}$
 (C) $MLT^{-2}K$ (D) $MLT^{-3}K$

102. A quantity x is given by $\left(\frac{IFv^2}{WL^4}\right)$ 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 :
(4 Sept 2020 | Shift 2)
- (A) Coefficient of viscosity
(B) Force constant
(C) Energy density
(D) Planck's constant
-
103. 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 :
(3 Sept 2020 | Shift 2)
- (A) MLT^{-2}
(B) ML^0T^{-3}
(C) $M^2L^0T^{-1}$
(D) ML^2T^{-2}
-
104. If speed V , area A and force F are chosen as fundamental units, then the dimension of Young's modulus will be
(2 Sept 2020 | Shift 1)
- (A) $FA^{-1}V^0$
(B) FA^2V^{-1}
(C) FA^2V^{-2}
(D) FA^2V^{-3}
-
105. If momentum (P), area (A) and time (T) are taken to be the fundamental quantities then the dimensional formula for energy is
(2 Sept 2020 | Shift 2)
- (A) $[P^2AT^{-2}]$
(B) $[P^{\frac{1}{2}}AT^{-1}]$
(C) $[PA^{\frac{1}{2}}T^{-1}]$
(D) $[PA^{-1}T^{-2}]$
-
106. 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 :
(9 Jan 2020 | Shift 1)
- (A) Energy
(B) Momentum
(C) Area
(D) Volume
-
107. The dimension of stopping potential V_0 in photoelectric effect in units of Planck's constant ' h ', speed of light ' c ' and Gravitational constant ' G ' and ampere A is :
(8 Jan 2020 | Shift 1)
- (A) $h^{1/3} G^{2/3} c^{1/3} A^{-1}$
(B) $h^0 c^5 G^{-1} A^{-1}$
(C) $h^{2/3} c^{5/3} G^{1/3} A^{-1}$
(D) $h^2 G^{3/2} c^{1/3} A^{-1}$

108. The dimension of $\frac{B^2}{2\mu_0}$, where B is magnetic field and μ_0 is the magnetic permeability of vacuum, is : (7 Jan 2020 | Shift 2)

- (A) ML^2T^{-2} (B) MLT^{-2}
(C) $ML^{-1}T^{-2}$ (D) ML^2T^{-1}
-

109. Which of the following combinations has the dimension of electrical resistance (ϵ_0 is the permittivity of vacuum and μ_0 is the permeability of vacuum)? (12 Apr 2019 | Shift 1)

- (A) $\sqrt{\frac{\epsilon_0}{\mu_0}}$ (B) $\frac{\epsilon_0}{\mu_0}$
(C) $\sqrt{\frac{\mu_0}{\epsilon_0}}$ (D) $\frac{\mu_0}{\epsilon_0}$
-

110. The number density of molecules of a gas depends on their distance r from the origin as, $n(r) = n_0 e^{-\alpha r^4}$. Then the total number of molecules is proportional to :

(12 Apr 2019 | Shift 2)

- (A) $n_0 \alpha^{-3/4}$ (B) $n_0 \alpha^{-3}$
(C) $n_0 \alpha^{1/4}$ (D) $\sqrt{n_0} \alpha^{1/2}$
-

111. In the formula $X = 5YZ^2$, X and Z have dimensions of capacitance and magnetic field, respectively. What are the dimensions of Y in SI units? (10 Apr 2019 | Shift 2)

- (A) $[M^{-3}L^{-2}T^8A^4]$ (B) $[M^{-2}L^{-2}T^6A^3]$
(C) $[M^{-1}L^{-2}T^4A^2]$ (D) $[M^{-2}L^0T^{-4}A^{-2}]$
-

112. In SI units, the dimensions of $\sqrt{\frac{\epsilon_0}{\mu_0}}$ is :

(8 Apr 2019 | Shift 1)

- (A) $A^{-1} TML^3$ (B) $A^2T^3M^{-1}L^{-2}$
(C) $AT^{-3}ML^{3/2}$ (D) $AT^2M^{-1}L^{-1}$
-

113. If surface tension (S), Moment of inertia (I) and Planck's constant (h), were to be taken as the fundamental units, the dimensional formula for linear momentum would be :-

(8 Apr 2019 | Shift 2)

- (A) $S^{1/2}I^{1/2}h^0$ (B) $S^{3/2}I^{1/2}h^0$
(C) $S^{1/2}I^{1/2}h^{-1}$ (D) $S^{1/2}I^{3/2}h^{-1}$
-

114. Let ℓ , r , C and V represent inductance, resistance, capacitance and voltage, respectively. The dimension of $\frac{\ell}{rCV}$ in SI units will be : (12 Jan 2019 | Shift 2)

- (A) $[A^{-1}]$ (B) $[LTA]$
(C) $[LA^{-2}]$ (D) $[LT^2]$

115. The force of interaction between two atoms is given by $F = \alpha\beta \exp\left(-\frac{x^2}{\alpha kt}\right)$; where x is the distance, k is the Boltzmann constant and T is temperature and α and β are two constants. The dimension of β is : (11 Jan 2019 | Shift 1)

- (A) $M^2L^2T^{-2}$ (B) M^2LT^{-4}
(C) MLT^{-4} (D) $M^0L^2LT^{-4}$

116. If speed (V), acceleration (A) and force (F) are considered as fundamental units, the dimension of Young's modulus will be: (11 Jan 2019 | Shift 2)

- (A) $V^{-2}A^2F^2$ (B) $V^{-4}A^{-2}F$
(C) $V^{-4}A^2F$ (D) $V^{-2}A^2F^{-2}$

117. Expression for time in terms of G (universal gravitational constant), h (Planck constant) and c (speed of light) is proportional to : (9 Jan 2019 | Shift 2)

- (A) $\sqrt{\frac{hc^5}{G}}$ (B) $\sqrt{\frac{c^3}{Gh}}$
(C) $\sqrt{\frac{Gh}{c^5}}$ (D) $\sqrt{\frac{Gh}{c^3}}$

118. The characteristic distance at which quantum gravitational effects are significant, the Planck length, can be determined from a suitable combination of the fundamental physical constants G , h and c . Which of the following correctly gives the Planck length ? (15 Apr 2018 | Shift 2)

- (A) $G \hbar^2 c^3$ (B) $G^2 \hbar c$
(C) $G^{1/2} \hbar^2 c$ (D) $\left(\frac{G\hbar}{c^3}\right)^{1/2}$

119. Time (T), velocity (C) and angular momentum (h) are chosen as fundamental quantities instead of mass, length and time. In terms of these, the dimensions of mass would be :

(8 Apr 2017 | Shift 1)

- (A) $[M] = [T^{-1} C^{-2} h]$ (B) $[M] = [T^{-1} C^2 h]$
(C) $[M] = [T^{-1} C^{-2} h^{-1}]$ (D) $[M] = [T C^{-2} h]$
-

120. A, B, C and D are four different physical quantities having different dimensions. None of them is dimensionless. But we know that the equation $AD = C \ln(BD)$ holds true. Then which of the combination is **not** a meaningful quantity ?

(10 Apr 2016 | Shift 1)

- (A) $A^2 - B^2 C^2$ (B) $\frac{(A - C)}{D}$
(C) $\frac{A}{B} - C$ (D) $\frac{C}{BD} - \frac{AD^2}{C}$
-

121. In the following 'I' refers to current and other symbols have their usual meaning. Choose the option that corresponds to the dimensions of electrical conductivity :

(9 Apr 2016 | Shift 1)

- (A) $ML^{-3} T^{-3} I^2$ (B) $M^{-1} L^3 T^3 I$
(C) $M^{-1} L^{-3} T^3 I^2$ (D) $M^{-1} L^{-3} T^3 I$
-

122. A beaker contains a fluid of density ρ kg/m³, specific heat S J/kg°C and viscosity η . The beaker is filled up to height h . To estimate the rate of heat transfer per unit area (Q/A) by convection when beaker is put on a hot plate, a student proposes that it should depend on η , $(S\Delta\theta/h)$ and $(1/\rho g)$ when $\Delta\theta$ (in °C) is the difference in the temperature between the bottom and top of the fluid. In that situation the correct option for (Q/A) is

(11 Apr 2015 | Single slot)

- (A) $\eta(S\Delta\theta/h)$ (B) $\eta(S\Delta\theta/h)(1/\rho g)$
(C) $(S\Delta\theta/\eta h)(1/\rho g)$ (D) $S\Delta\theta/(\eta h)$
-

123. If electronic charge, electron mass m_e , speed of light in vacuum and Planck's constant are taken as fundamental quantities, the permeability of vacuum μ can be expressed in units of

(11 Apr 2015 | Single slot)

- (A) $((mc^2)/(he^2))$ (B) ()
(C) () (D) ()
-

124. If the capacitance of a nanocapacitor is measured in terms of a unit u , made by combining the electronic charge e , Bohr radius a_0 , Planck's constant h and speed of light then c (10 Apr 2015 | Single slot)

(A) $u = (e^2 a_0)/(hc)$

(B) $u = (hc)/(e^2 a_0)$

(C) $u = (e^2 c)/(h a_0)$

(D) $u = (e^2 h)/(c a_0)$

125. From the following combinations of physical constants (expressed through their usual symbols) the only combination, that would have the same value in different systems of units, is (12 Apr 2014 | Single slot)

(A) $(ch)/(2\pi\epsilon_0)$

(B) $(e^2)/(2\pi\epsilon_0 G m^2)$

(C) $(\mu_0 \epsilon_0)/(c^2)(G)/(h e^2)$

(D) $(2\pi\mu_0)/(c e^2)(\epsilon_0)/(\sqrt{\mu\epsilon})(h)/(G)$

126. In terms of resistance and time, the dimensions of ratio $R T(\mu)/(2\epsilon T)$ of the permeability and permittivity is: $\mu\epsilon$ (11 Apr 2014 | Single slot)

(A) $[R T - 2]$

(B) $[R - 1]$

(C) $[R^2]$

(D) $[R^2 T^2]$

127. A metal sample carrying a current along X -axis with density J_x is subjected to a magnetic field B_z (along z -axis). The electric field E_y developed along y -axis is directly proportional to J_x as well as B_z . The constant of proportionality has SI unit (25 Apr 2013 | Single slot)

(A) $(m^2)/(A)$

(B) $(m^3)/(As)$

(C) $(m^2)/(As)$

(D) $(As)/(m^3)$

128. If the time period of the oscillation of a drop of liquid of density ρ , radius r , vibrating under surface tension σ is given by the formula $t = \sqrt{r^2 \sigma / \rho g}$. It is observed that the time period is directly proportional to $\sqrt{d}/(s)$. The value of d should therefore be: b (23 Apr 2013 | Single slot)

(A) $(3)/(4)$

(B) $\sqrt{3}$

(C) $(3)/(2)$

(D) $(2)/(3)$

129. Let $[\epsilon_0]$ denote the dimensional formula of the permittivity of vacuum. If M = mass, L = length, T = time and A = electric current, then: (7 Apr 2013 | Single sitting)

(A) $\epsilon_0 = [M^{-1} L^{-3} T^2 A]$

(B) $\epsilon_0 = [M^{-1} L^{-3} T^4 A^2]$

(C) $\epsilon_0 = [M^1 L^2 T^1 A^2]$

(D) $\epsilon_0 = [M^1 L^2 T^1 A]$

- 130.** The dimensions of angular momentum, latent heat and capacitance are, respectively
(22 Apr 2013 | Single slot)
- (A) $ML^2 T^{-1} A^2$, $L^2 T^{-2}$, $M^{-1} L^{-2} T^2$ (B) $ML^2 T^{-2}$, $L^2 T^2$, $M^{-1} L^{-2} T^4 A^2$
(C) $ML^2 T^{-1}$, $L^2 T^{-2}$, $ML^2 T A^2$ (D) $ML^2 T^{-1}$, $L^2 T^{-2}$,
 $M^{-1} L^{-2} T^4 A^2$
-
- 131.** The electrical resistance of a conductor of length and area of cross section is given by $R = \rho l / a$ where ρ is the electrical resistivity. What is the dimensional formula for electrical conductivity σ which is reciprocal of resistivity? (26 May 2012 | Single slot)
- (A) $[M^{-1} L^{-3} T^3 A^2]$ (B) $[ML^{-3} T^{-3} A^2]$
(C) $[ML^3 T^{-3} A^{-2}]$ (D) $[M^{-2} L^3 T^2 A^{-1}]$
-
- 132.** Given that K = energy, V = velocity, T = time. If they are chosen as the fundamental units, then what is dimensional formula for surface tension? (7 May 2012 | Single slot)
- (A) $[KV^{-2} T^{-2}]$ (B) $[K^2 V^2 T^{-2}]$
(C) $[K^2 V^{-2} T^{-2}]$ (D) $[KV^2 T^2]$
-
- 133.** The dimension of magnetic field in M , L , T and C (coulomb) is given as
(27 Apr 2008 | Single sitting)
- (A) $MLT^{-1}C^{-1}$ (B) MT^2C^{-2}
(C) $MT^{-1}C^{-1}$ (D) $MT^{-2}C^{-1}$
-
- 134.** Which of the following units denotes the dimension $\frac{ML^2}{Q^2}$, where Q denotes the electric charge?
(30 Apr 2006 | Single sitting)
- (A) Wb/m^2 (B) Henry (H)
(C) H/m^2 (D) Weber (Wb)
-
- 135.** Out of the following pair, which one does NOT have identical dimensions is
(8 May 2005 | Single sitting)
- (A) angular momentum and Planck's constant (B) impulse and momentum
(C) moment of inertia and moment of a force (D) work and torque

136. Which one of the following represents the correct dimensions of the coefficient of viscosity? (23 May 2004 | Single sitting)

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

(B) MLT^{-1}

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

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

137. Dimensions of $\frac{1}{\mu_0 \epsilon_0}$, where symbols have their usual meaning, are

(26 Apr 2003 | Single sitting)

(A) $[L^{-1}T]$

(B) $[L^{-2}T^2]$

(C) $[L^2T^{-2}]$

(D) $[LT^{-1}]$

138. Identify the pair whose dimensions are equal

(19 May 2002 | Single sitting)

(A) torque and work

(B) stress and energy

(C) force and stress

(D) force and work